Soil Block Presses

by Kiran Mukerji

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Kiran Mukerji

Soil Block Presses
SOIL BLOCK PRESSES
Report on a Global Survey

Prepared on behalf of

German Appropriate Technology Exchange
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## CONTENTS

1. INTRODUCTION 1

2. PREPARING THIS REPORT 2
   2.1 Bibliographical Research 2
   2.2 Correspondence 2
   2.3 Personal Contacts 2
   2.4 General 2

3. RESULTS OF THE STUDY 5
   3.1 Notes on Some Institutions 5
   3.1.1 GATE, Eschborn 5
   3.1.2 IRB, Stuttgart 5
   3.1.3 DESWOS, Kaiserslautern 6
   3.1.4 Gesamthochschule Kassel 6
   3.1.5 Institut Lehmembau, Weil-Beuernbach 6
   3.1.6 AVM, Russelsheim 6
   3.1.7 ITDG, London and Rugby 6
   3.1.8 Building Research Station, Garston 9
   3.1.9 GRET, Paris 9
   3.1.10 CRATerre, Eybens (Grenoble) 9
   3.1.11 Centre de Terre, Lavalette (Toulouse) 10
   3.1.12 SKAT, St. Gall 11
   3.1.13 ETH-Hönggerberg, Zurich 11
   3.1.14 IFEC, Washington, D.C. 11
   3.1.15 AT International, Washington, D.C. 11
   3.1.16 CTA, Asunción 12
   3.1.17 ADAUA, Ouagadougou 12
   3.1.18 UST, Kumasi 12
   3.1.19 HRDU, Nairobi 12
   3.1.20 CBRI, Roorkee 14
   3.1.21 ASTRA, Bangalore 14

3.2 Summary of Soil Block Presses 15
   3.2.1 Currently available presses, with details in Annex A 16
   3.2.2 Currently available presses, without further details 20
   3.2.3 Industrial factory based plants 21
   3.2.4 Soil block presses, which are not being produced anymore 21

3.3 Soil Block Presses Past and Present 37
   3.3.1 Building with earth 37
   3.3.2 Development of soil block presses 37
   3.3.3 General aspects of producing compressed soil blocks 38

ANNEXES 41
   A. Soil Block Presses 41
   B. Addresses 121
   C. Bibliography 127
   D. Reply Form 129
INTRODUCTION

During the past 5 - 10 years, there has been a rapid increase of interest in soil construction technologies in most parts of the world - particularly in developing countries. Consequently, the various appropriate technology (AT) information centres, including GATE, have been receiving a growing number of requests for information on this subject. Within this field, an area of special interest has been the production of compressed soil blocks, directly on the building site.

Most AT organizations and research institutions dealing with soil technologies have a collection of information on soil block presses, but it appears that no comprehensive study on these machines exists so far. Thus, it is largely a matter of chance, whether or not the required information on soil block presses can be provided by the institution asked.

In order to achieve more clarity on this issue, GATE decided to conduct a global survey of easily transportable or mobile soil block presses. The aim is to prepare a document, which will be distributed to AT and research institutions around the world, or sent upon request to interested parties in developing countries and all those involved in development activities.

This report represents a first stage of the survey. It was prepared by evaluating all the literature in the GATE library and some of a few other institutions in Europe. Additional material was accumulated through extensive correspondence with institutions and manufacturers of block presses, in various countries. The result of this work, documented in this report, constitutes the basis for the final publication, which, hopefully, will be more complete and up-to-date. This document is, therefore, being circulated to all the addresses listed in Annex B (and to a limited number of institutions on request), with a view to receiving comments and further information, which could be of use in preparing the final publication. In connection with this, GATE kindly requests all correspondence to be conducted directly with the author, whose address is given on the title page.

It is hoped that the information given in this study, will help to activate further interest in soil construction technology and provide potential builders with the means of finding the most appropriate block-making machines. As far as possible, all sources of information and addresses have been given, and cross-references have been made in the text and charts, wherever appropriate, so that anyone can carry out further investigations, if necessary.

Several recipients of this report have either directly or indirectly contributed literature, illustrative material, comments and the like, for which the author wishes to express his sincere thanks. Without this interchange of information and ideas, no reasonable work can be done on a project of this kind. The preparation of this document must, therefore, be viewed as a joint international effort, from which, hopefully, a great many people will benefit - most of all, the local house-builder, who is thus able to find the most appropriate soil block press.
Town hall on the Isle of Mayotte, built with stabilized soil blocks, by CRAterre, Grenoble. Photo: Jurgen Schneider (Bibl. 54)
PREPARING THIS REPORT

The main object of this study was to collect information. This was implemented by three means:

- bibliographical research,
- extensive correspondence,
- personal visits to institutions, block press manufacturers and experts in Germany, England and Switzerland.

The work was carried out in the course of four months, which is a relatively short period for a global survey. Nevertheless, with the encouraging response that was received from all sides, it was possible to collect a great deal more material, than was originally expected.

2.1 Bibliographical Research

A fairly intensive study of all available literature on soil construction and related appropriate technologies was necessary, in order to find out, where requests for information would be most effective. This required visits to the libraries of universities, information centres, research and development organizations, as well as to AT institutions. As was expected, this last group had the most useful literature to offer. Visits to bookshops and the author’s own collection of literature provided further sources of information.

Studying the better-known standard literature on soil construction, one tends to get the impression that there are only about 15 - 20 types of soil block presses. However, conference proceedings, AT journals, bulletins from research institutions and similar publications, which are not usually easy to get, brought to light quite a few more types of machines. But, in most cases, the information obtained was insufficient, so that contacts with the developer or manufacturer were necessary, in order to obtain more details.

2.2 Correspondence

Well over 100 letters, requesting information, were sent out to AT institutions, research and development organizations and manufacturers of soil block presses throughout the world. The addresses were mainly selected on the basis of references found in the literature studied. Further addresses emerged from several replies, so that writing letters became a major feature of the project and is still continuing, while this report is being written.

Two requirements needed to be fulfilled:

- firstly, to achieve a high rate of response, and
- secondly, to receive the replies in time to incorporate them into the report.

In order to generate greater interest in the survey, and consequently more readiness to reply, the letters were written on the following basis:

- As far as possible, each letter was written individually, taking into account the special activities, experiences, publications, products of the address. Many years of experience have shown that circular letters or general questionnaires usually tend to remain unanswered - for understandable reasons.

  - Each request for information was accompanied by a short explanatory note from GATE, in order to underline the official nature of the survey.

  - Since no help should be expected without an adequate reciprocation, the author offered to be of assistance, in any way desired, in return for information and comments received. The refund of any costs incurred, was also offered. And in various cases, these offers were accepted.

The problem of receiving replies in time to evaluate the information and use it for the report, was not solved, although the requests indicated the urgency. The overall response was about 50 %, while replies from European countries exceeded 60 %, those from North and South America were in the region of 40 %, and those from Africa and Asia remained below 30 %. Nevertheless, most of the replies contained valuable information and have thus helped to complete this fairly comprehensive study.

Correspondence will hopefully continue on account of the interest that this document is expected to generate. Readers are requested to send any appropriate information, comments or criticisms to the author's address, so these will help to compile a more complete and useful study in the final stage.

2.3 Personal Contacts

As far as the financial resources and limited time permitted, every opportunity was taken to speak to experts, either by telephone calls or personal visits. No other means of communication can be more effective, as it not only helps to break the barriers of anonymity, which allow a freer exchange of views, but also saves a great deal of time, since it avoids lengthy correspondence, by receiving answers to questions immediately. In the case of personal visits, processes and equipment can be demonstrated, photographs can be taken and useful literature or samples of material can be handed over.

2.4 General

Since the collection of material largely depended on what happened to be available in libraries, or what was sent in response to the author’s requests, as also on manufacturers’ pamphlets and personal visits of experts, a value judgement of the soil block presses, mentioned in this study, was not permissible. Thus, the summary of soil block presses (Section 3.2) contains all the types of machines, that were identified so far, even if minor similarities may be noted amongst some of them. However, in most cases, it is just the technical principle that is the same, while the technical details are
differ substantially, according to certain specific local requirements and individual ideas of the respective designers.

It is, therefore, extremely useful to include machines that resemble each other, and to point out, in which way they actually differ. This gives those who propose to buy or construct a press of their own, a means to find the most appropriate design for their particular needs. It also helps them to find the supplier located closest to them, so that the costs of transportation can be kept as low as possible.

In the proposed final GATE document on soil block presses, which will incorporate all the responses generated by this report, the aim will be to provide the information and technical data, according to a uniform system, such that comparisons will be possible, to a certain extent, and a reasonable value judgement can be made, according to the reader's own criteria.

Prior to this final study, however, GATE is considering preparing information leaflets (called "Product Information: Soil Block Presses") on a few selected machines that have been tested in the field and found worthy of further recommendation. Therefore, personal opinions, positive or negative experiences in the use of soil block presses will be greatly valued. The reply form at the end of this report can be used for this purpose, or any other appropriate form of communication.
3.1 Notes on Some Institutions

As mentioned in the previous section, several institutions throughout the world were identified and contacted, although not all of them responded, or were able to contribute towards the preparation of this report. Some of them, however, are of special interest in the context of this study, which is why a few comments and general information on them are given below.

3.1.1 GATE; Eschborn

The activities of GATE in the field of soil technology mainly include housing and research projects in some developing countries, as well as the publication of relevant literature and dissemination of experiences of the GATE staff and of information, which has been collected in the GATE documentation department. Housing projects, that involve soil technologies have been implemented in some Latin American countries, of which one example, namely in El Salvador, is described in a GATE publication (Bibl. 21). Research projects, in which soil techniques were investigated, were undertaken, for example, in Guatemala, in connection with low-cost, earthquake-resistant roofing (Bibl. 41), and in Kenya, with a view to applying the local Lateritic soils for low cost housing. A detailed manual on the construction of a soil block stove (CINVA-Ram Type), used in Cameroon, was also published by GATE (Bibl. 33), and is included in Section 3.2: Summary of Soil Block Presses (CENEDA Press).

On account of its extensive international contacts, the GATE "Question and Answer Service" had accumulated a pile of information on various known soil block presses. The potential "marketing of the "marketing capital", which helped the author to save a good deal of time and effort for preliminary investigations.

Further useful information was gathered in the GATE project documentation section, which has a large collection of standard literature, various journals, project working papers and confidential reports, on all aspects of appropriate technologies for developing countries. However, a computer search through the various data banks, to which GATE has access, disappointingly brought forward only few insignificant references.

3.1.2 IRB, Stuttgart

The "Informationzentrum RAUM und BAU", which is one of 25 institutions of the Fraunhofer-Gesellschaft, a semi-governmental organisation, is perhaps the biggest German documentation centre on all regional planning and architectural issues. Apart from a large
I/ dnal dhvelopment'of housing co-operatives, particularly (with very few exceptions) only in

1. mentioned that the soil block houses, which were built in El Salvador (1978 - 79) as part of concrete blocks. Furthermore, Mr. Wegener, buildings tend to become as expensive as conventional structures, made of burnt bricks or concrete blocks. Furthermore, Mr. Wegener, mentioned that the soil block houses, which were built in El Salvador (1978 - 79) as part of a GATE project, have caused considerable dissatisfaction amongst the dwellers.

(Author’s note: This attitude can be observed quite frequently, but need not apply to all situations. There are sufficient examples of successful soil construction projects in all parts of the world. In some parts of the USA and Europe, earth buildings are valued for their living comfort and environmental appropriateness. As this awareness spreads to other regions, and construction techniques are improved, the poorer population of the Third World will be more inclined to accept soil building.)

3.1.4 Gesamthochschule Kassel

The Research Laboratory for Experimental Building, at Kassel University, which is headed by Ing. Gerhard Minke, has been conducting intensive research on soil-technologies since the mid-1970s. A number of prototype structures, employing a variety of old as well as newly developed techniques, have been built in Germany and overseas, all of which are well documented, though unfortunately (with very few exceptions) only in German. Professor Minke also publishes a kind of periodical (which appears irregularly, roughly twice a year), called “Bauen mit Lehmm” (Building with Soil), which features new developments and project reports on soil constructions, mainly in Germany.

On account of the long experience in soil technology at Kassel University, practical courses (usually of 6 days duration) are held regularly, which are always well attended by architects, masons, students, even from other faculties. But apart from research and training, building with soil has found its way into the large housing scheme of 600 houses, for which Professor Minke is mainly responsible.

3.1.5 Institut Lehmbau, Weil-Buehrbach

The non-profit Soil Building Institute was founded in 1982 by Roger Krotz, a sculptor, soil building specialist, and lecturer at Hanover University, after about 5 years of active research and development work on the various uses of adobe for housing projects such as an old farm house in Weil-Buehrbach in 1983. The members are a group of independent experts, mainly architects, and their aims include the promotion of soil technologies in Germany, provision of advisory services and project implementation. These activities will shortly be extended to overseas development aid projects. A great deal of experimental work is being undertaken, some specialized building materials, furniture, as well as interior decorations and renovatios with soil. Short training courses on various themes, eg walls, domes, ovens, are held very frequently and constitute the main activities of the institute. These are sometimes held outside Germany, so that inspirations can be derived from other environments and cultural influences. The regular exchange of information, experiences and views with other experts in Europe and overseas is another major function of the institute, which organizes annual meetings of soil experts, in a different place each time.

3.1.6 AVM, Ruesseleheim

The Metalwork Training Centre (Ausbildungszentrum Metall), in Ruesseleheim, has little to do with developing countries, but was recently asked by GATE to produce four CINVA-Ram type soil block presses, according to the GATE manual of the CENEEMA Press from Cameroun (1981, 25). Two of them are now being used on some overseas projects. These are probably the first CINVA-Ram type presses to be built in Germany, and some modifications were made so that they meet the standards. It is pleasing to note, that this expertise for trainers had a very direct practical use for a development project in the Third World - a model that could be incorporated in many other training programs.

3.1.7 ITDG, London and Rugby

The Intermediate Technology Development Group, whose head-offices are in London (formerly in Rugby, since 1 January 1985). Only IT Publications and the Bookshop, together with three smaller units, have remained in the London office.

Soil technologies are presently not a special area of activity of ITDG, but information is being collected, as far as possible. The author was able to meet Michael Parkes, who is in charge of the building materials section, and Tony Bullard, for a discussion. With a few reorganizations within ITDG, new ideas and strategies are to be expected soon. A lot of useful information was found in the ITDG documentation files. Further information was purchased at the bookshop in London, but the choice of books dealing with soil construction is rather limited.
7 Aufbringen eines Lehmpates


8 Anbringung einer Lehmschleppe


Anmerkungen

1 Leitung der Kurse und theoretische Einführung: Prof. Dr.-Ing. Gerhard Hohe

2 Praktische Betreuung: Dipl.-Ing. Günter zur Meeden

3 Organisation: Dipl.-Ing. Helmut Nies

4 Sekretariat: Ulfried Luders

5 Anmeldung und Anfragen: Ulfried Luders

Menzelsstr. 1, 3500 Kassel
Tel.: 0561/304 5110

Excerpt from the first issue of Gerhard Hinkel's journal on "Building with Soil" (Bibl. 38).
The experimental building which was constructed in 1956. The photograph was taken in October 1965.

Detail view of the experimental collab building, showing different weather treatments. The front corner has been left untreated, but will take relatively good condition after several years of exposure.

Current laboratory tests with stabilized soil blocks which were made with the BREPAK machine. Each block sample has a different combination of soil and binder. In the picture: John Roome, who is in charge of these tests.

David Webb demonstrating the BREPAK Block Clamp, with which heavy blocks can be easily carried with two hands and placed accurately in masonry construction, producing perfectly uniform joints. (See page 81.)
3.1.8 Building Research Station, Garston

This research institute, which was founded in 1921, probably has the longest experience in tropical building research. It is interesting to note that, as early as 1950, an experimental building constructed of soil-cement bricks was erected on the site. It has been in use as a store, and has satisfactorily withstood the cold-humid English climate, without special care. However, the first layers of bricks up to damp-proof course level consisted of fired clay bricks, giving the walls good moisture protection. The walls were divided into sections, partly solid and partly cavity-brickwork, with a variety of surface finishes and renderings, most of which gave the walls good moisture protection.

Stabilized soil constructions are being investigated and developed more intensively over the past decade, mainly under the responsibility of David Webb, internationally one of the leading experts in this field. He also designed the BREPAK soil block press and other useful devices. Together with his colleague, Ray Smith, he has just completed a monograph on the production of stabilized soil blocks, which will be published by the International Labour Office, Geneva, as one of three technical memoranda on building materials for low-cost housing within their Technology Series. The assistance that these two experts gave the author was invaluable.

It is also worth mentioning that Mr. Webb is a member of the working party on Laterite Based Materials (LBM), which was initiated by KIITEM (International Union of Testing and Research Laboratories for Materials and Structures), Paris, in January 1983, to prepare international guidelines on laterite technology. Furthermore, he is involved in the updating of the British Standard (BS 1924) on "Methods of Testing Stabilized Soils".

3.1.9 GRET, Paris

The Technological Research and Exchange Group, which was established in 1976, aims to collect available documentation on different technologies and to promote the diffusion of information through its Question/Answer Service. GRET's publications include several hundred technical development leaflets, books, studies and technical files covering a variety of disciplines, and a bimonthly bulletin, "RESEAUX - la lettre du GRET".

In August 1985, GRET published a "Dossier Presses d'Argiles," which contained information on 16 soil block presses. This was probably the most comprehensive and up-to-date compilation done by an appropriate technology institution. It had to rely mainly on photocopied material from other sources, such that some illustrations are not easily distinguishable. Nevertheless, it contained information on 6 brick presses, and happily also the manufacturer's address, which the author had not come across before. This was a good example of how valuable the work of an AT institution can be for a study of this kind.

3.1.10 CRATerre, Eybens (Grenoble)

The members of the Centre for Research and Application on Earth Construction Technology are among the most experienced soil experts. Apart from research and training courses, which are conducted at the Grenoble School of Architecture (UPAG), the group has implemented numerous soil building projects and studies, not only in France, but also in many French-speaking African countries, as well as Mexico and Peru. They are presently the technical advisors of the largest single soil building project in Europe, comprising 64 houses, located at Isle d'Abeau (between Lyon and Grenoble).
The members of CEA Terre have designed and constructed two soil block presses, "La Palatina" and "CEA Terre Press," and published several monographs, handbooks, and articles on soil technologies. One of these, "Construire en Terre" (Building with Earth), is certainly one of the most attractive and complete publications on the subject, but unfortunately only available in French. The lack of such books has been the main obstacle in getting the book translated into English.

Judging from this book, CEA Terre seems to possess the most comprehensive documentation on soil technologies. The book also contains the largest number of references to soil block presses, but without details and addresses. It was, however, disappointing that a direct request for these was not complied with by CEA Terre.

3.1.11 Centre de Terre, La Valette (Toulouse)

This centre for research, demonstration and documentation of soil building techniques was founded in 1979 as a private initiative, by Joseph Colasse, an architect and soil building enthusiast. One of his specialties is to introduce artistic forms in soil-cement masonry structures, and to carve out ornamental shapes in finished walls. The architectural firm, called ARCHICO, is responsible for the design and construction of over 100 soil buildings in Southern France.

The Centre de Terre also incorporates a firm, called SOLEY, which develops soil block presses (TOP-System, ECO-10, GEO-390) to produce the soil-cement blocks for ARCHICO's projects.

Photos from ARCHICO, Centre de Terre

Top : View of the centre in La Valette, with some unconventional details of the facade and courtyard.

Left : Soil block production unit ("Leudae Tunnel"). With which the centre makes its own building material.

Below : Examples of ARCHICO's projects: two "bioclimatic" houses built in and around Toulouse, Southern France.
3.1.12 SKAT, St. Gall

As a subsection of the Institute for Latin-American Research and Development Cooperation at the University of St. Gall, the Swiss Centre for Appropriate Technology was established in 1978. However, it does not deal only with Latin America, but with the entire Third World. The activities of SKAT are manifold: consultancy, project implementation, feasibility studies, question/answer service, documentation, publications, monographs, working papers, etc., book-sales, conferences, seminars and cooperation with other AT organizations.

Of all the information centers visited by the author, the SKAT documentation was found to be the most complete, and consequently, most useful. It is also of great advantage that many of the books in the library can be purchased directly from SKAT.

Various issues of mutual interest were also discussed with Dr. Urs Heierli, Managing Director of SKAT. Since a few soil block pressing projects are being conducted in Switzerland, SKAT has been involved in their assessment, on behalf of the Swiss government. They also prepared a working paper on "Soil block Making Equipment" (Bibl. 37). Dr. Heierli agrees with some of the author's suggestions, as a result of which the study of these machines would be very valuable, in view of the growing demand in all parts of the world and the increasing choice of equipment. He also feels that it would be especially beneficial for all those involved in low cost housing, if a number of AT development and research institutions would coordinate their activities, in testing as many machines and systems as possible under field conditions, and exchanging test results and experiences. There is no doubt that this suggestion deserves further consideration, especially amongst development and organizations.

3.1.13 ETH-Engeggiweg, Zurich

At the Institute for Building Technology of the Swiss Technical University, intensive research is being undertaken on soil based materials. In charge of these investigations is Hans D. Sulzer, assistant professor and technical consultant, who designed and built a manually-operated soil block press (SATURNIA), which greatly simplifies handling and produces uniform, good quality bricks at a faster rate than other manual presses.

It is interesting to note that Mr. Sulzer originally planned to construct three more types of presses, to satisfy a variety of differing requirements, but has now given up this idea, on account of insufficient money for his machine and the bricks it produces. The reason is not that the press is less efficient than other known types, but that he has come to the conclusion that the physical properties of soil-cement blocks are superior to those of compressed soil-cement blocks. Although this is difficult to believe, as it contradicts generally accepted views, this has been proved by laboratory tests results. Even with regard to seismic resistance and low-cost housing programs in Nicaragua, and on NUMPA's soil building techniques (24, sym. 30). ATI is currently considering a brick project in Tanzania, where the working performance of several soil block presses will be assessed. If this materializes, it would already be a big step towards the realization of Dr. Heierli's proposal (ref. section 3.1.12: SKAT).
3.1.16 CTA, Asuncion

In 1981, the Centre for Appropriate Technology was established at the Catholic University, under the direction of Dr. Ing. Thomas Giehmann, an expert in the field of non-conventional energy sources in Paraguay. CTA's activities are oriented towards the development of low-cost housing technologies and the utilization of non-conventional energy sources in Paraguay. Within these objectives, soil building techniques represent a major area of research.

Of special interest is the development of a soil block press, which is similar to the CINVA-Ram, but produces three blocks at a time, thus achieving an extremely high rate of production. A demonstration building has been constructed with these soil blocks, at only 30 - 40% of the cost of conventional constructions with burnt bricks. A current 2-year project deals with the improvement of housing in rural areas of Paraguay, with a view to eliminating infestation by a vector, the triatomines, which transmit the dangerous Chagas disease. The results of this work will be of great interest to all tropical and sub-tropical countries of Latin America.

Several technical bulletins and audio-visual material (slides and cassettes) are available from CTA.

3.1.17 ADAUA, Ouagadougou

With its headquarters in the capital of Burkina Faso (formerly Upper Volta), ADAUA is probably the most active group of soil building specialists in Africa. This non-profit Association for the Development of Traditional African Architecture and Urbanism was founded in 1974 in Geneva, Switzerland, but is now entirely run by Africans, and operates mainly in West Africa. The staff includes architects, engineers, social workers, as well as brick-makers and masons. Their main functions are to revive traditional soil building techniques, develop improved systems, train and support local artisans and implement building projects encouraging and guiding low-income families to build their houses themselves.

The principal material used are soil-cement bricks, which are produced on a press, that was invented as far back as 1904, and is still being manufactured in Belgium. ADAUA has perfected the techniques of building vaults and domes, which were rediscovered by Hassan Fathy in Egypt.

3.1.18 UST, Kumasi

The Building and Road Research Institute, at the University of Science and Technology in Kumasi, Ghana, is well-known for its extensive research work and many technical publications on various aspects of soil construction, particularly with lateritic soils. Especially famous is the TEK-Block Press, which was developed in 1970 by the Department of Housing and Planning Research, Faculty of Architecture. This development resulted from experiments undertaken to determine the suitability of the CINVA-Ram for use in Ghana. Since the CINVA-Ram was found to have a few deficiencies, a new block press was designed to overcome them. Until then, not many soil block presses were known, but it seems that the development of the TEK
Settlement in Bamako, Mali

Some impressions of ADIF's work. Photos: Jürgen Schneider (Bibli. 54)

The Pamirian Institute in Ouagadougou, Burkina Faso (Upper Volta)
3.1.20 CBRI, Roorkee

The Central Building Research Institute grew out of a small research unit, established in 1947, by the Indian Council of Scientific and Industrial Research. CBRI is now the largest building research institute on the sub-continent and has a high international reputation. It deals with practically all aspects of housing, building and planning in the context of tropical developing countries, and most of the work is documented in the institute's reports, articles and conference papers.

Soil engineering is one of the institute's main areas of research. Several innovative materials, building components and techniques have resulted from this, e.g. the "sarvatogriha" (house for all), with a vaulted roof, based on the Egyptian technique used by Hassan Fathy. Also hand-operated as well as automatic brick presses have been developed, primarily to produce clay and sand-lime bricks for firing, but which probably are also suitable for making soil-cement bricks.

3.1.21 ASTRA, Bangalore

As a centre for the Application of Science and Technology to Rural Areas, at the Indian Institute of Science, Bangalore, ASTRA has conducted extensive studies on rural building techniques in Southern India, of which soil constructions are, for obvious reasons, the most widespread. Studies of locally available soil block presses revealed deficiencies, which could be eliminated by a modified machine. Such a machine, named ASTRAM, was developed by K.S. Jagadish and B.V. Venkatarama Reddy in 1980 (Bibl.25). After more than four years of field testing, commercial production began in 1985, by the end of which year, 60 machines have been operating in India.

"Sarvatogriha": An experimental low-cost vaulted house built without cement or steel and using no formwork.

Developments of the Central Building Research Institute
3.2 Summary of Soil Block Presses

This section contains all the soil block presses that were identified in the course of the study. They are divided into four groups:

3.2.1 Currently available presses, with details in Annex A
3.2.2 Currently available presses, without further details
3.2.3 Industrial factory based plants
3.2.4 Soil block presses, which are not being produced anymore

As this is the most important part of the study and probably the section that will be consulted most often, pains were taken to make it as accurate, up-to-date and comprehensive as possible. However, no claims are made to completeness, and the correctness of the information depended on the material available when completing the report, none of which being too vague, or possibly outdated.

A few words need to be said about the column on "Average rate of production". The figures do not always correspond to the values given by the manufacturers, who either mention minimum or maximum production rates. Furthermore, each machine has its own range of block size(s), which usually differs from others. On account of the large number of machines listed here, similar devices could be compared with one another; showing that some producers tended to give rather optimistic figures (probably achieved under ideal workshop conditions over short periods), while others estimate the output more modestly. The figures given in the following summary, therefore, represent an attempt to even out these differences, although admittedly, these have been worked out on purely theoretical estimation. The users of this inventory are, therefore, requested to view the column on production rates merely as a guideline.

Truly comparable output rates can only be established by extensive field tests of all the machines under the same conditions. As regards the number of workers mentioned in the list, they generally include one person to prepare the soil mix, in addition to those needed to charge, unload and operate the press. Some manufacturers, however, prefer to include more people for these operations, which is indeed more realistic and appropriate for developing countries.

It is hoped, that the expected response to this study will bring forward more accurate and comparable data; and that the section 3.2.2 (on presses without further details) can be eliminated in the final document.
### Soil Block Presses

<table>
<thead>
<tr>
<th>Model</th>
<th>Year of Development</th>
<th>Source of Information</th>
<th>Brief Description</th>
<th>Rate of Production</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CINVA - Ram</strong>&lt;br&gt;1952</td>
<td>a Inter-American Housing and Planning Centre&lt;br&gt;COLOMBIA</td>
<td>B 51, 60, 64</td>
<td>Steel mould box with a piston at the bottom and a lid which is opened for filling. A long metal handle is manually operated, moves the compression piston via a toggle linkage. All connections welded. Production of one block per cycle.</td>
<td>40 - 60 ( \text{Blocks per hour} )</td>
</tr>
<tr>
<td></td>
<td>b Metalibec Ltda&lt;br&gt;COLOMBIA</td>
<td></td>
<td></td>
<td>(3)</td>
</tr>
<tr>
<td>&amp; 2 Industria e Comercio de Maquinas&lt;br&gt;BRAZIL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&amp; 3 Schraeder-Bellows&lt;br&gt;USA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&amp; 4 Fraser Eng. Co.&lt;br&gt;NEW ZEALAND</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **TEX Block Press**<br>1970 | a/b Department of Housing and Planning Research<br>Faculty of Architecture<br>UST, Kumasi<br>Ghana | B 13, 45, 60 | Sturdier version of CINVA-Ram, with simplified handling, wooden lever and larger block size. | 30 - 40 \( \text{Blocks per hour} \) |

| **La Pulafitte**<br>1975 | a ADETEN<br>L'Unité Pédagogique d'Architecture de Grenoble: CRAterre<br>Loc. Rauaux, Haut-Brie, 38320 Eybens<br>FRANCE | B 01, 06 | Modified TEX Block Press | 40 - 50 \( \text{Blocks per hour} \) |

| **CINVA-Ram**<br>1977 | a/b CETA<br>15 Av., 14-61. Zona 10<br>Guanimal City<br>GUATEMALA | B 31 | Modified CINVA-Ram to produce hollow blocks (for placement of reinforcing rods in seismic wall construction) | 40 - 60 \( \text{Blocks per hour} \) |

| **CENEEMA Earth and Loam Block Press**<br>1979 | a/b CENEEMA<br>B.P. 1040<br>Yaoundé<br>CAMEROON | B 23 | Modified CINVA-Ram | 40 - 60 \( \text{Blocks per hour} \) |

| **AVM Block Press**<br>1984 | a/b Ausbildungswerkstatt<br>Bernhard-Adelung-Straße 42<br>6090 Rüsselsheim<br>FED. REP. OF GERMANY | C | CENEEMA Press modified such that only German DIN standard parts are used. | 40 - 60 \( \text{Blocks per hour} \) |

| **SISD Dirt-Cement Brick Press**<br>1984 | a/b Southern Institute for Skill Development Thai-German Project<br>PO Box 5, Kao Sang<br>Songkhla 90001<br>THAILAND | R 96 | Modified CINVA-Ram | 40 - 60 \( \text{Blocks per hour} \) |

| **Meili - 60 Manual**<br>1985 | a/b Meili Engineering<br>Gewerbe-Center Rothaus<br>8635 Bürnten<br>SWITZERLAND | C | Modified CINVA-Ram, assembled only with screws and bolts. | 40 - 60 \( \text{Blocks per hour} \) |

<p>| <strong>MARO Block Press</strong>&lt;br&gt;1985 | a/b MARO Enterprise&lt;br&gt;95 bis route de Suisse&lt;br&gt;1290 Versoix&lt;br&gt;SWITZERLAND | L | | |</p>
<table>
<thead>
<tr>
<th>SOIL BLOCK PRESS</th>
<th>ADDRESSES:</th>
<th>SOURCE OF INFORMATION</th>
<th>BRIEF DESCRIPTION</th>
<th>AVERAGE RATE OF PRODUCTION (Blocks/hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year of development (if known)</td>
<td>Developer</td>
<td>C</td>
<td>Similar to MARO Block Press</td>
<td>40 - 60</td>
</tr>
<tr>
<td>(P) = Prototype</td>
<td>Manufacturer</td>
<td>L</td>
<td>Copy of CINVA-Ram</td>
<td>40 - 60</td>
</tr>
<tr>
<td>A.B.I. Block Press</td>
<td>a/b Abidjan-Industrie</td>
<td>D.P. 343 45 Rue P.et M. Curie Zone 4 C Abidjan IVORY COAST</td>
<td>Same principle as CINVA-Ram, with interchangeable moulds for hollow blocks</td>
<td>40 - 60</td>
</tr>
<tr>
<td>CTA Block Press</td>
<td>a/b CTA</td>
<td>Facultad de Ciencias y Tecnologia Universidad Católica Asunción PARAGUAY</td>
<td>Modified CINVA-Ram, producing 3 blocks per cycle</td>
<td>150 - 180</td>
</tr>
<tr>
<td>GEO 50</td>
<td>a/b SOLEN</td>
<td>Centre de Terre lavalenne 31590 Verfay</td>
<td>Same principle as CINVA-Ram, but easier to handle with lever action only on one side.</td>
<td>20 - 50</td>
</tr>
<tr>
<td>SATURNIA 1983 (P)</td>
<td>a ETH-Honggerberg Inst. für Hochbautechnik SOS 3 Zurich SWITZERLAND</td>
<td></td>
<td>Same principle as CINVA-Ram, but easier to handle, with one-sided lever action and mechanism for accurate filling of mould.</td>
<td>100 - 150</td>
</tr>
<tr>
<td>RIFFON Block Press</td>
<td>a/b J. Riffon</td>
<td>Rue de l'Abbaye 6 5220 Andenne BELGIUM</td>
<td>Pedal and lever operated press, with piston suspended over 1 m high moulding table, designed such that operator stands upright.</td>
<td>100 - 120</td>
</tr>
<tr>
<td>EILSON Blockmaster (S, D, SB 1, SB 2) 1950</td>
<td>a ELLSON Equipments (Pty)Ltd.</td>
<td>PO Box 261 532 Excom 2023 SOUTH AFRICA</td>
<td>Similar to CINVA-Ram, in principle, but larger, heavier, with interchangeable moulds. Compression effected by “jumping-pull”, thus better compaction than CINVA-Ram.</td>
<td>60 - 80</td>
</tr>
<tr>
<td>ASTRAM 1990</td>
<td>a ASTRAL</td>
<td>Indian Institute of Science Bangalore 560012 INDIA</td>
<td>Lighter and improved version of EILSON Blockmaster</td>
<td>60 - 80</td>
</tr>
<tr>
<td>SOIL BLOCK PRESS ADDRESSSES:</td>
<td>SOURCE OF INFORMATION</td>
<td>BRIEF DESCRIPTION</td>
<td>AVERAGE RATE OF PRODUCTION Blocks/hour (number of workers)</td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------</td>
<td>------------------</td>
<td>---------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>CRA Terre Perou Block Press 1982</td>
<td>a/b CRATerre Perou Apagado Postal 399 Huancayo PERU</td>
<td>B 06. 35</td>
<td>In principle, similar to ELLSON Blockmaster, but with wheels and larger block size. Side tables for soil mix and finished blocks facilitate handling. 100 - 120 (5)</td>
<td></td>
</tr>
<tr>
<td>Multibloc BREPAK Block Press 1981</td>
<td>a Building Research Station Overseas Division Garston, Watford WD2 7JR ENGLAND</td>
<td>C L</td>
<td>Sturdier version of CINVARam with manually operated hydraulic pump, achieving five times higher compaction than CINVARam. 35 - 40 (5)</td>
<td></td>
</tr>
<tr>
<td>ZORA Brickmaking Machine 1982</td>
<td>a/b Zora Company Ltd. 112 Power Road London W4 3PY ENGLAND</td>
<td>C L</td>
<td>Motor-driven hydraulic block press with extremely high compaction 120 - 150 (3)</td>
<td></td>
</tr>
<tr>
<td>TERSTARAM Block Press 1904</td>
<td>a Les Ateliers de Villers-Perwin 1-3 rue E. Gossiaux 6311 Villers-Perwin BELGIUM</td>
<td>C L</td>
<td>Manually operated press for making blocks and tiles, producing 24 blocks per cycle (Original names: SUPER MADEM, later STABIBLOC, also well-known as LANDCRETE). 150 - 200 (4)</td>
<td></td>
</tr>
<tr>
<td>CERAMAN Manual Press 1904</td>
<td>a same as TERSTARAM</td>
<td>C L</td>
<td>Same as TERSTARAM, but with automatic ejection of blocks 200 - 300 (4)</td>
<td></td>
</tr>
<tr>
<td>Semi-Terstaramatic 1933</td>
<td>a and b: same as for TERSTARAM</td>
<td>C L</td>
<td>Motor-driven version of TERSTARAM (Original name LA MAJO) 400 - 600 (4)</td>
<td></td>
</tr>
<tr>
<td>CERAMATIC Automatic Brick Press 1953</td>
<td>a and b: same as for CERAMAN</td>
<td>C L</td>
<td>Motor-driven mechanical block press with rotating 3 station table, for filling, moulding and ejection of 2 bricks a time (original name: LA MAJO-MATIQUE). 1000 - 1500 (3)</td>
<td></td>
</tr>
<tr>
<td>LESCHA SBM 1976/1984</td>
<td>a Lescha/Augsburg and Consolid/SWITZERLAND Ulmar St. 249/251 8900 Augsburg FED. REP. OF GERMANY</td>
<td>C L</td>
<td>Complete production unit on wheels, incorporating mixer, hopper and 4 station rotating table with hydraulic press for 2 bricks a time (improved version of CLU 2000) 500 - 700 (4)</td>
<td></td>
</tr>
<tr>
<td>CLU 3000 1980</td>
<td>a/b CONSOLID AG Aechelstr. 18 9435 Heerbrugg SWITZERLAND</td>
<td>C L</td>
<td>Further development of CLU 2000 with higher compaction of bricks, but 1 brick each time. 300 - 500 (4)</td>
<td></td>
</tr>
<tr>
<td>Model</td>
<td>Manufacturer</td>
<td>Year of Development</td>
<td>Developer</td>
<td>BRIEF DESCRIPTION</td>
</tr>
<tr>
<td>-------</td>
<td>--------------</td>
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<td>-----------</td>
<td>------------------</td>
</tr>
<tr>
<td>ECOBRICK 1000</td>
<td>a/b Dieter Schmidheini</td>
<td>1996</td>
<td>Weinbergstr. 29, 9436 Balgach, SWITZERLAND</td>
<td>Simplified version of CLU 3000, semi-automatic operation, 1 brick per cycle (rotating table omitted)</td>
</tr>
<tr>
<td>MEILI Mehanpress</td>
<td>a/b Meili Engineering</td>
<td>1984</td>
<td>Gewerbe-Center Rocheau 6635 Diirnten, 80208 Biberach, GERMANY</td>
<td>Same operating principle as CLU 3000</td>
</tr>
<tr>
<td>TERRE 2000</td>
<td>a/b RG Terre 2000</td>
<td>1984</td>
<td>S.P. 96, 13160 Chateaurenard, FRANCE</td>
<td>New type of hydraulic press with separate mixer and conveyer pipe for soil mix, 1 block per cycle</td>
</tr>
<tr>
<td>PACT 500 Block Press</td>
<td>a/b ALTECH</td>
<td>1993</td>
<td>Rue des Cordeliers, 10300 Paris, FRANCE</td>
<td>Compact motor-driven mechanical press, with 4 station rotating table compacting 1 block at a time, interchangeable moulds</td>
</tr>
<tr>
<td>GEO 500 Semi-Bloc, Unité Atelier</td>
<td>a/b SOUEN</td>
<td>1984</td>
<td>Centre de Terre, Lavaletz 31590 Verfeil, FRANCE</td>
<td>Semi-automatic, diesel powered press, operated in conjunction with a separate mixer, all equipment being charged and unloaded manually</td>
</tr>
<tr>
<td>GROUPE UNITRESS</td>
<td>a/b HALLUMEGA</td>
<td>1993</td>
<td>37 rue des Ecoles 94780 Bainsieux, FRANCE</td>
<td>Complete production unit on 3 wheels, with mixer, hopper and rotating table for mechanical compaction</td>
</tr>
<tr>
<td>ULTRABLOC IMPACT 1/2</td>
<td>a/b ULTRABLOC</td>
<td>1984</td>
<td>Box 1363, Coral Gables, FL 33121, USA</td>
<td>Mobile hydraulic press, with manual (Impact 1) or automatic (Impact 2) operation: extremely high compaction</td>
</tr>
<tr>
<td>TERRABLOCK Duplex</td>
<td>a/b Earth Technology Corp.</td>
<td>1984</td>
<td>175 Drennan Road, Orlando, FL 32806, USA</td>
<td>Fully automatic, computer controlled, self-contained mobile production unit, extremely large blocks with highest known compaction</td>
</tr>
<tr>
<td>HANS SUMPF Brick Machine</td>
<td>a/b Hans Sumpf Adobe Co.</td>
<td>1966</td>
<td>Fresno, California, USA via: IFEC 3282 Theresa Lane, Lafayette, CA 94549, USA</td>
<td>Mobile production unit, which lays 35 blocks per cycle on clean, flat ground, no pressure moulding, hence strictly not a block press</td>
</tr>
<tr>
<td>EARTH BRICK MACHINE</td>
<td>a/b Australian Adobe</td>
<td>1984</td>
<td>Industries Suite 4, &quot;Ormond House&quot; 109 Yarra Street, Geelong, Vic. 3220, AUSTRALIA</td>
<td>Fully automatic, self-contained production unit on wheels, producing blocks of all sizes, with extremely high compaction</td>
</tr>
</tbody>
</table>
### BLOCK PRESS

<table>
<thead>
<tr>
<th>PRESS NAME</th>
<th>SOURCE OF INFORMATION / COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adobe Master hand-powered adobe maker</td>
<td>Bibl. 06 Address of producer: Design Services, Box 2334, Ruidoso, NM 88345/USA</td>
</tr>
<tr>
<td>Apex manual and hydraulic operated brick moulding machines</td>
<td>Information received from UNIDO, Vienna. Manufacturer: Apex Engineering &amp; Construction Co., PO Box 50687, Nairobi/Kenya</td>
</tr>
<tr>
<td>Bernat - Saulidre, output 300 - 400 bricks/hour</td>
<td>Bibl. 06, but without further details. Manufacturer: M. Teseyre, 74 rue de Pey, 81100 Castres/France</td>
</tr>
<tr>
<td>BG. 25, output 300 - 400 bricks/hour</td>
<td>Bibl. 06, but without further details</td>
</tr>
<tr>
<td>CBRI manual (100 bricks/hour) and mechanically operated brick presses (250 bricks/hour), with compaction pressures of 10 and 20 N/mm² respectively</td>
<td>Bibl. 04: Paper on ”Appropriate Technologies and Materials for Housing and Building in India” by staff members of Central Building Research Institute (CBRI), Roorkee/India. These presses were developed for the production of clay bricks and sand-lime bricks for firing; probably also suitable for soil-cement bricks.</td>
</tr>
<tr>
<td>Earth Ram</td>
<td>Bibl. 06, but without further details. Manufactured in Mesa, Arizona/USA</td>
</tr>
<tr>
<td>Hallumeca 3 75, B 100, B 150, B 200, mechanical presses</td>
<td>Bibl. 06, but without further details. Machine produced by Hallumeca, 37 rue des Ecies, 59780 Baisieux/ France</td>
</tr>
<tr>
<td>Han Suk Sang brick plant for non-fired clay bricks, compacted at 20 N/mm²</td>
<td>Article in Asia-Pacific Tech Monitor (May/June 1985), Bangalore/India. Address of producer: Han Suk Sang SA Co., Ltd., 1157-7, Chorang-Dong, Dong-kuk. Pusan/Korea</td>
</tr>
<tr>
<td>Latchblock manual (40 blocks/hour) and automatic (600 blocks/hour) block making machines</td>
<td>Bibl. 04: Paper on ”A New Low Energy Intensive Building Material based on Lateritic Soil for Low Cost Housing in Developing Nations”. Machine developed by Structural Engineering Research Centre (SERC), Madras, and Mechanical Engineering Research and Development Organization, New Delhi/India</td>
</tr>
<tr>
<td>Lorev</td>
<td>Personal communication from David Webb, Building Research Station, Garston/England. The machine is produced in Italy.</td>
</tr>
<tr>
<td>Mechanized, mobile brick press, driven by animal or hydro-power or simple one-cylinder combustion engine, with an output of at least 125 bricks/hour on a 4 step rotating table</td>
<td>Bibl. 33 and article in Asia-Pacific Tech Monitor (May/June 1985), Bangalore/India. The machine was developed by Dirk Janssen of Delft University of Technology, Centre for Appropriate Technology (CAT), PO Box 3048, 2600 GA Delft/Netherlands</td>
</tr>
<tr>
<td>Raffin</td>
<td>Bibl. 06, but without further details</td>
</tr>
<tr>
<td>Ram Tech, automated, hydraulically-powered rotating turret machine</td>
<td>Same news letter as above. Manufactured in Santa Fe, New Mexico/USA</td>
</tr>
<tr>
<td>Soil Cret, automated CINVA-Ram producing about 100 blocks/hour</td>
<td>Earth System Reporter (newsletter of Earth Systems Dev. Inst., PO Box 1217, Corrales, NM 87048). Manufactured in Southern Colorado</td>
</tr>
<tr>
<td>Valarm</td>
<td>Communication from Aromar Revi of Development Alternatives, Shelter Group, 22 Palam Marg, Vasant Vihar, New Delhi 110057. No details known, except that field testing of prototype is nearing completion and commercial production will commence in February 1986. Family of machines planned.</td>
</tr>
</tbody>
</table>
### 3.2.3 Industrial - factory based - plants

<table>
<thead>
<tr>
<th>PRODUCTION UNIT</th>
<th>SOURCE OF INFORMATION / COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latorex L3 brick plant, producing laterite-based bricks</td>
<td>Bibl. 40. Manufacturer: Droscholm Products A/S, 2950 Vadbaek/Denmark. Plants built in Philippines and Africa</td>
</tr>
<tr>
<td>Krupp Atlas brick plant, conceived to produce laterite-based bricks</td>
<td>Bibl. 40. Manufacturer: Krupp-Polysius AG, Graf-Galen-Str. 17, 4720 Boekum/FR Germany. The plant was supposed to be built in West Africa, but never passed the planning stage</td>
</tr>
<tr>
<td>Supertor hydraulically powered brick plant, with output of 2500 bricks/hour</td>
<td>Bibl. 32. Manufacturer: Torsa Maquinas et Equipamentos Ltda, Sao Paulo/Brazil</td>
</tr>
<tr>
<td>Tecmor HCR3, HCR5</td>
<td>Bibl. 06. Manufacturer: Tecmor Equipamentos, Maconicos Ltda, Rua da Imprensa, 331, Sao Carlos/Brazil</td>
</tr>
<tr>
<td>T.E.G. Equipment block press, evidently the same plant as Tecmor</td>
<td>Information from manufacturer: E. Goffaut, l-3 rue Emile Gossiaux, 6311 Villers-Penr/Belgium</td>
</tr>
<tr>
<td>Aebi ASP 350 automatic hydraulic press, output 1440 bricks/hour</td>
<td>Bibl. 01. Manufacturer: Robert Aebi SA, 8023 Zürich/Switzerland</td>
</tr>
<tr>
<td>Duplex Emperor mechanical brick-making press, output 2500 bricks/hour</td>
<td>Bibl. 01. Manufacturer: Sutcliffe Speakman &amp; Co Ltd., Leigh, Lancashire/England</td>
</tr>
<tr>
<td>ACCETTA. Presse &quot;DYNATERRE&quot;</td>
<td>Bibl. 06. Manufacturer: André Accetta, l'Ecole d'Architecture de St. Etienne, l rue Buisson, 42000 St. Etienne/France</td>
</tr>
<tr>
<td>Teroc T14 (1 block/cycle) and T4 (4 blocks/cycle)</td>
<td>Bibl. 33. Manufacturer: Saret, B.P. 102, Route de Carpentras, 84130 Le Pontet/France</td>
</tr>
<tr>
<td>CTBI Automatique (L.P.F. 500) output 350 - 400 bricks/hour</td>
<td>Bibl. 33. Manufacturer: CTBI; Zone Industrielle, 51140 Muizon/France</td>
</tr>
<tr>
<td>GEO 500 Auto-Bloc electronically powered automatic press, output 300 bricks/hour</td>
<td>Information from manufacturer: SOUEN, Centre de Terre, Lavalette, 31590 Verfeil/France. The press (also called &quot;Tunnel&quot;) was constructed to produce bricks for the centre's own use</td>
</tr>
</tbody>
</table>

### 3.2.4 Soil block presses, which are not being produced anymore

<table>
<thead>
<tr>
<th>BLOCK PRESS</th>
<th>SOURCE OF INFORMATION / COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MACHINE A BRAS No. 1</td>
<td>Bibl. 06, see Illustration &quot;Le Musée des Presses&quot;</td>
</tr>
<tr>
<td>PRESSE PM A BRAS</td>
<td>- ditto -</td>
</tr>
<tr>
<td>PRESSE RAPIDE No. 5</td>
<td>- ditto -</td>
</tr>
<tr>
<td>MACHINE HOUCHRA TYPE C</td>
<td>- ditto -</td>
</tr>
<tr>
<td>DAMETTE No. 1</td>
<td>- ditto -</td>
</tr>
<tr>
<td>BLOCK PRESS</td>
<td>SOURCE OF INFORMATION / COMMENTS</td>
</tr>
<tr>
<td>-------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>MACHINE PNEUMATIQUE TYPE 610</td>
<td>Bibl. 06, see Illustration &quot;Le Musée des Presses&quot;</td>
</tr>
<tr>
<td>PILONNEUSE A BRAS TYPE PBB</td>
<td>ditto</td>
</tr>
<tr>
<td>PILON GUIDE SYSTEME D</td>
<td>ditto</td>
</tr>
<tr>
<td>PILON GUIDE CANADA</td>
<td>ditto</td>
</tr>
<tr>
<td>PRESSE EN BOIS</td>
<td>ditto</td>
</tr>
<tr>
<td>HERCULEENNE</td>
<td>ditto</td>
</tr>
<tr>
<td>PRESSE CURER</td>
<td>ditto</td>
</tr>
<tr>
<td>SUPER MADELON/STABIBLOC</td>
<td>Improved version of LA MADELON</td>
</tr>
<tr>
<td>LANDCRETE</td>
<td>Same as SUPER MADELON, but produced by Landsborough Findlay Ltd., Johannesburg/South Africa</td>
</tr>
<tr>
<td>FIB-SM</td>
<td>Same as SUPER MADELON, but produced by Le Four Industriel Belge, 14 rue des 3 Arbres, 1180 Brussels/Belgium</td>
</tr>
<tr>
<td>LA MAJO</td>
<td>Developed by Les Ateliers de Villers-Perwin in 1933, as a motor-driven version of SUPER MADELON, now built with minor modifications under the name SEMI-TESTAMATIC</td>
</tr>
<tr>
<td>LA MAJO MATIC</td>
<td>Developed by above firm in 1953, now produced with slight changes under the name CERAMATIC</td>
</tr>
<tr>
<td>FIB-MM</td>
<td>Same as LA MAJO-MATIC, produced by Le Four Industriel Belge</td>
</tr>
<tr>
<td>WINGET Rotary Hydraulic Block Press</td>
<td>Details obtained from D. Webb, Building Research Station, Garston. Machine developed and produced by WINGET Ltd., Rochester, Kent/England</td>
</tr>
<tr>
<td>LD P / 11 P</td>
<td>Bibl. 01, 06. Modification of WINGET Block Press, manufactured as prototypes by Guillon Barthelemy, 18 rue de Mont Faver, 84 Avignon/France</td>
</tr>
<tr>
<td>MMH 2000 (rotary hydraulic press with single block moulds) / MMH 4000 (same machine with double block moulds)</td>
<td>Bibl. 01, 06, also information from M. Platbrood. The machine is basically the PRESSE MAJO-MATIC HYDRAULIQUE developed in 1976 by Les Ateliers de Villers-Perwin. Also produced by Fernand Platbrood, 20 rue de la Rieze, 6404 Cul-des-Sarts, Couvin/Belgium</td>
</tr>
<tr>
<td>POWER&quot;TEK BLOCK hydraulic press with 4 rotating mould boxes, producing 300 blocks/hour with compaction pressure of 7 N/mm²</td>
<td>Bibl. 01, 06. Prototype developed at Dept. of Housing and Planning Research, UST Kumasi/Ghana, to achieve higher output, cheaper and stronger bricks than the manually operated TEK BLOCK press</td>
</tr>
<tr>
<td>CLU 2000, self-contained, hydraulic block press on wheels, with 4 step rotating table, output 350 - 500 blocks/hour</td>
<td>Bibl. 01, 06, 33. Jointly designed by Consolid AG, Aeschliestr. 18, 9434 Heerbrugg/Switzerland, and Lesche KG, Ulmer Str. 249/251, 8900 Augsburg/FR Germany</td>
</tr>
<tr>
<td>TOB-System/Soteram</td>
<td>Bibl. 33 and information from SOUEN/ARCHICO, Centre de Terre, Lavelette, 31590 Verfeil/France. Although the press functioned well, mounting it on a wheeled chassis was found to make it unnecessarily cramped, complicated and expensive. Thus it was succeeded by the GED 300 Semi-Bloc,</td>
</tr>
</tbody>
</table>
LE MUSEE DES PRESSES

MACHINE A BRAS N° 1

Le meunage est lâché par actionnement à la levette de rouleau lubrifié qui évite ainsi une perte de meunage à l'industriel. Actionnement par levier de meule morte
Le fabricant d'un paupling à la fois
Matériel Bonnet

MACHINE PNEUMATIQUE TYPE 85

Compresseur à bras avec ressorts de rappel
Flans d'engrenage et pistons
Poids de la pression de paupling à l'industriel
Matière sableuse Franc-Allézienne

MACHINE PNEUMATIQUE TYPE 85

Presse à simple compression directe
Grâce à un certain nombre d'axes à jour où les meules sont en mouvement à un vitesse continue. Un levier de meunage permet l'élévation du paupling
Sans torche, un paupling à la fois
Pression : 20 x 10 x 40
Matériel Thebault

MACHINE PNEUMATIQUE TYPE 85

Poids d'un paupling à la fois
Matière sableuse Franc-Allézienne

MACHINE PNEUMATIQUE TYPE 85

Machine à soudeuse à tirer
Compresseur actionné par un piston de paupling actionné par cames un paupling à 13 fois
Pouvoir nécessaire 300 W
Presse avec emboutage machine en acier
Matériel Bonnet

MACHINE PNEUMATIQUE TYPE 85

Ce genre de machines, utilisées pour la fabrication de meunage de teinte, sont également utilisées pour la fabrication de meunage de teinte, à l'industriel de l'A.T.T., un certain nombre de ces machines sont utilisées pour l'action de meunage à un certain nombre de fois. En fin fin, le meunage est fini dans une pièce verticale, et déposé par simple pression. Matériel Bonnet

Voici des exemples de machines qui n'ont pas
plus d'1 mètre, mais
qui peuvent donner
quelques idées...
Figure 236

PILONEUSE A BRAS TYPE PBS

La figure montre la principale vue de la machine à pilonner à bras du système D. Les pièces sont décrites en détail dans le texte suivant.

PILON GUIDE CANADA

L'opérateur guide le pilon pour parvenir à la plus grande longueur possible. La machine est conforme aux normes CANADA.

PRESSE EN BOIS

Conçue par le STF de Dakar et employée en Afrique occidentale.

PRESSE CURER

Conçue par l'Université des Sciences Agricoles.

Presses à bois et acier usines qui étaient livrées avec des feuilles perméables de 100 x 20 cm. L'acier était utilisé pour fabriquer des bouchons des cuves, des dents, des aimants, des lames de 4 x 4 cm, de 4 x 8 cm, d'acier, de 8 x 8 cm, d'acier, de 8 x 8 cm, d'acier, de 8 x 8 cm, d'acier.
La Meilleure Presse à Briques

RENDEMENTS MAXIMAUX

* La presse à briques est la meilleure fabriquée par les n° 176 016 et 176 063.

** LA MADELON ** est le dernier modèle de presse à briques. C'est le fruit de 20 ans d'expérience dans la construction de ces presse de presse. Elle est conçue pour les maisons de briques de toutes les tailles. Cette machine est la meilleure pour les maisons de briques, et on a toujours dit que les machines permettent des résultats conformes à des conditions de qualité. Les machines qui ont été fabriquées ont une grande qualité de travail. La Madeleon est la machine la plus rapide et la plus économique pour la fabrication de briques.

* USAGÉ : * La Madeleon est une presse de briques en forme franche. Elle permet une grande flexibilité de production. Elle produit des briques de qualité supérieure.

* PRESSION : * La Madeleon est utilisée pour la fabrication de briques. Elle permet une grande flexibilité de production. Elle produit des briques de qualité supérieure.

* Fonctionnement : * La Madeleon est utilisée pour la fabrication de briques. Elle permet une grande flexibilité de production. Elle produit des briques de qualité supérieure.

* Production : * La Madeleon est utilisée pour la fabrication de briques. Elle permet une grande flexibilité de production. Elle produit des briques de qualité supérieure.

* Construction : * La Madeleon est utilisée pour la fabrication de briques. Elle permet une grande flexibilité de production. Elle produit des briques de qualité supérieure.

* MOULÉS : * Les briques sont produites en vue d'être utilisées pour la fabrication de briques. Elle permet une grande flexibilité de production. Elle produit des briques de qualité supérieure.
LA SUPER MADELON COLONIALE

La Super Madelon Coloniale sans chaine fonctionne comme une Madelon ordinaire, mais avec plus de facilité étant mise sur roulements fixes. Une seconde machine permet à celui qui envoie les brique à aider le presseur, assurant une pression constante, en même temps que la pression se fait exercée par les efforts conjugués des deux hommes, est fortement augmentée.

Sur la Super Madelon pour brique, on peut placer des moules pour la fabrication des tuiles, carreaux, tuyaux, briques, moules, etc., il n'est donc pas nécessaire de demander une machine spéciale et à l'avant on peut faire des différents produits. Les moules et accessoires nécessaires peuvent toujours être obtenus et placés sur la presse sans modification.

La Super Madelon est employée par de nombreux coloniaux qui ont constaté après avoir que la production était généralement 20%, plus forte qu'avec les presse à brique.

La Super Madelon Coloniale est fabriquée en une pièce en planche de 2 m au culin que 3,40 d'air et que 4,40 d'air.

C'est une Madelon renforcée et perfectionnée qui se prête à des usages importants. Sa construction et sa volume sont restés semblables de même parce que les renforcements consistent en l'emploi de fer au lieu de fonte et d'acier de forte résistance.

Les quelques caractéristiques qui précèdent justifient bien son nom de Coloniale.

Outre les nombreux avantages de la Madelon, facilité de fonctionnement, d'entretien et de déplacement, nous avons par les perfectionnements suivants fait de la Super Madelon une machine idéale à bon point de vue.

Le poids de pression, important en fonte, est, en acier forge, le même que le poids d'acier remplacé par une belle activité, l'engin essentiel, qui peut être remplacé par briques sans gêne et être pratiquement interchangables et inoxydables.

Le toner de dégradation place au centre de la machine, est approprié de façon à pouvoir fabriquer des briques ayant jusqu'à 14 cm d'épaisseur.

Les organes de pression, cuivre, bête, etc., sont protégés par un matériau résistant à l'acide. La machine est solide, ce qui assure une longue durée.

Le roulement est optique de façon qu'il se couvre et se forme avec une aisance parfaite.

Le novateur de forme, dont les pièces s'ajustent à usage sont facilement remplaçables et à peu de frais, y est appliqué.

Les moules se réparent avec une facilité que l'on ne trouve dans aucune autre machine.

Le mouvement de pression est monté de telle sorte que la terre ne reste jamais sur son articulation et, de ce fait, l'usure est pratiquement nulle.

Montée sur roues, et munie de manœuvres pour la conduite, elle se déplace très aisément sur le chantier.

Les principales pièces de la Super Madelon, telles que cuvées, un avant de pression, fente, etc., sont les mêmes que celles employées dans la Madelon ordinaire et qui ont été étudiées pour un travail beaucoup plus dur que dans les presse à main.

Les pièces étant parfaitement interchangeables, son entretien est facile et les réparations peu coûteuses.

Bien qu'il a été négligé de faire de la Super Madelon une machine nettement supérieure, son prix est peu plus cher que celui des machines concurrentes, est simplement justifié par les nombreux avantages qu'elle réunit.

La Super Madelon Coloniale est une machine dont on dit : je l'ai payée un peu plus cher, mais au moins j'ai une bonne machine qui est plus économique qu'une autre à bon marché" surtout aux colonies où les frais d'emballement et de transport sont très élevés, qu'il s'agisse d'une machine moderne ou d'une Madelon.
<table>
<thead>
<tr>
<th>Rep.</th>
<th>Nombre pièces</th>
<th>Désignation</th>
<th>N° Pièces</th>
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<td>Calotte de la machine</td>
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<tr>
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<td>2</td>
<td>Support du guide piston</td>
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</tr>
<tr>
<td>3</td>
<td>2</td>
<td>Guide du piston</td>
<td>3101030</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>Piston</td>
<td>3101040</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>Levier de démoulage</td>
<td>3101050</td>
</tr>
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<td>6</td>
<td>1</td>
<td>Axe du levier de démoulage</td>
<td>3101060</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>Sommier de pression</td>
<td>3101070a</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>Support du sommier de pression</td>
<td>3101080</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>Coudé de pression</td>
<td>3101090</td>
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<td>10</td>
<td>2</td>
<td>Menotte de manœuvre</td>
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<td>11</td>
<td>1</td>
<td>Couvercle</td>
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<tr>
<td>12</td>
<td>1</td>
<td>Axe de couvercle</td>
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<td>Fermeture du couvercle</td>
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<td>2</td>
<td>Pièce d'usure de la fermeture</td>
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<td>1</td>
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<td>17</td>
<td>1</td>
<td>Support triangulaire</td>
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<td>18</td>
<td>2</td>
<td>Menotte pour conduire</td>
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<td>19</td>
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<td>Support de démoulage</td>
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<td>Levier de déclenchement</td>
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<td>21</td>
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<td>Axe des roues</td>
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<td>22</td>
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<td>23</td>
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<td>Contrepoids du levier de déclenchement</td>
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<td>Plaques de réglage</td>
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<td>25</td>
<td>2</td>
<td>Roues Φ 200</td>
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<td>Chaîne de compression - type M14 à DIN 1167</td>
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<td>Chaîne de démoulage 1&quot; x 19 maillons</td>
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<tr>
<td>29</td>
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<td>Coussinet du levier de démoulage Φ 25/32 x 40</td>
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<tr>
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<td>-</td>
<td>Plaques de réglage</td>
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<td>2</td>
<td>Entrecôtes</td>
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<td></td>
<td></td>
<td>- Moulage</td>
<td></td>
</tr>
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<td></td>
<td>- Table</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Plateau du piston</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Plateau du couvercle</td>
<td></td>
</tr>
</tbody>
</table>
### "LA MAJO" MOTOR BRICK PRESS

**La MAJO** being owned by the Hand and Motor Presses, F & R, England, we have no hesitation in recommending it for other countries.

Although, for the largest sizes, mounted bricks, etc., can all be placed on the **LA MAJO** a brick press. There is therefore no need to invest a special machine if at some future date it is desired to manufacture other articles. The necessary moulds and accessories can always be obtained and placed on the press without making any alteration.

**MANUFACTURING WITH **LA MAJO**

The work is entirely the same as with hand presses, but the bricks are pressed and turned out of the mould automatically in 2 1/2 seconds, without any effort on the part of the workman, for merely has to pull down the lead lever.

This is an additional advantage where the labour available is of limited ability and discretionary to make the necessary effort to press strongly.

#### PRESSURE

- **La MAJO** is designed to give a pressure comparable to that which a man weighing 120 lb, and with his body low, could apply with a hand press. One may therefore count on obtaining perfectly pressed bricks.

- **La MAJO** may be inclined without apparent danger to the least inclined worker. - We are mindful of any possible occurrence, and have designed the machine so that the operator may work on the hand press without any danger or damage whatever. Provided the operator's back is free from tension, the **La MAJO** will never hurt any body.

- The machine is built to press as moulded a man weighing 220 lb, so that any person it is carried as easily as it is carried in a 120 lb man. The workman has to simply follow the lead lever, which is fixed in such a manner that the mould will slide out when the workman has finished his work.

- **La MAJO** is a most advantageous machine for the smaller sizes of bricks.

#### UPHOLD

- The machine is capable of an abnormal amount of work and is made when it is run dry, before the lead lever is pulled out, or it is run dry, before the lead lever is pressed down.

- **La MAJO** works smoothly and effortlessly, whereas is often less than for a hand press.

#### Table: Performance

<table>
<thead>
<tr>
<th>Per Hour</th>
<th>Time per Press</th>
<th>Finishing End per Press</th>
<th>Per Hour</th>
<th>Time per Press</th>
<th>Finishing End per Press</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,500</td>
<td>4 1/10&quot;</td>
<td>2 3/10&quot;</td>
<td>900</td>
<td>9&quot;</td>
<td>5 5/10&quot;</td>
</tr>
<tr>
<td>1,400</td>
<td>5 1/10&quot;</td>
<td>2 1/10&quot;</td>
<td>800</td>
<td>8&quot;</td>
<td>5 5/10&quot;</td>
</tr>
<tr>
<td>1,300</td>
<td>5 5/10&quot;</td>
<td>3&quot;</td>
<td>100</td>
<td>10 3/10&quot;</td>
<td>9&quot;</td>
</tr>
<tr>
<td>1,200</td>
<td>6&quot;</td>
<td>3 5/10&quot;</td>
<td>100</td>
<td>10 3/10&quot;</td>
<td>9 9/10&quot;</td>
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<tr>
<td>1,100</td>
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<td>4&quot;</td>
<td>100</td>
<td>10 3/10&quot;</td>
<td>9 9/10&quot;</td>
</tr>
<tr>
<td>1,000</td>
<td>6&quot;</td>
<td>4 1/10&quot;</td>
<td>100</td>
<td>10 3/10&quot;</td>
<td>10 9/10&quot;</td>
</tr>
</tbody>
</table>

### Remarks

The figures are given on 2 1/2 seconds for pressing and turning out, in practice this is the time it takes for a press to do its work. Naturally, with a man who is pressing and turning out, the time may vary, but it is not very much. Furthermore, the operator may be inclined at any moment to go back to his work and start again, especially when he has been working on a large amount of work and has not had time to take his time.

The impression of the **La MAJO** is that it is an ideal machine for the smaller sizes of bricks, and suitable for the larger sizes of bricks, especially where a large amount of work is to be done. It is, therefore, a most advantageous machine for the smaller sizes of bricks.

- **La MAJO** is a most advantageous machine for the smaller sizes of bricks.

#### Motive Force Necessary

- **La MAJO** is fitted with a 1 1/2 HP electric motor or a 1 1/2 HP internal motor. Both types of motors are supplied with suitable supports and serviceable, so that the metal is not always changed and the motor is not the same size. Both are made of the same material.

#### Packing

- **La MAJO** is packed completely assembled in a 4/4 wooden case, containing the necessary accessories, and is ready for immediate use.

- The necessary electric motor can be obtained from any manufacturer, and can be mounted on a suitable frame, and is ready for immediate use.
Messieurs,

Veuillez trouver ci-jointes, les références que quelques clients ont eu l'amabilité de nous envoyer. Ces témoignages sont la plus sûre garantie de la qualité de notre matériel et de l'intérêt qu'offre notre "MAJO-MATIC". Nous vous prions d'agréer, Messieurs, l'expression de nos sentiments distingués.

Ateliers GOSSIAUX
Better, cheaper and faster construction with stabilised soilblocks

The Winget Rotary Hydraulic Block Press

A HIGHLY EFFICIENT MACHINE PRODUCING BLOCKS OF EXCEPTIONAL STRENGTH

THE WINGET ROTARY HYDRAULIC BLOCK PRESS

BRIEF SPECIFICATION

Both powering and opening rams are double acting and are protected against line loss. The pressing ram works to a definite stop, ensuring that all blocks are of equal thickness. The load applied by the pressing ram is 45 tons; L/D ratio per press is 12 in x 6 in. block, and when this pressure is attained a tell-tale gives the operator a visible signal.

The whole machine is robustly constructed and is mounted on metal wheels.

Volume measuring boxes are supplied; these permit the accurate measurement of material and rapid charging of the mould boxes.

The standard machine will make plain blocks 12 x 6 x 4 in but the following variations are available—

(a) Block with central longitudinal grooves on each 12 x 6 x 4 base.
(b) Block with deep top groove giving a reduction in weight of about 300 blocks per cent.

Tests have established that the machine, with two operators, are on the move and three on the block machine a minimum production rate of 160 blocks per hour can be maintained readily, and this can be increased to 200 blocks per hour with an experienced team of operators.

APPROXIMATE SHIPPING SPECIFICATION

No 1 Class—Rotary Hydraulic Block Press
62 x 48 x 43 cm high (120 x 122 x 109 cm.)
Gross weight 1 ton 4 cwt. 192 lbs.
(1721 kilograms)
Net weight 1 ton 3 cwt. 2 gns.
(1691 kilograms)

No 2 Class—Type D4 Trough Mixer
72 x 35 x 20 cm high (196 x 186 x 132 cm.)
Gross weight 1 ton 0 cwt. 0 gns.
(1624 kilograms)
Net weight 1 ton 0 cwt. 2 gns.
(1604 kilograms)

The Winget Research and Development Staff are constantly making advances in design and incorporating improved materials. It is in the interest of users that improvements are applied without delay, consequently the details given in this catalogue may be altered without notice.
THE WIGET STABILISED SOIL BLOCK PROCESS

what it is
and what it does

Stabilised Soil Blocks - Why? There has always been a great need throughout the world for good, cheap buildings. For centuries and has been used to produce them, mostly in one of these ways:

1. Traditional mud bricks
2. Handmade mud bricks
3. Mud bricks

But, under the methods certain drawbacks were always present. With poor, uncontrolled materials and inadequate thickness of soil, it was necessary to provide sufficient strength. Foundation and Amateur mud bricks were usually thick and heavy.

Here are the five basic stages with stabilized and blocks produced on the Wippet Stabilized Soil Block Process. A holistic view and the block are then stabilized with high load-bearing capacity and durability. Making them ideal for use in walls and foundations.

After a long period of time, both the natural and the laboratory, Wippet have mastered the design and the stabilised soil press in the front of the Wippet Rotary Block Press. In short, it provides a high-quality, long-lasting, easily replaceable, and cost-effective option for the construction industry.

The composition of the type and layout of the plant is described below.

The Wippet Equipment: The Wippet Rotary Block Press. The press is designed to provide high-quality, long-lasting blocks to the construction industry. The blocks are then stabilized and fired in the Wippet Block Brick to produce the blocks which are then used for building. These blocks are then cut into desired sizes and shapes.

No Fellers Needed: The high pressure employed in the Wippet Block Press produces the materials into a block of such extreme density that the need for supporting pillars is completely eliminated.

Label for Wippet Block Products: Only well-trained labor is required. One man operates the Wippet Rougher and three men the Wippet Block Brick. Wippet Soil Block Houses. The houses are constructed from zero to 100 blocks in one to 120 blocks in one day using 600 blocks in one day. Each day, the blocks are moved to the building site and placed in the blocks for use.

The Standard of Wippet Equipment: All Wippet products are tested and examined at the highest standards, making them suitable for all types of construction. Some parts are available from stock.

Youself and Wippet: Although there is no advice in this book we have tried to answer the questions which we think will be most useful. You may have more questions which you would like more information. In this case, please do not hesitate to ask, but it is not in the scope of our service.

SOME TECHNICAL DATA

The essence of the Wippet high-pressure process is making stabilized soil blocks, in the high density, and crack strength of the finished block. This is in part due to the high degree of consolidation of the soil. The density of the finished block is affected by the nature and quality of the soil. Some within the laboratory category, and for this purpose it is enclosed. The Wippet Block Brick is made of a mixture of soil and sand. The blocks are then cut into desired sizes and shapes, using a portable cutting machine. The blocks are then used for building, and then cut into desired sizes and shapes for use in walls and foundations.

The following are three typical analyses of sand samples which we have received at various times:

A. English Sand
B. Italian Sand
C. Portuguese Sand

In extreme weather conditions, mix the stabilized soil blocks and water thoroughly. This can also be done by applying a water-saturated spray, or by rubbing the soil blocks with a natural wetting agent, reducing the temperature to about 50% of the normal. Coated or otherwise treated blocks are capable of maintaining resistance to extremes of climate and temperature.

The advice of our technical and research departments on the various problems connected with the production of stabilized soil blocks is always available.
New low-cost soil brick plant "CLU 2000" produces water resistant soil bricks.

The soil brick plant "CLU 2000" allows the simple manufacture of high-quality soil bricks, which will be an excellent construction material for low cost housing, erosion protection walls, linings for irrigation and drainage channels, dams, embankments, etc.

For soil bricks, any type of soil, having a semi-cohesive or cohesive structure, can be used because this natural cohesion is necessary to get the required compressive strength. The treatment with CONSOLID 444 and CONSERVEX is protecting the brick against softening by water and loss of strength.

The compressive strength of such treated bricks will be between 25 to 60 kg/cm², in this range sufficient for single storey houses. If higher compressive strength is required, already the addition of 1 to 3 % cement to the treated soil will increase the compressive strength to values of about 100 kg/cm².

The commonly used landcrete and sandcrete blocks may as well be produced with the soil brick plant "CLU 2000". It is recommended to use a combination of cement and CONSOLID 444 or lime hydrate and CONSOLID 444 to get their optimum results.

Most soils qualified for high-quality bricks are in the range of the optimum moisture content between 10 and 20 %. Highly cohesive soils can be cut down to this OMC by adding sandy material. Noncohesive soils (clay) will require the addition of up to 20 % of clayish material to get enough natural cohesion for stable soil bricks.

For water-resistant soil bricks, the required average quantity of CONSOLID 444 and CONSERVEX, per one cubic metre of soil, is one litre of CONSOLID 444 and 10 litres of CONSERVEX, to be properly mixed with the soil in the paddle mixer of the soil brick plant.

A crew of 4 to 5 workers can produce per working day 2000 to 3000 bricks with one plant. The bricks are stored for air-drying in the shade and achieve their full strength after drying out. However, they may be used already one to two days after production. During the drying period, the bricks must be protected against heavy rain.
1. Filling the moulds

Soil, having been thoroughly mixed with CONSOLID 444 and CONSERVEX in the paddle mixer, is delivered by hand to the filling gauges which automatically feed the soil into the marine form moulds, filling the groove up to the fill mark. On the gauges, the operator monitors the filling process and adds as much or as little soil as necessary until the fill mark is reached. Another marine form almost hand produces the height of the mould to control constant thickness.

2. Brick-pressing by hydraulics

The free board part of the hydraulically operated machine resides carefully lifted forms underneath the hydraulic press. The edge of the bricks is trimmed with a trimmer tool according to the table's trim marks, allowing the press to engage the brick melt, thus forming a very high pressure. The same procedure is carried out on a machine operated by hydraulic ram, releasing simultaneously the pressure at the height of the extrusion of the material inside the bricks.

3. Extruding the bricks

The next quarter turn is the movable table transport and locates the compacted bricks above the hydraulically operated press, pressing the bricks against the forms. The bricks are then fed into a hopper on top of theisEnabled beam. The operator monitors the press, adjusting the hydraulic pressure as necessary until the bricks are compacted. The bricks may be used for masonry work similar to burnt bricks or concrete blocks. The mortar, which glues the bricks together, can be a mixture of sand and cement as well as zinc sulfate and zinc-mates (CONSIL and CONSERVEX), which is mixed with the water and used as an adhesive. The bricks must be coated with a water-based solution (CONSIL) to achieve full water resistance. The protective coating will become fully effective after evaporation of the solvent.

The quality of the extruded bricks can be improved by registering voids or uneven corners of the bricks as long as they are moist. If the bricks are manufactured properly, each 'cemented' brick will not be unnecessary or incorrect on a very small proportion.

When dry, the bricks may be used for masonry work with the same technique as burnt bricks or concrete blocks. The operator has an additional advantage to the mixture of sand and cement as well as zinc sulfate and zinc-mates (CONSIL and CONSERVEX), which is mixed with the water and used as an adhesive. The bricks must be coated with a water-based solution (CONSIL) to achieve full water resistance. The protective coating will become fully effective after evaporation of the solvent.
TOB SYSTEM

Groupe Mobile de Production de Briques en Terre Crue Compressée
Transportable unit for the manufacture of bricks from compressed unburnt clay

1. Mélangeur
   Mixer
2. Trenche de remplissage
   Filling hopper
3. Carrosserie à trois postes
   Mobile mould bloc with three positions
4. Motore Diesel
   Diesel engine
5. Réserveur du circuit hydraulique
   Hydraulic system reservoir
6. Châssis tracté
   Trailer
7. Trappè de vidage pour utilisation en bétonnière
   Loading door for use as cement mixer

2

TOB-System
SOUEN
La Founff
31130 Baelze
France

PRICE
11,765 - 14,380 U.S.

TIME OF DELIVERY
2 Months

DIMENSIONS OF MACHINE
470 x 180 x 220 cm

WEIGHT
1970 kg

TYPE OF ENGINE
Lombardini L40 Diesel

TYPE OF FUEL
Diesel

ENERGY CONSUMPTION
6.71/h

STATIONARY, PORTABLE OR MOBILE
Mobile

TYPE OF MIXER
TOB mixer 5001

MANUFACTURING PRESSURE
57 kg/cm²

COMPRESSION VOLUME
2

SIZE OF BLOCKS
29 x 14 x 8.5 cm (Interchangeable moulds)

DIMENSION OF MOLD IN OPEN STATE
29 x 14 x 17 cm (Standard-mould)

NUMBER OF BLOCKS PRODUCED PER DAY (8 HOURS)
3000

NUMBER OF EMPLOYEES WORKING THE MACHINE
3

PRODUCTION VOLUME PER DAY
10 m³

COMMENTS:
It is possible to use the machine as a cement mixer on site.
3.3 Soil Block Presses: Past and Present

3.3.1 Building with Earth

Soil today, as it was thousands of years ago, is the most widely used building material, and will surely always remain so. But, despite this fact, building with earth is looked upon, in many regions of the world, with distrust — as being the construction system of the poor. And yet, soil is one of the most appropriate materials, in terms of environmental and health aspects.

The reasons for the widespread negative attitude towards such constructions are manifold. Some principal ones are:

- Soil is available almost everywhere and usually at no-cost. (What does not cost anything, is not valued!)
- Earth constructions require regular maintenance and repairs, even under moderate climatic conditions. Negligence could otherwise lead to rapid dilapidation (but repairs mean a great deal of extra work and, quite often, extra expenses).
- Keeping earth buildings clean can be difficult; such uniform cracks in the soil floor, wall or ceiling can harbor vermin and parasites, which carry dangerous diseases, such as the "Chagas" disease, which affects at least 20 million people in Latin America.

However, as long as the use of soil as a building material is rejected for purely technical reasons, there are several remedies, such as proper building design (with sufficient weather-proofing and precautionary measures), careful and correct preparation of the soil mix (grain size distribution, addition of plasticizing agents, mixing, water content), and, equally important, good compaction, irrespective of the type of construction.

3.3.2 Development of Soil Block Presses

Experience in soil construction has shown that manual compaction of the damp earth (by throwing or ramming) generally cannot achieve the desired strength and durability of burnt clay bricks or concrete (blocks), with which soil structures are invariably compared. In order to achieve higher compaction, mechanical devices were developed, both in the form of tampers, as well as in the form of block presses (first made out of wood, later out of iron or steel). The first documented block press was invented by Francois Cointeaux in 1789, which the Frenchman named "La Cressot". A variety of presses have been developed since then, and many are not being produced or used since long. However, the oldest soil block press, which is still being manufactured today, was invented in 1906 (see page 20).

The machine was designed by a Belgian engineer, E. Gossiaux, of Villers-Perwin, together with Belgian missionaries, who were beginning to explore and develop the Congo (today Zaire). The popular French marching song of those days gave the press the name LA MADELON. The improved version of the machine was called SUPER MADELON. Many years later the machine was manufactured in South Africa, called "LANDCRETE", and became well-known throughout the world. In 1923, the inventor of the SUPER MADELON developed a semi-automatic, motor-driven version of it, and called it LA MAJO. About 20 years later, Gossiaux designed and built an automatic, mechanical block press, which was to make it LA MAJOR-MATIC. A similar machine was also built in India, which is known as the INVA-Ram, whereby "Ram" was derived either from Ramirez, or from the English word for a compacting device.

The INVA-Ram is now by far the best-known and most widely used block press. Numerous variations of it have been manufactured in many countries, but, in its original form, it is still the lightest and least expensive block press available. In terms of handling, output and durability, it is one of the best. Another well-known, manually operated block press is the FUJI-SM, which was originally produced in South Africa, but is now being manufactured in India since 1959. However, despite its versatility and efficiency, it is not as widely used as the INVA-Ram, probably due to its greater size, width and cost.

In the 1950s and 60s, interest in soil construction was generally low. In the 1970s, research work and development in soil construction technologies in development-projects steadily increased, largely on account of the worldwide energy crisis. Apart from several other publications, Hassan Fathy's "Architecture for the Poor" (Bib. 15), which was published in 1973, did a great deal in reviving interest in soil construction systems. Of importance was also the TEK-Block Press (Ghoni, 1970), and the FETA-Block (Kolumbo, 1972). Since the beginning of the 1980s, this tendency has gained additional momentum.

In the course of these developments, a new generation of soil block presses came into existence in the 1970s, namely complete production units on wheels. The equipment generally required for blockmaking, apart from the press, are a loader, a mixer and a measur-
3.3 General Aspects of Producing Compressed Soil Blocks

The list of soil block presses in section 4.4 gives vivid impression of the diversity of the machines available today. There are machines for almost any given situation and desired performance, accordingly also at all prices, between 200 and 75000 US Dollars.

It is self-evident that the cheaper and more expensive machines cannot be compared with each other in any way, even though they principally serve the same purpose. The following (extremely generalized) compilation of the respective advantages and disadvantages clearly shows, that each system caters for a certain rough needs and thus has a valid place to fill. Grossly simplified, the cheaper devices are taken to be manually operated, while the expensive machines are referred to as motor-driven and automated.

Advantages of manually operated presses
- Low capital and operational costs.
- Quick delivery.
- Low weight (devices like the CINVA-Ram can, if necessary, be taken along as unaccompanied flight luggage; easy to transport on wheelbarrows or bullock-carts).
- Small in size, thus little storage space required.
- Simple to handle, even for unskilled workers.
- Apart from filling the mould and lubrication of moving parts, low maintenance requirements.
- Possibility of repairs in local workshops, no special spare parts required.
- Usable at any location, since only muscle power is required.
- No additional costs of energy.
- No time loss due to failure of energy supply.

Disadvantages of manually operated presses
- Low rate of production per machine (on average between 40 and 150 blocks per hour), thus requiring a number of machines to achieve a reasonable output.
- Low compaction pressure (averaging 0.5 to 2.5 N/mm²), hence poor quality of soil blocks (i.e. lower compressive strength, higher moisture absorption, susceptibility to disintegration).
- Tendency to produce irregular block sizes.

or compaction, depending on compressing system, if filling the mould is done manually.
- Extremely tiring operation; thus, in the course of a series production, tendency of gradual drop in quality and uniformity of blocks produced, if the pressure is continuously exerted by the same person.
- On account of the lower compaction pressure, necessity of adding larger proportions of binder (consequently increasing the costs), in order to achieve sufficient ultimate strength and water resistance.

Advantages of automatic, motor-driven presses
- High rate of production (on average between 200 and 1500 blocks per hour).
- High compaction pressure (between 4 and 24 N/mm²), hence good quality of soil blocks (optimum dimensional uniformity, stability of edges and high compressive strength, low moisture absorption, longevity, saving of costly and tedious surface treatment, appropriateness for multi-storied buildings).
- Continuously uniform quality of blocks, since no muscle power is applied.
- Requirement of only small proportions of binder (thus saving costs), on account of the high compaction pressure.
- Reduction of manual work, thus saving costs, where wages are high.

Disadvantages of automatic, motor-driven presses
- High capital and operational costs.
- Relatively long delivery time.
- Usually very heavy, requiring powerful lifting gear and vehicles for transportation, ie. transports are troublesome and expensive.
- Large size, requiring large working area, making safe storage under lock and key difficult.
- Requirement of high insurance cover.
- Necessity of skilled labour for operation of machines.
- Maintenance requirements compatible with those of motor vehicles.
- Requirement of special tools for repairs; spare parts possibly expensive and difficult to get, or only after long delivery time.
- Dependancy on local energy supply.

Summary

The above list of advantages and disadvantages of the different categories of soil block presses lead to the following conclusions:

Small, manually operated machines are best suited:
- for projects in remote areas, or those that lack the necessary infrastructure;
on small building sites, with limited working space;

- in areas of low precipitation, thus excluding the danger of excessive water absorption;

- for small building projects with single-storied structures, for which the quality of soil blocks is of less importance;

- in places, where the potential for self-help inputs is high;

- or where entrepreneurs, with a small capital base and a team of unskilled workers, produce soil blocks for the local market.

Powered, high capacity machines are advantageous:

- where sufficient financial resources are available;

- in cases where high production rates are needed and there is a high demand over a long period;

- for projects, that specify better qualities of soil blocks;

- in working environments with sufficient energy supply, as well as maintenance and repair facilities;

- in cases, where labour is expensive or not easily available;

- or in case of disaster aid operations, which necessitate efficient and quick help, and good, cheap material in large quantities. (Quite often, tents and other temporary accommodations are provided at high costs, requiring more permanent substitutes later on. It is wise to help the disaster victim to build stable, permanent houses straight away. Thus it could be a far better bargain, to invest the money, which usually is spent on provisional measures, in the procurement of a high capacity soil block press.)

In view of the vast choice of machines available, it seems difficult to decide which one should be bought. If there is not enough money to buy expensive equipment, the choice is smaller, and the decision much easier. But generally, the following points need to be considered, especially when the available resources allow for the purchase of higher priced equipment.

Ancillary devices: Does the soil block press incorporate all the functions required for block production, or does additional equipment (crushing machine, sieve, mixer, measuring scoop, etc.) have to be procured? Consideration should not only be given to the costs, but also to the required storage and working space, as well as transports.

Material quality: Even though the compressive strength of blocks, in most cases, need not be high — the quality of CNVN-Ram blocks is structurally quite adequate — it is important to note, that weakly compacted blocks are porous and easily absorb moisture, the course surface is difficult to keep clean and can be abraded easily, while cracks and cavities are likely to harbour vermin. Such surfaces usually need some protective coating, which naturally incurs additional costs. Denser blocks, which have been compacted with pressures upwards of about 7 or 8 N/mm², can remain untreated, offer no refuge to insects, and can be done with small quantities of binder (i.e., cement or lime). Alternatively, in case of low compaction pressures, a chemical additive (e.g., asphalt-based) can provide the necessary substrate resistance. However, such additives do not increase the compressive strength of the block, and it should also be remembered, that these substances invariably have to be imported, thus making the production of blocks more expensive and dependent on supplies.

Block format: Small sizes require a greater number of blocks per cubic metre than larger ones, so the overall effort needed to produce small blocks is greater than that of making large ones. Furthermore, masonry constructions with small bricks require more mortar, since the proportion of joints is higher. Therefore, the best block format is determined by the maximum weight and size that can be easily handled by a single person.

Manual work: It is generally accepted that 8 hours represent a working day. Considering that a manually operated press requires the person, who pulls or pushes down the lever, to exert a great force, up to about twice every minute, it becomes clear that gradual exhaustion causes diminishing performance and lower quality blocks. In development projects, this work is frequently done by unskilled workers, who commonly are not blessed with regular or nourishing meals, and thus possess less strength and stamina. In view of this, every means of facilitating manual operations should be given priority, if the financial resources permit. If a motor-driven machine is chosen, it would be advantageous to also be able to operate it manually, in case of short supply of energy, or failure of the motor.
The soil block presses, of which detailed information and illustrations (from manufacturers' pamphlets, publications and other sources) are given in this annex, correspond to those listed in section 3.2.1. The selection of material presented here was determined by the choice of available documents and their suitability for reproduction. Some machines are well documented, while the information on others is, in some cases, totally inadequate. Thus, the number of pages of information on the respective machines only indicates the availability of suitable material, but has nothing to do with the quality or appropriateness of the machines.

The aim of this compilation is to enhance the usefulness of the document, by helping the user to understand the rather abstract list in section 3.2 better. Also, as a kind of catalogue, potential soil block builders may obtain sufficient information from a single source, rather than having to conduct costly and time-consuming correspondence with various manufacturers. Although a final document is planned later, it is hoped that this study can be put to immediate use, in spreading the information on soil block presses, especially through the question and answer services of the respective appropriate technology centres. The binding of this document was thus chosen to facilitate photocopying.

The machines included here are:

- CINVA-Ram
- TEK Block Press
- La Palafitte
- CFTA-Ram
- CENAEMA Earth and Loam Block Press
- AVM Block Press
- SIGO Dirt-Cement Brick Press
- Neili 60 Manual Soil Brick Press
- MARO Block Press
- CTBI Block Press
- UNATA
- JESSON Brick Press
- A.B.I. Block Press
- CTA Block Press
- GE0 50
- SATURNIA
- RUFFON Block Press
- ELLSON Blockmaster
- ASTRAM
- CHATEarre Perou Block Press
- Multibloc BREPAK Block Press
- ZORA Brickmaking Machine
- TERSTARAM Block Press
- CERAMAN Manual Press
- SEMI-TERSTAMATIC
- CERAMATIC
- LESCHA SDN
- CLEW 3000
- ECOBRICK 1000
- NEILI Mechanpress
- TERRE 2000
- PACT 500 Block Press
- CTBI Hydraulic Press
- GEO 500 Semi-Bloc, Unita Atelier
- GROUPE UNIPRESS
- ULTRABLOC IMPACT 1/2
- TERRABLOCK Duplex
- HANS SUMPF Brick Machine
- EARTH BRICK MACHINE
The CINVA-Ram Block Press is a simple, low-cost portable machine for making building blocks and tiles from common soil. The press, made entirely of steel, has a mould box in which a hand-operated piston compresses a slightly moistened mixture of soil and cement or lime.

The press was developed as a tool for small individual or mutual self-help programs. It was designed by Rafael Ramirez, an engineer, at the Inter-American Housing Center (CINVA) of the Organization of American States in Bogota, Colombia, in 1952. It is still the cheapest and lightest machine available and has been copied and modified several thousand times in all parts of the world.

### TECHNICAL DETAILS

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>63 kg (140 lbs.)</td>
</tr>
<tr>
<td>Height and base width</td>
<td>76 x 17 x 46 cm (10 x 15 x 26 in)</td>
</tr>
<tr>
<td>Application</td>
<td>36 kg (80 lbs.)</td>
</tr>
<tr>
<td>Force of lever</td>
<td>140 lbs. (640 N)</td>
</tr>
<tr>
<td>Bearing Strength</td>
<td>2500 psi (17,240 kPa)</td>
</tr>
<tr>
<td>Size of blocks</td>
<td>9 x 14 x 29 cm (3.5 x 5.5 x 11.5 in)</td>
</tr>
<tr>
<td>Jars up</td>
<td>10 x 13 x 30 cm (4 x 5 x 12 in)</td>
</tr>
<tr>
<td>Size of tiles</td>
<td>9 x 14 x 29 cm (3.5 x 5.5 x 11.5 in)</td>
</tr>
<tr>
<td>Lays up</td>
<td>5 x 15 x 30 cm (2 x 6 x 12 in)</td>
</tr>
<tr>
<td>Average number of blocks</td>
<td>300-500</td>
</tr>
<tr>
<td>Average number of tiles</td>
<td>2500</td>
</tr>
<tr>
<td>Average number of blocks</td>
<td>150</td>
</tr>
<tr>
<td>for a two-room house</td>
<td>2500</td>
</tr>
<tr>
<td>Average number of blocks</td>
<td>150</td>
</tr>
<tr>
<td>per 50 kg of cement</td>
<td>500</td>
</tr>
</tbody>
</table>

### REFERENCES

OPERATING THE PRESS

In order to make good compressed earth blocks and tiles, enough earth mix must be loaded into the mold box to require a hard pull on the handle. Make a few test blocks and tiles to determine the quantity of your earth mix which must be loaded into the press to give you this adequate hard pull.

There are three basic operations in making the compressed earth blocks or tiles:

1. Loading the mold box.
2. Compacting the mix.
3. Ejecting the finished product.

DETAILED MOVEMENTS

1. Place the handle in the rest position and open the mold box by swinging the cover horizontally until its stop is reached; then fill the mold box with prepared earth.

2. Close the mold box, skimming off excess earth and bring the handle to the vertical position, then release the latch.

3. Pull down the handle until it is parallel with the ground. This applies the necessary pressure to form the block. If the mold box is properly filled, this should require a "hard pull".

4. Return the handle to the original rest position, swing cover back and open the mold box.

5. Pull down on the handle in the opposite direction until it is parallel with the ground. This ejects the block.

6a. Removing blocks from the press: Place hands flat at the ends of the block, being careful not to damage the corners or edges and then gently lift the block from the mold box. Place on edge at the curing site.

6b. Removing tiles from the press: Place one flat hand on top of the tile. Keeping the tile and wooden insert together, slide both off the mold box until the other hand can be placed beneath the insert. Place both on edge at the curing site and then gently separate the insert from the tile.

ADJUSTING THE PISTON

In full ejection position the piston head should be level with top of mold box. Continued use of the press or accidental jarring may loosen the two guide angles or force them out of vertical alignment, producing blocks having unequal end dimensions. To correct this, move guide angles by regulating adjustment bolts.

MAINTENANCE AND REPAIRS

The machine must not be overloaded. This happens when too much soil is placed in the mold, and another man is asked to "give a hard pull" with compacting. Never allow two men on the handle, either for compacting or ejecting the block.

All moving parts and wearing parts (trolleys, pins, pressure planks, guide plates, piston cylinder, bearings and supports of axles) should be well lubricated every four to eight hours with heavy oil or grease to insure smooth operation and cut down on wear.

The pins which secure the pin shafts, compression yoke and roller should be replaced when broken by the largest nails available, because they will last longer than the average cotter pin. If C-ring replacements are not available, broken C-rings can be replaced by wrapping a piece of wire in the groove.

The inside of the box and the under surface of the cover must be kept clean.

Breaking and cracks are caused by loose or incorrectly adjusted guide plates.

Tapering is caused by incorrectly adjusted guide plates.

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Telex: 41523-GTZ D
Starnberg/FRG
January 1986

Compiled by:
Kiran Mukerji, Consultant Architect
Starnberg/FRG
People in both industrialized and developing countries have long been waiting for an improved version of the “Clava Ram” brick press to come onto the market. That product has arrived with the introduction of the “Meili-60” manual soil brick/block press.

The 20 tons manual press for the economic production of earth building bricks and blocks of any size offers:

- Rugged design
- Trouble free operation
- Unsurpassed economy
- High performance
- Minimum investment
- Maintenance free

The “Meili-60” press operates according to the principle of the off-center press utilizing the maximum leverage effect possible in the final phase of the pressing process. The machine easily achieves a pressing power of 20 tons, corresponding to a pressure of more than 50 kg/cm² – sufficient to achieve the desired brick density.

Technical information

- Soil brick dimension: 250 x 250 x 80 mm
- Pressing power on lever: 50 kg
- Pressing power on brick: 20 tons
- Specific pressure: 50 kg/cm²
- Density degree: 1.18
- Output per hour: 60 to 120 bricks plus

Other size bricks can be manufactured according to your specifications. Manufacturer reserves the right to change technical specifications.

Offers for manufacturing the “Meili-60” manual soil brick/block press under license in various countries will be considered.

Manufacturer reserves the right to change technical specifications.
Block Production Sequence with the NARO Block Press
(1) - MOULE EN ACIER SPÉCIAL POLI
(2) - BIÈLLES EN ACIER MONTÉES SUR BAGUES "GLYCOUR" SANS GRAISSAGE
(3) - MÉCANISME DE PASSAGE ET D'ÉVACUATION + COUVERCLE EN ACIER 1/2 DUR
(4) - SUPPORT DE COUVERCLE EN FER PLAT
(5) - STABILISATEUR EN FER CORNITRE DE 50 MM DEMONTABLE PAR 4 VIS
(6) - LEVIER EN TUBE RENFORCE Ø 40 MM
(7) - GUIDAGE PLATEAU INFÉRIEUR EN TUBE CARRE DE 80 MM DE CÔTE
(8) - POIGNÉES DE MANUTENTION COUVERCLE EN ACIER ROND Ø 18 MM
CONCEPTION BASED ON RESEARCH INTO THE PAST + EXPERIMENTATION IN THE PRESENT

- Simple and resistant mechanism,
- Minimal of physical effort,
- Compact design, Case size $0.95 \times 0.52 \times 0.33 = 0.170$ m$^3$.
  Weight (ready for use): 85 Kg.
- Double (surplus) compression
  Earth + 2% cement = 25 Kg/cm$^2$.
- Output (loading and unloading excluded): 15 seconds for a block of $29 \times 14.5 \times 11$ cm.
- Full range of technical services: assistance, analyse, climatic protection, etc.

C.T.B.I. "CONSTRUCTION TERRE BOIS INTERNATIONAL"
111 Rue du Grand Pré 91140 MUIZON (FRANCE)
S.A. au capital de 240 000 Francs N° SIRET 330.472.101.00014
TEL. 26.02.90.02 TELEX: DATA300 830 560 F
Double manual system (DSM)

a) DESCRIPTION:

Simple & resistant equipment made of current metallurgical raw materials.

Simple: in its original conception
- 1 stand
- 1 magazine press
- removable floor for ejection
- one lever for both pressing and ejection

Simple: to assemble
- strain borne by soldered parts
- bolting, and mechanical soldering, for removable parts

Resistant: by the quality of materials used, in its basic working principle.

b) OPERATING:

Stage 1 - Filling of Frame:
The frame is filled by hand using a shovel or bucket. The quantity of earth required is indicated by the rest position of the adjustable cover plate.

Stage 2 - Clamping of Frame:
To close frame, simply slide the cover plate forward over the opening.

Stage 3 - Pressing by Lower Plate:
Pressure is applied in two stages. First the lower part is raised by bringing the lever from a vertical into a horizontal position. This requires very little effort.

Stage 4 - Pressing by Upper Plate:
As soon as the lower plate stops rising, the upper plate is automatically lowered a short way, thus multiplying satisfactorily the final pressure exerted.

Stage 5 - Opening of Frame:
The frame is opened by sliding the cover plate back across the opening.

Stage 6 - Ejection:
The earth block is ejected by lowering the lever from a vertical to a horizontal position. This is a simple operation that requires no change in the position of the worker in relation to the machine.

Then back to Stage 1 by bringing the lever back into the vertical position.

c) PHYSICAL CHARACTERISTICS:

- Weight: 85 Kg.
- Height: 1,02 m without lever/2,25 m with removable lever.
- Length: 0,65 m without cover rest or stabilizer, 1,15 m with cover rest and stabilizer.
- Breadth: 0,28 m
- Average strain perpendicular to lever during pressing operation: 30 daN
- Force exerted on block at end of pressing operation: 15 T.

Technological characteristics:

- Simple and resistant mechanism.

d) OUTPUT:

Blocks of 29 x 14,5 x 10,5:
- Weight: 10 Kg.
- Output varying with:
  - the product required
  - the number of workers involved
  - the preparation for different types of earth

Average output 50 - 90 earth blocks/hour, with 3 workers.
(preparation 1, press 1, ejection 1).

e) PACKAGING - TRANSPORT - WEIGHT:

Stand, lever and sliding cover plate are removable for easy transport.

All items are packed in a wooden box suitable for different types of transport as required.

Size of packing: 0,95 X 0,53 X 0,33, i.e. 0,17 m3; weight of 105 Kgs.

All types of transport are possible: plane, ship, truck (even small van, or boot of private vehicle); animal transport for African countries.

f) COSTS:

Depend on destination. An estimate will be given based on distance and importance of order.

This equipment is mainly designed for developing countries.
Packing, transport and prices:

The dimensions of a brick-press are as followed:

packed: 940 x 510 x 300 mm
unpacked: 700 x 450 x 260 mm

For daily prices you can better consult the price-list, which is freely available at UNATA secretariat.

For general transport modalities look at the last page of this catalogue.
Which are the advantages of the UNATA brick-press?

With the UNATA brick-press, it is possible to make building-bricks with the local earth. Such stones were already made in former times. They were called "adobes". The fundamental difference between the adobes and our building-stones, is that the adobes had to be pressed down by hand in wooden forms, while with our brick-press, a metal form is used, so that our stones are pressed under high pressure.

Using pressed stones of earth has following advantages:

You can press the stones at the same place wherever you want to build. The structure of the local soil is often suitable to make building-stones. The volume of water is minimal, so it is possible to build during the season. These circumstances give you the possibility to reduce production-costs and time considerably.

Working with the brick-press does not require special qualifications. When it is carefully used, it can be passed on to other people and communities (for instance by a sort of renting system). So individuals as well as communities can use the brick-press without high expenses. Houses can be constructed more easily because of the regular form of the stones. These stones also better resist the tropical circumstances than the traditional adobes.

Advantages of the more perfectionated presses:

The UNATA brick-press has a low weight: 80 kg. It is easily transportable from one place to another, even when no carriages are available. Provided with the fastening beam, which makes the press more stable, it can be moved over long distances by four people without a problem. The low price makes it purchasable for persons, communities, cooperatives and little undertakings, who don't have much financial means. The UNATA brick-press is suitable for building dwellings, buildings for agriculture and buildings for public use.

After you have pressed, the power-unit has to be removed in opposite direction of the press, as far as possible, and the stone comes out.
How to use the brick-press?

It is a simple machine, operated by hand. Maybe it's good to make a team, that's responsible for digging, pulverizing and pressing the stones. If necessary one can add a stabilizer (cement or mortar or a decoction of banana-leaves).

The brick-press has to be placed on a fastening-beam and a flat underground. One opens the cover and fills the form with earth, which is pulverized and sifted. One can add a stabilizer (5% mortar, cement or a decoction of banana leaves), but this is not indispensable.

Close the cover and the stone is pressed by one person.

Production capacity.

Depending on the number of workers, for instance 2 to 6, it is possible to press 20 to 50 bricks an hour.
The dimensions of the brick are: 29 x 14 x 9 cm.

According with these dimensions, one needs about 33 bricks a square meter to build for instance a dividing-wall.

The building of a little house in Rwanda

A water-level, a rectangle and a string were sufficient.
A NEW concept in hand-operated brick presses has been developed by Mr. Harold Jesson, of Port Elizabeth. The beauty of this press is that it's made mainly of soil that is available anywhere and at virtually no cost, and most subsoils, including the layers containing organic material, are suitable for providing the soil aggregate.

The press is designed to bring what is believed to be a greater degree of pressure on to the mixture than has been possible before.

A production rate of about 1,200 bricks a day could be expected from three inexperienced operators from each machine. Much more could be operated by the company.

- It is very mobile and completely self-contained on a flat surface without need for elevated riggering.
- Incorporates a dial and a hopperinged for the machine which can be set on an adjustable position automatically and easily by over-spilling.
- The dial opens and closes automatically and quickly at the correct position.
- Converts about 70 kg of pressure on the top and 30 kg on the bottom of the box in less than 10 seconds.
- It is easy to operate and only takes a few minutes to bring the brick to the vertical position and couple it with the machine.

The beauty of this press is that it uses mainly soil that is virtually no cost, and any soil that contains organic material is suitable for providing the soil aggregate.

With this machine, soil excavated on a building site can be used to make the bricks you're going to need to erect the building.

**Dirt-Cheap Building Bricks**

**by NIC SHYMAN**

Mr. Jesson demonstrating his self-contained brick-making machine, which has a capacity of 1,200 bricks a day.

**Dirt-Cheap Building Bricks**

**by NIC SHYMAN**

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PRESSE À PARPAINGS DE TERRE
BREVETÉE - S.G.D.G.

Notre presse à parpaings permet d'obtenir des parpaings de terre extrêmement compactés de 5 cm, 10 cm ou 15 cm d'épaisseur. Cette petite machine, étudiée et réalisée dans nos ateliers présente l'avantage d'être très maniable ; sa robustesse lui garantit un long usage sans aucun entretien.

RENDEMENT DE LA PRESSE : deux employés peuvent moudre facilement 500 blocs de terre dans une journée normale de travail.

MOULES À MAIN : nous fabriquons des moules à mains pour parpaings de ciment.

<table>
<thead>
<tr>
<th>Moules de</th>
<th>20 cm pleins</th>
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<tbody>
<tr>
<td>15 cm creux</td>
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<tr>
<td>10 cm creux</td>
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ainsi que des moules «claustrots» dit «boîte aux lettres».
COMPONENTES DE LA MAQUINA BLOQUERA C.T.A

PLATAFORMA DE SOPORTE DE MATRICES Y COMPRESION

PLANTA DE SERIE DE MATRICES Y COMPRESION

EJE DE ELEVACION Y COMPRESION

PLANTA Y BRAZO FIJADOR DE RECORRIDO DE COMPRESION

PALANCA Y BRAZO FIJADOR DE RECORRIDO DE COMPRESION

CUCHILLO

GUIAS REGULABLES

VISTA LATERAL
CTA Block Press,

- Placing the dividers beforeilling the mould.

- Position of level just before compaction phase.

- Pulling out the dividers after compaction.

- Removal of the everted bricks.

- Laying out the fresh bricks for drying.

- On-site brick production with the CTA Press, for a church project in Paraguay.
FABRIQUEZ VOUS-MÊME VOS BRIQUES EN TERRE COMPRESSÉE
(Produce yourself compressed soil blocks)

- Investissement minimum.
  (Low cost).

- Manipulation simple et rapide.
  (Easy and quick to handle).

- Bonne qualité des briques.
  (Prime quality blocks).

Une équipe pluridisciplinaire,
une expérience de plusieurs années, plus de cinquante réalisations de terre : le CENTRE DE TERRE vous aide à construire

CARACTÉRISTIQUES

- Compression à double effet
  (Dual compaction action)

- Force maximale : 8 tonnes
  (Maximal strength)

- Pression moyenne : 15 à 20 bars
  (Mean pressure)

- Production : 20 à 50 briques/heure
  (Output)

- Poids de la presse : 100 kgs
  (Press weight)

- Dimensions minimales :
  (Minimal dimensions meters)
  L 0,40 x l 0,35 x h 1,00 (m)

- Caractéristiques des briques :
  (Blocks characteristics)
  - longueur (length) : 29 cm
  - largeur (width) : 14 cm
  - Epaisseur (Thickness) : 9 cm
  - Poids (Weight) = 7 kgs.

UTILISATION (USE)

- Utiliser une terre argile-sableuse légèrement humidiﬁée et additionnée éventuellement de ciment ou de chaux (4 à 5 %) bien malaxée.
  (Use clayed sand soil lightly moistened and eventually add lime or cement 4 -5 % well mixed).

- Fixer la presse horizontalement sur une longue pièce de bois.
  (Fix tightly the press on a long beam).

- Le levier est manipulé par une seule personne.
  (The lever is handled by one person of the same time).

- Les briques sont stockées à l’abri pendant 15 jours avant leur utilisation.
  (Shelter the blocks during 15 days before use).

- Nettoyer et graisser la presse après chaque utilisation.
  (Clean and oil the press after every use).

FONCTIONNEMENT (WORKING PROCESS)

- Remplir le moule
  (Fill up the mould)

- Rabattre le couvercle
  (Shut down the cover)

- Compression
  (Compaction)

- Ejecter le bloc
  (Block ejection)

- Retour en position de remplissage
  (Return to the fillin position)

PRESSÉ À TERRE MANUELLE
(MANUAL PRESS)
la machine GEO 50 est entièrement démontable.

L'entretien et la maintenance peuvent être ainsi facilement assurés avec un outillage simple.

- **Découpe en plaques d'acier épais, soufflées.**
- **Plateau inférieur** : plaque d'acier épais perforée, fixée sur support tube potelet 50 mm et guidée par roulements stanches sur profilés en inox laminés.
- **Coussinet** : plaque d'acier épais perforée et linéaire par l'intermédiaire de trous.
- **Arceau en fer plat cintré**.
- **Support de transmission des efforts** : plaque d'acier épais.
- **Chemin de roulement** : axe par plat articulé par arêtes à X5 synchro.
- **Joint de tube potelet formé**.
- **Enfiches de couplage articulés, tournant par bout-verseur, fer plat platé.**
- **Support stabilisateur amovible** : pointe 50/50 mm raccordé par 1 usinage profond.
- **Rallonges levier amovibles, tubes tige pliables.**
- **Roulements d'appui, étanches double lisse avec étoile acier commercialisée 6 30mm.**
- **Articulation sabot - lubrifiée**.
- **Système de suspension** : ensemble roulette-chemin de roulement à articulation et ressorts de rappel.
**The SATURNIA Press** - developed at ETH-Zürich by B B Sulzer

**AIM**

- Improvement of productivity of hand press, compared with that of the CINVA-Ram.
- Quality of end product:
  a. Better consistency of compressive strength values through more accurate filling of mould (2% difference in filling can lead to 2% variation in strength)
  b. Pressing on both sides, in order to achieve better, homogeneous compaction on both faces of the block.

**CONCEPT**

- Hand press.
- Mobility on wheels.
- Compaction through toggle lever (like the CINVA-Ram)
- Mechanism under the mould (unlike the CINVA-Ram)
- Lid attached to cam (unlike the CINVA-Ram), such that it is buffered down during compresion, making the top surface compacter.
- Filling and measurement of the soil mix in a separate unit, which is adjustable to get optimum quantities, depending on the type of soil used.
- Possibility of making perforated blocks by means of inserts. (Sulzer: This proved to be a fallacy!)
- Compression and extraction following each other in the same movement of lever.

**DISADVANTAGES** (according to B B Sulzer)

- Price approx. 2000.- sFr, if manufactured in Switzerland (approx. 1200.- sFr, if made in a low-wage country).
- Weight approx. 200 kg (3 x CINVA-Ram).
- Hand press: difficult to motorize.
- Higher productivity (4 blocks/min) is illusory, since a team of 2-3 men cannot stand the effort for an 8-hour day.
- Pressing is not the best way to produce blocks; adobe is superior.

However, right solution for soil-cement, or other pulverulent stabilizer. Especially suitable when the area for drying is small (pressed blocks can be stacked immediately on removal from the press).
No foundation required.

The machine can be transported by bullock cart to the remotest village.

Hand operated. No engine, no motor.

Simple to operate. Employs unskilled labour.

With “Soil on Site” there will be no transport delays, no breakages, no waste and with stabilised-soil no burning.

Hand operated. No engine, no motor.

Simple to operate. Employs unskilled labour.

With “Soil on Site” there will be no transport delays, no breakages, no waste and with stabilised-soil no burning.

Manufacturer: ELLSON BLOCKMASTER
Kathiawar Metal & Tin Works Pvt. Ltd.
9 Lati Plot, Rajkot (Gujarat), India

Distributors: JOSHI INDUSTRIES
Rajkot Nagarik Sahakari Bank Building
Room No. 4, First Floor
Dhebar Road, Rajkot 360 001 (Gujarat)

All steel welded assembly.

Base: 28" x 17".

Height: 36".

Inclined legs extend to 2 feet from rear of base.

Total weight: 456 lbs.

Inclined legs and operating lever fully detachable.

The "pull-down" completed, the clamp released, out comes a "true to shape" home-building block 12"x5"x4" with built-in Elsson high compression. The block is picked off right away.

Consistent charging of the mould is the very key to efficient operation of the Blockmaste. A specially designed triangular scoop is overfilled with a "ready-for-use" mix. The mix is struck off with a preset adjustable striker. The scoop now contains just the right amount of mix to be emptied into the mould. Proper charging of the mould ensures blocks of uniform weight and density. Note the two men on the operating lever standing on the inclined legs, ready for the "pull-down." These men must experience an evident effort in completing the compression stroke.

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The Elsinor Lesson

- Use of ideal materials: One of the cheapest and most readily available building materials is common earth. It has been used for thousands of years for floors and walls in all parts of the world. In India earth is widely used in building materials even now, especially in areas having dry climate. Adobe building blocks, stones set in mud, sun-dried bricks and the pise-de-terre methods persist in this day.

- The problem: Traditionally used, earth constructions suffer from various defects, viz., poor durability when exposed to weathering, movement of walls due to moisture and temperature changes, impermeability of protective coatings such as cement plaster and stone, unhindrance of dusts.

- Substitution: Many of the above drawbacks can be overcome by adding a small quantity of cement (or other stabilizers such as lime, bisumum cutback ad), to earth soil and by applying mechanical pressure to produce well graded, true-to-shape building blocks.

- Type of soil: Nearly 80% of the earth's soil is Stebiliation: Many of the above drawbacks can be overcome by adding a small quantity of cement (or other stabilizers such as lime, bisumum cutback ad), to earth soil and by applying mechanical pressure to produce well graded, true-to-shape building blocks.

- Mix: To obtain a uniform mix of mud, sand, silt, and clay, one must select a uniform soil, to which they are subjected. This may be obtained with lime or similar material. For example, sand-lime-cement plaster is applied thinly and used instead of cement. Sand-lime-plaster is applied thinly and used instead of cement. Sand-lime-plaster is applied thinly and used instead of cement.

- Use of lime: Stabilization. Good results can also be obtained when working with soils of high clay content. Lime is used in conjunction with cement (thereby also reducing the cement quantity required) affords better impermeability to the resulting blocks. The advice of a soil testing laboratory in such cases is important. The advice of a soil testing laboratory in such cases is important. The advice of a soil testing laboratory in such cases is important.

- Floor tiles of size 12"x12"x2" can also be produced. A well graded mortary mix is necessary. The objective of this mix is to make the tiles more resistant to wear to which they are subjected. To produce lighter tiles, a lime-cement mix of higher proportion is common. The use of cement (2:1) in spread on the bottom of the mould box before filling it with the soil-cement mix. This layer can also be mixed with mineral colours.
UNE PRESSE À BRIQUES
AU TRAVAIL:
LA "BLOCKMASTER"

...TOUT D'ABORD... UNE BONNE DOSE...

DE TERRE...

LE REMPLISSAGE TERMINE, LE CONVREUX EST FERMÉ ET VEROUILLÉ

LE BRAS EST AMORCE (SANS GRAND EFFORT) FALISANT RE
MULLE ET COMPRESSANT LA TERRE...

ET LE BRAS ABAT LA MAXIMUM DE SA COURSE FAIT REMONTER LA BRIQUE

ET VOILÀ UNE MAGNIFIQUE BRIQUE DE TERRE COMPRESSÉE QUI, UNE FOIS SECHE, SERVIRA PEUT-ÊTRE À LA CONSTRUCTION DE L'UN DE CES SÉNITIQUES BOSALICUS...

(Excerpt from Bibl. 06)
Plate 1. The Astram

Plate 2. Filling the Astram mould with soil

Plate 3. Soil Block Compaction

Plate 4. Ejection of soil block

FIG.1. ASTRAM

Developed at ASTRA
Centre for the Application of Science
and Technology to Rural Areas
Indian Institute of Science
Bangalore 560 012 / INDIA

Manufacturer:
M/s AEROWEL INDUSTRIES
BS, HAL Industrial Estate
Bangalore / INDIA
The presence of clay in a soil can be easily recognized by its tendency to form lumps in the dry condition. A good amount of clay is indicated when a dry soil lump cannot be easily crushed in the hand. The presence of coarse sand particles can be ascertained by squeezing the wet soil in the hand. If the soil is too clayey, it can be improved by mixing sand or sandy soil. However, highly clayey soils can pose problems while mixing. The rod loams and latritic soils of South India are generally suitable for compacted soil blocks.

It would be ideal if the soil at the site of the building can be used for the making of the blocks. This would completely eliminate the need to transport the blocks. In the event of the local soil not being satisfactory for block making, one could consider mixing it with a better soil transported from a different spot. As a rough guide to the quantities of soil needed, it may be assumed that a 25 square meter (plinth area) house will need about 19 cubic meters of loose soil. This much of soil can be obtained by digging to a depth of 15 cm over a 10 m x 13 m site.

3. THE ASTRAM (Plate-1)

Figure 1 shows the end elevation of the ASTRAM. The machine consists essentially of (1) a mould to receive the soil, (2) a toggle lever mechanism to compact the soil and (3) a frame to support the mould and the toggle lever. The mould is provided with a stiffened plate lid which can be locked down after closing with an eccentric locking mechanism. The mould is interchangeable and currently moulds of two sizes are being used with the ASTRAM. The two moulds can produce blocks of sizes 30 cm x 14.5 cm x 10 cm, and 30 cm x 23 cm x 10 cm respectively. The frame of the ram can also easily accept moulds of other sizes, if needed. Figure 2 shows the scoop which is to be used in measuring out the right amount of soil. Moulds of different sizes must be used with corresponding scoops. The ram with the smaller mould weighs 107 kg.

4. SOIL BLOCK MANUFACTURE IN THE ASTRAM

The following steps are to be followed in compacting soil blocks in the ASTRAM.

1. Preparation of the soil:

   It is desirable to remove roots and large pieces of stones (> 1 cm in size) from the soil before producing the block. The compaction of the soil in the machine must be carried out at a moisture content which is as close to the optimum moisture content as possible. It is not essential to carry out an 'optimum moisture content measurement' for every block making operation. A simple field test can be used to determine whether the moisture content is right or not. When the moisture content is optimum, the soil can be easily pressed into a ball in the hand and it hardly sticks to the palm in the process. For a majority of the soils, this moisture content varies between 12% to 16%. The requisite amount of water is to be added to the soil with a fine sprinkler and the soil is to be thoroughly mixed by hand.

2. Soil block making in the ram:

   (a) The lid of the mould is first opened completely and the compaction lever raised to a vertical position (Plate-2). The lever must be held as close to the mould as possible. The interior of the mould may be initially sprayed with used lubricating oil or any other cheap oil (This may be repeated once after 5 or 6 blocks are made). The thin base plate of the ram is now placed at the bottom of the mould. The prepared soil is now measured out in the scoop and poured into the mould. The sharp end of the scoop must be pushed deep into the mould and the soil emptied by an up and down motion.
(b) The lid of the mould is now closed with a slight impact and is held down by the eccentric looking arrangement.

(c) The compaction is now carried out by pressing the lever down till it reaches the stopper (Plate-3). During this operation, the base of the mould moves up by 5 cm.

(d) The lid is now opened by lifting the block lever. The compaction lever is pushed further down through an angle of about 20°, forcing the compacted mud block out of the mould (Plate-4). The block may now be removed by sliding it horizontally along with the base plate. The lever must be held down while the block is removed from the machine.

The block is now kept for drying/curing on its side and the base plate brought back to the mould for the next block. The compaction lever is now raised up and the base plate inserted in the mould. The machine is now ready for the second block.

(iii) The stacking of blocks:

The blocks are to be stacked for drying/curing in a shaded area on level ground. The area used for stacking must also be as close to the machine as possible. The blocks may be stacked one above the other up to five layers.

(iv) Hints for trouble-shooting in compaction:

(a) In a satisfactory compaction, some resistance will be felt towards the completion of the stroke. In case, the compaction is too easy, it is possible that too little soil was used and the resulting density and strength will be on the low side. A little extra soil may be fed into the mould so that increased density and strength will be achieved.

(b) Sometimes the compaction stroke cannot be completed due to high resistance. It is possible that one of the following is happening:

1. Too much soil has been fed into the mould.
2. The amount of moisture in the soil is inadequate.
3. The soil is too dry.

The situation in cases 1 and 2 can be remedied by using lesser soil and more moisture respectively. Situation 3 needs a mixing of more clayey soil to reduce compactive effort.

(c) The weight or the density of the block is generally a good index of its quality. The 30 x 14.5 x 10 cm block will generally weigh 8 kg or more when it is just out of the machine. Similarly the 30 x 23 x 10 cm block will weigh 13 kg or more. A block which is very much lighter must be rejected. The block with low density can often be usually recognised by its rough and porous surface texture.

(d) If the moisture is too much the soil will tend to stick to the sides of the mould. The corners will appear to be out of shape.

(e) The locking lever of the lid can sometimes get jammed. This can happen especially if excessive soil has been fed into the mould. The lid should not be forced open in such cases. The locking bolt of the lid must be loosened with a spanner to release the locking pressure. The bolt must be brought back to the original position before the next block is made.

5. STABILISED SOIL BLOCKS

It is generally preferable to make compacted blocks out of stabilised soils for exterior use. This is not to discredit the fine performance of mud walls which is often observed in many rural areas. The soil properties which contribute to the durability of mud walls have not yet been clearly understood. It is hence desirable to be more circumspect about the performance of unstabilised soil blocks, until more detailed information about soil behaviour under varying climatic situations is available.
EL BLOQUE DE TIERRA PRENSADO

El bloque de tierra prensada es una técnica intermedia entre el adobe y el tapial. Se diferencia del adobe porque utilizamos un molde para presionar la tierra directamente dentro de un local, colocando hasta un dos hileras los bloques frisos. Los bloques secan en una semana, al sol y al viento, y en un mes, dentro de un local. También es común hacer este trabajo con materiales comprados en el mercado local.

Las ventajas que se puede hacer bloques en época de lluvias, porque no se puede almacenar en un molde de tierra suelta y no se barrer.

Se necesita una máquina especial, una prensa para hacer bloques de tierra (las bloqueteras para cemento no sirven).

Existen varios modelos de prensas. CRATERRE ha diseñado y construido en 1980 en los talleres del observatorio de Huayao (Instituto Geológico del Perú) un primer modelo de prensa fabricado con materiales comprados en el mercado local.

Actualmente, CRATERRE está construyendo varias prensas en talleres de Huayao, que se prestan a construir bloques en comunidades que van a realizar construcciones comunes.

La preparación de la tierra: Es tan fácil como en el adobe. Pero, hay que desmenuzar la tierra y secar las piedras. Mejor suelde es cemento (no más de medio pulgada).

Verificación de la humedad de la tierra: La cantidad de agua en la tierra debe ser muy exacta. Debe ser un poco húmeda. El control preciso de la humedad está descrito en la página del tapial.

Moldeo:
- Se lleva la tierra a la mesa de la prensa por montoneros del proyecto, para que el hombre que coloca la tierra tenga siempre tierra a la mano.
- En el fondo del molde se coloca una planchita de tripay.
- Se llena el molde con tierra húmeda, se cierra la tapa.
- Se llena la prensa con fuerza y se presiona la tierra. El volumen de la tierra se reducirá a la mitad (la presión es de 10 a 20 Kg/cm²).
- Terminando la presión, se abre la tapa por el lado de la mesa.
- Se sigue bajando la palanca y salen de la prensa las planchas de tripay.
- Se llena el bloque con la planchita en la segunda mesa, sin chispa, se lleva al lugar de secado.

Con este sistema se puede producir 120 bloques de 28 x 28 x 9 cm. cada hora. El bloque de tierra prensada es tan duro que se puede usar sin problemas. Se pone de cabeza y se recupera la planchita de tripay para el siguiente bloque.

(Curso de CRATERRE)
FICHE DESCRIPTIVE DE LA PRESSE « CRATERRE »

- Presse manuelle à pression statique.
- Moulage, ouverture automatique du couvercle et démoulage obtenu par abaissement du levier d'un mouvement continu et uniforme.
- Poids : presse seule : 230 kg, presse toute équipée : 280 kg.
- Pression de compactage : 15 à 20 kg/cm².
- Taux de compression : 1.67.
- Profondeur max. du moule : 160 mm.
- Course max. du plat : 70 mm.
- Dimensions des blocs : variables - système de moules interchangeables : 1 bloc de 28 x 28 x 8 cm ; 1 bloc de 28 x 28 x 8 cm à encoches latérales ; 2 blocs de 28 x 12.8 x 8 cm ; 2 blocs de 28 x 12.8 x 8 cm à encoches latérales.
- Nombre de blocs/heure : 120 blocs de 28 x 28 x 8 cm.
- Volume possible compacté par jour : 3,23 m³.
- Nombre de personnes : minimum 2 à 3.
- Entretien : par graisseurs à coupelle.
- Accessoires : 1 table destinée au stockage de 60 kg de terre, 1 table destinée au dégagement des blocs, 10 plaquettes de contreplaque pour le transport des blocs frais par type de moule.

Cette presse a reçu un brevet d'invention en 1982.
**Soil Selection**

Not all soil types are suitable for block production. However, Latitana soils, which are clayey in nature and found in the tropical and semi-tropical regions of the world, are generally acceptable. In this type of soil, the clay content of the soil is more susceptible to the action of swelling and shrinkage and would need to withstand the addition of water.

The type of soil may be stabilised by the addition of a suitable agent and where the clay content is less than 30%, cement would be suitable. For higher clay contents, stabilisation with hydrated lime would be more appropriate. The addition of the stabilising agent will add the compressive strength of the block and improve durability under wet weather conditions.

Compaction of the stabilised material on the BroPaK with a pressure approaching 10 MN m⁻² allows the full advantage of the stabilising agent to be realised.

**Mixing**

Mixing of the soil should be carried out after the stabilised soil has been dried under the sun. Clay, sand, and gravel (where available) to form the base cement may be added approx. 1/3. The necessary water is then added to bind the mixture and aid in production and also to work with the stabilising agent. The amount of water is approximately 12% by weight.

In general, 0.4 tons of mixed material will be required per hour to keep the pressing machinery working at maximum efficiency. The pressure required is approximately 8.3 MN per block.

Final mix proportions and amount required per block is usually found by wet sieving and trial working conditions.

**Technical Statistics**

1. Overall length (including lever arm) 790 mm
2. Overall width (excluding sector ram lever) 510 mm
3. Overall height 720 mm
4. Leveur arm extension 1560 mm
5. Press weight 150 Kgs
6. Lower arm weight 11 Kgs
7. Ejector ram lever weight 2 Kgs
8. Effective tonnage on a 44 Tonnes
9. Effective thrust on an 8.5 Tonnes
10. Effective compaction pressure 10 MN m²
11. Average production rate 3900 blocks per hour
12. Labour force required 5 men
13. Standard block size 29 x 14 x 10 cm

**Shipping Specifications**

- Length: 840 mm
- Width: 620 mm
- Height: 920 mm
- Approx. weight: 120 Kgs

**THE MULTIBLOC BREPAK BLOCK PRESS**

Producing low cost quality building blocks from stabilised soil.

Simple to operate with minimal maintenance required.

Compact and easy to move from site to site.

Ideal for use in remote areas. No power required.
The Multibloc Brepak machine comprises a moulding area of fixed size which, together with the supporting structural frame, forms an integral unit of all-steel construction. The complete unit should be mounted to a permanent foundation or may be used on a rigid timber baseboard.

Access to the mould area is via a top cover plate pivoting about a centre mounted locating pin. The cover plate may be moved to one side away from the mould opening. The compact design of the unit allows for ease of installation at site and may be used from site to site when mounted to a timber baseboard.

The machine design and manufacture is specifically in keeping with the requirements for long service life with a minimum of spare parts usage and maintenance, making the unit particularly suitable for use in areas where rural development is of primary importance.

The press is fitted with a lever arm extension and mechanical linkage which provides a means of locking the top cover plate on to the mould and also allows for initial compression of the block material within the mould area.

The Multibloc Brepak machine produced by the Building Research Establishment is manufactured under the terms of the license granted by the Establishment.

The Brepak block clamp is developed by the Building Research Establishment of the UK Building Research Establishment and is manufactured specifically for use within the block clamp.
Field Trial

Overseas Development Administration (ODA) support the first overseas field trial in Kenya of the BREPAK block making machine. The object being to evaluate this new machine under actual site working conditions. A joint research project was started in 1981 between BRE and the Housing Research and Development Unit (HRDU) of the University of Nairobi, Kenya.

The joint BRE/HRDU soil stabilisation research project consisted of three main aspects:

(i) Scientific laboratory tests to establish the proportions of materials to be used.

(ii) The on-site field trial preparation of soil mixes and production of stabilised soil blocks using the BREPAK machine.

(iii) The erection of a 50 m² demonstration structure (eventually to be used as a medical clinic) using the blocks made on-site by village labour.

The site selected for this field trial was located at Kabiro village within the Kawangware District of Nairobi and is some 18 km from Nairobi city centre.

The soil selected dealt with village soils to identify suitable local soils for stabilisation and to determine the optimum mixture contents for these soils. The most economic proportion of different stabilisers for the various soils was then selected. Sample blocks were tested to obtain wet compressive strength, resistance to moisture absorption and durability.

The local soil at Kawangware is called Murram and contains about 15% clay. Because hydrated lime is more expensive than cement it was decided to stabilise the Murram soil with cement and good quality blocks were produced.

The field trial made use of the results of the laboratory tests. These results had to be put in a simplified form for the use of people in the field. The people were able to prepare the soils, measure the required quantities by volume, prepare the mixes by hand and produce blocks on a large scale using the BREPAK block making machine.

The cost of stabilised soil-cement blocks produced by the BREPAK machine compared favourably with conventional concrete blocks of 140 mm thickness. For example, a square metre of walling built with cement stabilised soil blocks resulted in a cost saving of about 76% of the cost of a concrete block wall.

About 3000 stabilised soil-cement blocks produced by the people were used to erect the demonstration structure of over 46 square metre floor area.

The completed medical clinic at Kabiro
Best of Both Worlds

ZORA BRICK MAKING MACHINE

The advanced patented design of the "Zora" brick making machine enables the production of common salt and building bricks in a few seconds. The ready, mobile unit incorporates a unique double hydraulic ram, which provides the very high pressures to form pressure bricks in a few seconds.

The simple "Zora" hydraulic brick making machine is easy to use and converts consistent production, and also has some other advantages. The machine is weather-proofed with a light rain cover and is also available in a semi-automatic model.

Operational speed is maintained by the new design, and power is supplied by a powerful hydraulic system. The machine is covered by the manufacturer's guarantees and is available in three versions. It is supplied with a manual pump or a manually operated hydraulic pump. Apart from pure soil bricks, a wide range of other bricks such as standard-sized bricks, hollow-core bricks, and concrete bricks can also be produced.

The machine is covered by the manufacturer's standard guarantees and is subjected to worldwide testing to ensure durability under weathering conditions. The amount of moisture in the earth is one of the most important considerations and should be 18% - 20% by weight. A simple test to determine the correct amount of moisture is to use a plant or a soil test. If the soil is broken in two without crumbling and without leaving any mark on the surface, the soil is correct. If the test is too dry, the addition of water is necessary.
Block Production Sequence with the ZORA Brickmaking Machine

The ZORA Machine

Landing the starter rope

Starting the engine

Lowering the piston

Filling the mould

Compressing the block

Ejecting the block

Impact cast by throwing

Some finished interlocking blocks
PRESSE TERSTARAM

Machine manuelle pour le moulage de terre par compression.
Idéale pour la fabrication de briques en terre stabilisée et pour le moulage de briques de terre cuite.
Elle accepte des moules aux dimensions du client avec un maximum de 295 x 295 mm.
Le changement de moule se fait en 15 minutes.
Sa conception et sa robustesse a été étudiée spécialement pour les pays tropicaux.

Fernand PLATBROOD

ÉTUDE ET CONSTRUCTION DE MAChINES POUR LA FABRICATION DES PRODUITS EN TERRE STABILISÉE

CARACTÉRISTIQUES TECHNIQUES :
Course fixe du piston inférieur : 38 mm.
Rabattement du couvercle dans le moule : 15 mm.
Réglage de l'épaisseur du produit par des cales de différentes dimensions livrées avec la machine.
Poussée théorique maximum : 20 tonnes
Production journalière :
800 blocs de 295 x 140 mm.
1600 briques de 220 x 110 mm.
(12 briques à chaque opération)

PLATBROOD
20 RUE DE LA RIEZE
B 6404 CUL-DES-SARTS — COUVIN
BELGIQUE
Other brickmaking machines and equipment:

**CERAMASTER** — integrated and autonomous production unit for the production of (unfired) hollow blocks consisting of a grid mill, a double shaft mixer and a hydraulic press with rotating table.

**CERAMATIC** — high production mechanical or hydraulic press consisting of a 3-station rotary table powered by electrical or chemical motor.

**CERAMEX** — cost-effective vertical extrusion unit (without vacuum) for quantity production of bricks (water-lubricated wooden die).

**CERADES** — impact disintegrator consisting of two counter-rotating hollow drums driven by two electrical motors, specially developed for use with CERAMAN and CERAMATIC presses.

**CERAMAX** — double or single shaft mixers, horizontal or vertical.

**CERAMILL** — mill for the grinding of clay.

**CERACUT** — multi-wire manual or electrical cutter.

**RGS 200** — firing equipment for solid fuels on Hoffman or tunnel kilns.

CERATEC presents not only machinery but also a complete range of services to its customers.

We take care of the complete engineering and layout of your brickmaking plant. On demand our services perform qualified expertise and engineering for existing or planned brickmaking projects. CERATEC also frequently offers complete training courses in brickmaking for future production and maintenance personnel.

We look forward to seeing you at the next one of the major trade fairs.
the CERAMAN exists in two versions:

Type S and Type H.

Type S can produce bricks with a height up to 70 mm.

Type H permits, though only a minor adjustment, to produce either products with a maximal height of 70 mm or a maximal height of 90 mm (see table).

the CERAMAN
The reliable and versatile low cost brickmaking machine you need.

The CERAMAN is a truly low cost press operated by two persons.
Its main characteristics are its robustness and reliability, its extreme simplicity in use, its efficient performance and its portability.
In just changing moulds (a few minutes work), you can produce either plain or perforated bricks (of practically all sizes), paving tiles of every wanted design and even roofing tiles.

The CERAMAN press is one of the most widely used hand operated mechanical presses.

Brick producing with the CERAMAN requires no special skills, the clay, which is put in the mould by a shovel, is pre-compressed by closing the cover, bricks are pressed and automatically ejected by using the two levers.

The production method used is "dry" or "cold" pressing.

The CERAMAN can produce either clay bricks, fired or compressed earth blocks, or any kind of building material as long as the mould is held in hand. (Information on request).

Technical data sheet:

<table>
<thead>
<tr>
<th>Type</th>
<th>mm</th>
<th>S</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke length of the press</td>
<td>127</td>
<td>127 or 45</td>
<td></td>
</tr>
<tr>
<td>Maximum filling height of the mould</td>
<td>112</td>
<td>112 or 45</td>
<td></td>
</tr>
<tr>
<td>Height of finished products</td>
<td>20 - 70</td>
<td>20 - 70 or 20 - 90</td>
<td></td>
</tr>
<tr>
<td>Maximum nominal compression force</td>
<td>10000</td>
<td>10000 or 15000</td>
<td></td>
</tr>
<tr>
<td>Nominal compression pressure</td>
<td>kg/cm²</td>
<td>21</td>
<td>25 or 28</td>
</tr>
<tr>
<td>Hourly production</td>
<td>bricks</td>
<td>50 - 100</td>
<td>300 - 400</td>
</tr>
<tr>
<td>(Standard sized bricks 220 x 107)</td>
<td>Number of operators</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Net weight (without mould)</td>
<td>kg</td>
<td>350</td>
<td>350</td>
</tr>
<tr>
<td>Net weight of a standard sized double brick mould</td>
<td>kg</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>Size</td>
<td>cm</td>
<td>190 x 50 x 100</td>
<td>190 x 50 x 100</td>
</tr>
</tbody>
</table>

the CERAMAN
A large choice of moulds:

The CERAMAN can be delivered with a large variety of moulds; brick moulds can be fired or compressed earth blocks, or any other kind of building material as long as the mould is held in hand. (Information on request).

The moulds can be covered with an elastic layer to permit an easy remoulding.

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The moulds can be covered with an elastic layer to permit an easy remoulding.
PRESSE SEMI-TERSTAMATIQUE
Le construction et la conception permet une utilisation de main-d’œuvre peu qualifiée et d’entretien aisé par des artisans locaux peu outillés.

Ce matériel répond à un usage intensif, à une utilisation maladroite, aux contraintes climatiques (chaleur, humidité et vents de sable).

Le volant d’inertie permet d’obtenir une poussée de 20 tonnes avec seulement 1 moteur électrique de 1,5 Ch.

La régulation et la commande de la presse sont obtenues par un embrayage de voiture Renault sur-dimensionné.

Le ressort puissant dans le système de poussée évite les accidents suivants : trop de terre - corps durs dans la terre.

Cette presse accepte les moules dont les dimensions ne dépassent pas 40 x 30 cm (moulles identiques à la Terstaram manuelle).

La production journalière est de 5,000 briques de 22 x 10,5 x 6 cm (2 briques à la fois) ou 2,000 blocs de 29,5 x 14 x 9 cm.

Version moteur essence ou diesel sur demande.

Câblage multi-axe de 2,22 m x 0,70 m x 1,14 m de hauteur.

Poids B : 525 Kgs
Other brickmaking machines and equipment:

CERAMASTER: integrated and autonomous production unit for the production of (tubular) hollow blocks consisting of a kneading, a double-shaft mixer and a hydraulic press with loading table.

CERAMAN: versatile, low-cost manual brick press for the production of plain or perforated bricks, paving tiles and building cubes.

CERAMEX: cost-effective vertical extrusion unit (without vacuum) for quantity production of bricks (water-lubricated compaction).

CERADES: impact disintegrator consisting of two counter-rotating hollow dams driven by two electrical motors, especially developed for use with CERAMAN and CERAMATIC presses.

CERAMAX: double or single-shaft mixers, horizontal or vertical.

CERAMILL: grid mill for the grinding of dry clay.

CERACUT: multi-way manual or electrical cutter.

RGS 200: firing equipment for solid fuels on Holman or tunnel kilns.

And more in general all machines for the production of bricks from the simple to the most automated installations.

CERATEC presents not only machinery but also a complete range of services to its customers.

We take care of the complete engineering and delivery of your brickmaking plant.

On demand our services perform qualified expertise and engineering for existing or planned brickmaking projects.

The year-round team of our staff is operating brick plants and in developing new brickmaking machines can be used to your advantage in developing and implementing your complete brick plant.

CERATEC also frequently organizes complete training courses in brickmaking for future production and maintenance personnel.

CERAMATIC
Automatic brick press
the CERAMATIC
The renowned automatic brick press with the rotating 3-station table

The CERAMATIC is an all mechanical automatic brick press with a favourable production to capital cost ratio. Its main characteristics are its robustness and reliability, its simplicity to use, its efficient and autonomous performance and its mobility.

The CERAMATIC has an automatic rotating 3-station table, a filling station, a moulding station and a demoulding or ejection station.

Motor power is used for the automatic pressing and ejecting of the bricks and for the rotation of the table.

Bricks are produced on a continuous basis.

Through the "dry pressing" of the raw material: a simple and appropriate technology for the production of quality bricks.

The CERAMATIC can produce either dry bricks to be fired in a kiln or compressed earth blocks stabilised with cement or another binder.

Technical data sheet

<table>
<thead>
<tr>
<th>Type</th>
<th>kg</th>
<th>up to 6500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal compression force</td>
<td>kg/cm²</td>
<td>up to 65</td>
</tr>
<tr>
<td>Nominal compression pressure (standard sized brick)</td>
<td>mm</td>
<td>adjustable</td>
</tr>
<tr>
<td>Stroke length of piston</td>
<td>mm</td>
<td>60</td>
</tr>
<tr>
<td>Maximum stroke length of piston</td>
<td>mm</td>
<td>140</td>
</tr>
<tr>
<td>Maximum height of mould</td>
<td>mm</td>
<td>70</td>
</tr>
<tr>
<td>Compression ratio (product of 70 mm)</td>
<td>mm</td>
<td>186</td>
</tr>
<tr>
<td>Hourly production rate (depending on type of engine)</td>
<td>kg/h</td>
<td>600-2000</td>
</tr>
<tr>
<td>Standard size of bricks</td>
<td>mm</td>
<td>200 x 100 x 60</td>
</tr>
<tr>
<td>Number of operators</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Net weight without motor</td>
<td>kg</td>
<td>160</td>
</tr>
<tr>
<td>Size (l x b x h)</td>
<td>cm</td>
<td>200 x 100 x 140</td>
</tr>
</tbody>
</table>

the CERAMATIC
Simplicity in use and robustness for a guaranteed production of quality bricks.

Brick production with the CERAMATIC is easy and requires only two unskilled operators: one to fill the moulds and one to take the pressed bricks from the table and put them on a wheelbarrow.

In order to make the CERAMATIC, a reliable production machine: all mechanical parts have been largely dimensioned, a number of cavities have been provided for and all transmission gear has been concentrated in a closed casing.

Each CERAMATIC press is supplied with a set of first necessity tools and small spare parts.
Die neue Erdziegelmaschine LESCHA SBM bietet moderne Lösungen zur Herstellung von hochwertigen Mauersteinen aus Erden (Lehm, Laterit) ohne oder mit stabilisierenden Zusatzmitteln.

Drei spezielle Vorteile bestimmen die hohe Qualität der Lehmsteine:


Um sehr gute Wasseresistenz der Lehmsteine - selbst bei höherem Zementein- setz zu erreichen, wird ein Zusatz von LESCHA FL 1 empfohlen. Eine günstige Dosierung für Keime mit mittlerem Tongehalt ist zum Beispiel 3 % Zement und 1 % FL 1, jeweils vom Lehmgehalt. FL 1 ist stark wasserabweisend, mindert jedoch weder Festigkeit noch Austrocknung oder Atmungsfähigkeit der Wand und ist beständig gegen UV-Licht und mikrobielle Zersetzung. FL 1 sollte in Verbindung mit Zement oder Kalk verwendet werden.

Die Kosten für einen Erdziegel der Größe 25 x 13 x 7,5 cm können wie folgt kalkuliert werden:

<table>
<thead>
<tr>
<th>Material</th>
<th>Preise pro Stein</th>
<th>Gesamtkosten pro Stein</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zement</td>
<td>DM 120.00</td>
<td>DM 0,22</td>
</tr>
<tr>
<td>LESCHA FL 1</td>
<td>DM 350.00</td>
<td>DM 0,22</td>
</tr>
<tr>
<td>Kraftstoffverbrauch</td>
<td>9 l/h</td>
<td>DM 0,02</td>
</tr>
<tr>
<td>Lohnkosten bei 200 Steinen</td>
<td>DM 22.00</td>
<td>DM 0,11</td>
</tr>
<tr>
<td>Gesamtkosten pro Stein</td>
<td>DM 0,19</td>
<td></td>
</tr>
</tbody>
</table>

Um die Kosten für einen gebrannten Ziegelstein DM 0,50
1 Zementstein (Beton) DM 0,70

Technische Daten

Die Maschine besteht aus
1. Kipptrockenmischer
2. Materialaufzug für Lehm
3. Materialzuführbarrier
4. Steinpresse mit Drehtisch
5. Motorhaus

Steinformat: 25 x 13 x 7,5 cm, zwei Steine pro Frässatz
Leistung: Bis 700 Steine pro Stunde bei 4 Arbeitern
Mischer: Hydraulischer Preßstempel mit 110 to
Motor: 3 Zylinder-Viertakt-Dieselmotor "Deutz", mit 40 kW (54 PS) Leistung
Fahrwerk: ungefahr bis zu 40 km/h, auf Wunsch mit Federsystem und 60 km/h
SOIL BRICK PLANT CLU 3000

produces durable, weather-resistant soil bricks

adobe briques en terre ladrillos de barro

A Product of
CONSOLID AG

Technical specification:

Power: 15 HP diesel engine, HATZ Type G 3516, with constant fuel consumption approx. 2.5 l/hour
directly coupled hydraulic pump, delivering the power for all hydraulic components, functioning of press table, conveyor, extrusion
Mixer and feeder unit: A double mixer unit with horizontal mixing at approx. 50 RPM. The upper mixer is used for mixing the chemical components into the load, the lower mixer continues mixing and feeds the rotating moulds simultaneously with the ready-mixed load. Each mould has a mixing and storage volume of 100 litres of concrete
Rotary mould: The press table with 4 moulds is hydraulically turned one quarter after each press / extrusion step
Press / Extruder: The moulding of the bricks is manually initiated by the operator, simultaneously the forming moulds for single brick is extruded. The compressed load is 12.000 kg, compression with 50 kg / cm²
Transporter: The whole plant is mounted on a special pallet 1440 mm, with spring suspended 750 x 1440 mm, an adjustable shaft bar, a height adjustable front wheel and hand brake. Maximum speed according to regulations, not exceeding 50 km/h
Dimensions: Length: 3,000 cm, width: 1,400 cm, height: 1,652 cm
Net weight approx. 1,600 kg

1. Diesel engine
2. Telescopic legs
3. Mixer and feeder unit
4. Press table (rotary mould)
5. Mixer and press/extrusion lever
6. Hydraulic oil tank
7. Moulds for single brick
8. Telescopic legs
9. Hydraulic press cylinder
Half of our world population lives in houses mainly erected by the use of soil as building material. Therefore any quality improvement of soil for building purposes is of vital interest for millions of people. For building purposes soil is excellent, as long as its dry stability is maintained. Loss of such stability, primarily by water influence, is causing problems and may lead to total destruction of such houses. Weathering erosion by rain and softening of the soil material by soaking water damage heavily soil buildings. The treatment of in-place, cohesive soil with CONSOLID 444 and CONSERVEX allows to stop the destructive influence of water to a high degree by waterproofing soil effectively. Such water-resistant soil offers excellent opportunities for the manufacture of water-resistant soil bricks for better houses. Should the natural dry strength of soil not already satisfy, additional improvement is possible in combination with small quantities of binders. High-quality soil buildings require CONSOLID 444/CONSERVEX treated soil bricks, simultaneously an adequately advanced production facility, providing optimal sieving of the soil, thorough mixing with CONSOLID 444 and CONSERVEX and eventually other additives as well as high pressure for the soil brick production, granting constantly precise dimensional tolerances. These requirements are fulfilled with the soil brick plant “CLU 3000” and the CATAPULT sieve machine.

**1 Filling the moulds**

The “CLU 3000” is equipped with a double mixer unit. The upper mixer is mixing the soil with the chemicals CONSOLID and CONSERVEX. After mixing the batch is discharged into the lower mixer, where mixing is continued, and simultaneously the moulds of the press table are automatically filled through a hole in the bottom. In this way the moulds are always filled with the same quantity of soil which gives a constant thickness of the bricks.

**2 Brick-pressing by hydraulics**

When the mould filled under the feeder mixer turns one quarter, the filled mould is free to be filled. A further turning of a quarter brings the filled mould under the hydraulic press, which compacts the loose soil with a pressure of 18 000 kg or 50 kg/cm². The compressive strength of the green bricks is already high enough to allow stock-piling in high staples. Drying time for the bricks is approx. 2 to 3 days in the shadow.

**3 Extruding of the bricks**

The next quarter turn of the rotary mould is the extrusion station, where at the same time when the brick is pressed the formerly pressed brick will be extruded to be removed for stock-piling. With the next quarter turn the new empty mould returns again under the feeder mixer to be filled again. The quality of the finished bricks can be improved by repainting voids or uneven corners of the bricks as long as they are moist. If the bricks are manufactured properly, such "cosmetic" work will not be necessary or is required in a very small proportion.

When dry, the bricks may be used for decorative work with the same technique as burnt bricks or concrete blocks. The mortar, which glues the bricks together, can be a mixture of sand and cement as well as sand with cement and lime. But also a mixture of the same cohesive soil with CONSOLID 444 and CONSERVEX, which is mixed with the plant to a mortar by adding enough water, will be a suitable wall mortar with the advantage that the entire wall is built of uniform material.

If the bricks are used for purposes with extreme heavy water exposure or on the weathered surfaces of houses and walls, it is recommended to apply a top-coat with CONSIL soil-brick coating, a silicone-copolymer resin solution, which is creating highly effective waterproofing of the exposed surface. This coating is always applied as last step. Therefore, if a building is plastered and painted, the CONSIL top-coating will be the last process applied. Depending upon the local conditions, one or two coatings with CONSIL are applied by brush or roller. Bricks which will be used under water have to be coated with CONSIL on all sides by dipping the dry bricks fully into the CONSIL solution. The protective coating will become fully effective after evaporation of the solvents.
NEW LOW-COST SOIL BRICK MACHINE "ECOBRICK 1000"

The economical "ECOBRICK 1000" is a complete and universal soil brick manufacturing plant for producing quality but low-cost building bricks with almost any natural soil material.

The "ECOBRICK 1000" represents the result of more than 10 years of research, design and practical experience in soil brick manufacturing.

Its modern appropriate technology, its costs and efficiency are well qualified to satisfy the demand for good low-cost housing at an extremely attractive self-reliance/import ratio due to optimum use of local resources (materials and unskilled labor) and substantial elimination of transport problems.

The unique little giant "ECOBRICK 1000" is the key to create or boost decentralised family or small industry brick-making and therefore bound to counter effectively the huge and growing need of a large part of the world's population for low-cost, but decent housing.

TECHNOLOGY: Modern, appropriate, economic, efficient and unique. Various patents.

MATERIALS: All natural in-place mineral soils (except salt-contaminated and black-cotton soils). Any binding materials, such as clay, cement, lime, bitumen emulsions, chemicals, etc. at surprisingly low quantities.

LABOUR: After one day training, two unskilled male or female workers produce already 100 bricks per hour, corresponding to a 12 cm wall of 2 square meters.

BRICKS: Size 25 x 12 x 7.5 cm
Weight 4 to 4.7 kg
Compressive strength 30 to 100 kg/cm². Density 1.8 to 2.1. (Indicated ranges depend upon chosen process).

No firing process; 1 to 4 days air-curing. Flat and/or dented faces, uniform, plastic lime, original color of soil. Excellent room climate properties due to very low heat and noise transmission.

Walls may be plastered or painted.

Immediate setting of "green bricks" for air-curing; easy and quick handling by reason, causing no back troubles.

FLEXIBILITY: Mobile or stationary models as "ready to produce" or "do it yourself assembly kit" available.

Module design allows quick and simple disassembling and reassembling. Diesel or electrically powered (upon request).

Very large range of suitable soils from sandy to clayish materials. The unique soil processing unit performs also blending of different soils if desired. Also very handy for mortar mixing.

Simple but accurate field compressive strength testing device available.
## Meili mechanical soil brick press

### Technical Specifications of this Low-Cost High Performance Machine

**Engine**
- **Type of engine**: 2-cyl. diesel-engine
- **Cooling system**: air
- **Performance**: 38.5 HP DIN at 2700 r.p.m.
- **Range of revolutions**: 1800 - 2700 r.p.m.
- **Max. torque**: 6.25 mkg
- **Consumption**: 195 gr/hp
- **Starting mechanism**: hand-accelerator

**Drive**
- **Engine**: dry friction clutch-type engine
- **1st stage**: belt drive ca. 3:1
- **2nd stage**: belt drive ca. 3:1
- **Mixing**: off-center press function
- **Mixing ratio**: from the mixer by a mechanical clutch

**Soil Material Mixer**
- **Diameter**: 800 mm
- **Height**: 300 mm
- **Content**: 100 liters
- **Revolutions**: 60 - 70 r.p.m.

**Chassis**
- **Number of axles**: 3
- **Weight limit (total)**: 1600 kg
- **Suspension**: rigid
- **Equipment pole**: 155 SR-12 with a support

**Dimensions and Weights**
- **Total length without pole**: 3000 mm
- **Total width**: 1250 mm
- **Total height**: 650 mm
- **Packaging volume**: 475 m³
- **Total weight**: ca. 1700 kg

### Moulds and Press Table
- **Diameter of the table**: 1300 mm
- **Height of the table**: 120 mm
- **Moulds (standard)**: 280 x 125 mm, max. 300 x 150 mm
- **Turning rhythm**: every 4 sec. from 90 to 80 degrees.

**Steering Device**
- **Type of steering**: mechanical
- **Steering device**: pressing, turning, pushing out, lifting

### The Meili Mechanical Press Offers:
- **Simple Design**
- **Sturdiness**
- **High Performance**
- **Easy Maintenance**
- **Reliability**
- **Economy**

---

**As a result of the tremendous success achieved by the "Meili-60" manual brick/block press in countries like Guinea, Nigeria, and India, etc., and in recognition of the overwhelming need for large quantities of cheap, durable building materials in all of the developing countries, the Meili technology development group now offers its new and versatile "Meili Mechanpress".**

**The automatic soil brick and block making machine. Using the same basic idea and operating principles of the famous "Meili-60" manual brick/block pressing machine, Meili has now developed a motor-driven mechanical 20 tons soil brick and block making machine capable of producing upwards of 1000 top-quality soil bricks and blocks per hour.**

**The Meili mechanpress offers:**
- Simple Design
- Sturdiness
- High Performance
- Easy Maintenance
- Reliability
- Economy

---

**Agent:**
le bloc en terre: TERRE 2000
** TERRE 2000**

**DÉMARCHE DE PROJET**

<table>
<thead>
<tr>
<th><strong>1.</strong></th>
<th>DÉSCRIPTION DES PRODUITS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.1.</strong></td>
<td>Blocs de béton compressés - Procédé R2-TEME 2000</td>
</tr>
<tr>
<td><strong>1.1.1.</strong></td>
<td>L = 30 cm ; H = 15 cm</td>
</tr>
<tr>
<td><strong>1.1.2.</strong></td>
<td>Tolérance : inférieure à 1 mm</td>
</tr>
</tbody>
</table>

**2. UTILISATION DES PRODUITS**

Les blocs sont utilisables en murs porteurs de 15 cm d'épaisseur pour des constructions en rez-de-chaussée ou avec un étage. Suivant les traitimens et le mode de construction, l'enduit peut être supprimé. Enfin, un enduit de terre et ciment est le plus courant et encore, un simple balayage d'un produit hydrofuge (silicone, résine plastique, huile de lin, peinture,...) comme dans toutes constructions en parpaings, des chaînes d'angles et de liaisons sont recommandées. Ceux-ci peuvent être réalisés en béton ou par des feuillards en acier ou par des éléments en bois.

**3. NATURALIÉS ET FACILITÉS**

Tous les types de terre sont en principe utilisables avec plus ou moins d'intervention, excécuté les couches de terre arable.

<table>
<thead>
<tr>
<th><strong>3.1.</strong></th>
<th>Caractéristiques optimales abrasées les suivantes :</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3.1.1.</strong></td>
<td>- teneur en arrois : 60 %</td>
</tr>
<tr>
<td><strong>3.1.2.</strong></td>
<td>- teneur en limon : 40 %</td>
</tr>
</tbody>
</table>

La latérite est parfaitement utilisable.

Les stabilisants les plus courants sont le clément, la chaux, la chaine, la résine, avec une teneur moyenne de 3 %. Dans certains cas aucun adjonct n'est nécessaire.

**4. PROCÉDÉ DE FABRICATION**

| **4.1.** | Igne l'enduit et la préparation des blocs est faite dans un bétonnière, puis dans la presse par un comprimeur à vis. Les blocs sont conservés 15h, avant d'être séchés pendant 7 à 7 jours. Pour chaque projet d'implantation, il est indispensable de faire les analyses des sols du chantier et de prélever les ressources locales pour le traitement (blocs et enduits). Les analyses peuvent être réalisées par des laboratoires locaux. L'ensemble des travaux est réalisé par exemple. |
| **4.2.** | Les essais en franco sont normaux et nécessitent au total 30 kg pour des essais sur éprouvettes et jusqu'à 100 kg pour des essais réels. |

**5. PROJET ET BASE**

Il s'agit d'une unité autonome comportant un moteur de 350 kW, un transporteur à vis, une presse hydraulique de 150 T et un moteur Diesel de 150 kW à démarrage électrique ou manuel. L'ensemble pese environ 10 tonnes et les dimensions le rendent aisément transportable d'un chantier à l'autre en l'idée d'une remorque tractable.

**6. CAPACITÉ DE PRODUCTION**

350 blocs, soit en un temps : 2400 blocs/jour. Cette quantité correspond à 110 m³ de sur de 15 cm (12 blocs/m³).

**7. INVESTISSEMENTS**

<table>
<thead>
<tr>
<th><strong>7.1.</strong></th>
<th>Terrain et bâtiments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>7.1.1.</strong></td>
<td>Le maître de bâtiments n'est la maison qui sera utilisée pour abriter la machine et pour le stockage des blocs.</td>
</tr>
</tbody>
</table>

**7.2.** | ÉQUIPEMENTS DE BASE |

L'unité coûte 370.000,- FF TTC MARSEILLE 300.000,- FF CASSEMASSA.

**7.3.** | ÉQUIPEMENTS ET INSTALLATIONS ANNEXES |

Il s'agit de matériel classique d'extraction de terre, pour environ 15 t/jour.

**VISES DE TRANSPORT TERRE 2000**

| **V.1.** | Élément mobile fonctionnant par moteur électrique ou sous hydraulique d'éjection à définir, puissance de 5 kVA. |
| **V.2.** | Dimensions : Largeur : 8 m, longueur : 3,50 m, hauteur : 1,50 m, poids : 350 kg environ. |

| **V.3.** | Système d'arrêt automatique quand le remplissage de la bâche est achevé. |

**MALAXEUR**

| **M.1.** | Dimensions : Largeur : 0,60 m, longueur : 2,50 m, hauteur : 1,50 m, poids : 600 kg environ. |
| **M.2.** | Fonctionnement : par moteur électrique ou hydraulique, puissance de 6 kW, vitesse de rotation : 50 tours. |
| **M.3.** | Capacité : 500 m³. |

**HABILETS**

THE PLANT: PACT 500

PACT 500 is a press based on a specific patented ramming system and a four molds ramming plate.

Its nominal tonnage ranges from 2 to 20 tones, allowing the production of bricks ranging from 6 to 30 kg.

The machine essentially consists of a mechanical ramming mechanism and a rotating plate equipped with four molds permitting the following operations:

- Feeding.
- Molding.
- Unmolding.
- Ejection.

Each mold is built with parallel装配式. The soil rests on a flat table placed under the ramming plate and moves when the table moves. It is usually initiated.

Feeding is carried out through a hopper placed above the table, where the soil rests on the earth in a mold permitting a precise volumetric dosage.

Compaction is mechanically achieved by an eccentric whose shape varies at a constant speed to create an increasing force up to 50 tons, with an average movement of 1 m.

The duration of the entire compaction cycle is of the order of 6 seconds. It is operated through a command and automatically stopped after each compaction.

Ejection is done from below, through an opening on the bottom of the mold in the table. The moulded bricks are released on a sliding table and are removed by hand.

If a change of brick size is requested, remove the four moulds, the two plates supporting and separating the reception table and the press height wedges. This work doesn't take more than 10 minutes.

OPTIONS
- Pneumatic engine 200W, 0 to 600PSI
- Bottle frame with reversible wheels and pole
- Pneumatic hoist fixed instead of trolley

MAINTENANCE
- Weekly greasing of bearings and sliding pieces.

CHOICE OF SOIL

Many types of soil can be used to manufacture high quality raw earth bricks. They can also be blended to get better results.

The elementary technical properties of the soil are:
- Non-vegetable soil.
- Soil as a mix composed of clay (10 to 30%).
- Soil or all of a continuous grain size distribution.
- Residuals, if present, must be added. Due to these technical properties:
  - Proximity of the site (foundations, quarry).
  - Pressure ofumps (preparation bases).

PREPARATION OF THE SOIL

Sculpting
In order to eliminate undesirable elements from the soil for compaction (gravel and stones) and to get a uniform mix (clay).

The selected material should be staked and can vary from 5 to 15 cm according to the thickness.

The soil must be placed either through a fixed system of gravity, or a vibrating system, or a pulverizer which combines mixing and milling.

The soil must be dry or slightly wet.

GRINDING

Fortunately, it is seldom necessary.

This operation brings to a correct grain size and transforms the clayey material, or homogeneous other soils.
Les blocs de terre crue compactée. Les qualités du matériau terre sont unanimement reconnues :
- absence de cuisson impliquant un faible coût énergétique ;
- faible consommation d'air stabilisant permettant une indépendance de produits sou-vent importés (ciment, chaux...);
- une bonne inertie thermique offrant un meilleur confort d'habitation ;
- blocs manipulables solidement ;
- stockage immédiat et en tas sous simple bâche ;
- la possibilité d'embaucher une main-d'œuvre locale peu qualifiée à l'issue d'une formation de courte durée.

CARACTÉRISTIQUES DES BLOCS
Elles dépendent essentiellement de la terre utilisée :
- la résistance à l'écrasement peut varier de 40 à 150 kg/cm² ;
- la stabilité à l'eau est également fonction du choix et de la quantité du stabilisant introduit dans la terre.

A titre d'exemple, certaines terres permettent de réaliser des blocs qui résistent à une semaine d'immersion totale avec moins de 3 % de ciment.
PRESSE HYDRAULIQUE CTDJ

Description :
Matiérle réalisé avec des matières premières courantes et des composants courants.
Matièrle fonctionnant à l'aide d'un vérin hydraulique alimenté par un moteur électrique.
Matièrle plus volumineux que la presse manuelle mais du dimension raisonnables.
Matièrle monté sur longerons afin de pouvoir le fixer au sol en poste fixe. Il peut être monté sur un essieu et tractable derrière un véhicule léger.

Fonctionnement :
1er temps - Ammastique du moule :
Le remplissage peut se faire manuellement (à la pelle ou au seau) ou mécaniquement avec tapis d'aménée et une tronçonneuse de stockage située au-dessus du moule, la quantité de terre nécessaire est donnée par la position réglable du couvercle de pressage sur son appui.

2ème temps - Fermeture du moule
Manuellement on tire sur le couvercle qui en colissant vient obturer le moule.

3ème temps - Compriomption
Où que le couvercle est en position fermée et sans qu'aucune autre information ne soit donnée à l'opérateur d'automatisme le vérin de pressage s'actionne comprimant le carreau de terre en sandwich entre ses 2 plateaux inférieur et supérieur.

4ème temps - Ouverture du moule :
Automatiquement, sans intervention de l'opérateur dès que la côte finale du carreau est atteinte le couvercle s'ouvre verticalement.

Caractéristiques physiques :
Poids : 350 kg
Longueur : 1,6 m
Largeur : 0,9 m

Caractéristiques techniques :
Tous les composants sont français.

1) Électricité :
- a) automatisme "Telémecanique" et protections
- b) puissance : Moteur "LEROY SOMMER" 1500 tr/min
  puissance 5,5 Kw
  intensité 12,6 A
  tension 380 V

En option matériel tropicalisé.

2) Hydraulique :
- a- génération : Pompe HP1
  Débit 20 l/min à 1400 tr/min

b- vérin :
  Allonge = Φ 100 mm
  Tiège = Φ 60 mm
  Course = 125 mm
  Force = 12,5 t.

Selon temps - Ejection :
L'opérateur, en poussant le couvercle vers l'arrière donne le signal d'éjection par micro-contact.
Dès que le carreau est sorti du moule, l'opérateur s'en sert, le cycle est ainsi terminé.

Selon temps - Réalisation cycle suivant :
Une double commande (bouton "pousser" + pédale) autorise le départ d'un nouveau cycle en phase de remplissage.

Caractéristiques physiques :
Poids : 350 Kg
Hauter : 1,15 m
Longueur : 1,6 m
Largeur : 0,9 m

Caractéristiques techniques :
Tous les composants sont Français.

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b- vérin :
  Allonge = Φ 100 mm
  Tiège = Φ 60 mm
  Course = 125 mm
  Force = 12,5 t.
c) distribution : distributeurs "CPDAC"
limiteur de pression "CPDAC"
filtration "WPDAC"
bac contenance 50 l liquide hydraulique.

(3) MECANIQUE :
Le moule ainsi que toutes les pièces soumises à des efforts importants sont en aciers spéciaux mécano-soudés.
Les guidages sont réalisés par bagues "GLYCOUR" très résistantes.

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CTBI Hydraulic Press

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e) CADENCE DE FABRICATION :
Carreaux de 32x16x10,5
Poids d'un carreau : 12 Kg
Cadence variable suivant :
- la fabrication à réaliser
- les matériaux de service autour (alimentation de l'excavation). Ces matériaux peuvent mécanisée ou automatisée.
En moyenne 80 à 110 carreaux/horaire mais avec une seule personne au commande et sans effort physique (données extraites d'un chantier).

f) CONDITIONNEMENT - TRANSPORT - POIDS :
Dans la conception même du matériel ces détails n'ont pas été oubliés.
Son châssis en longeron permet une manipulation rapide et une mise en place préférable.
Son conditionnement peut être soit :
- 1 caisse bois de 1,20 x 1,85 x 0,95 pour un volume de : 2.100 M3 et un poids de 400 Kgs
- 1 housse plastique retractable
Tous les moyens de transport peuvent être utilisés : l'avion, le bateau, le camion, le camions-citernes. Ce matériel peut également être tracté derrière un véhicule léger lorsqu'il est monté sur roues.

g) COUT :
Matériel exécuté en un seul exemplaire. Prix actuellement estimé entre 65.000 et 75.000 F. Frais H.T. Déport 161192. Toutefois, toute étude est nécessaire à chaque consultation afin de répondre précisément à la demande du client.

h) DESTINATION :
Marché local en construction neuve pour des petites opérations. Marché à l'exportation. Toutefois, pour les pays d'Afrique il y a lieu que le matériel soit tropicalisé.
GEO 500 Semi-Bloc, Unité Atelier

A - ORGANISATION - MATÉRIEL - MAIN D'OEUVE

Hypothèse
- Gisement sur lieu de construction - extraction manuelle ou à l'aide de matériels agricoles disponibles sur place.
- Pas de réseau électrique: un moteur diesel (12CV) actionne la centrale hydraulique qui alimente la presse et le malaxeur équipé d'un moteur hydraulique.

Schéma de production

<table>
<thead>
<tr>
<th>MAIN D'OEUVE/OPERATIONS</th>
<th>MATÉRIEL</th>
<th>MATERIAUX</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- Extraction - Préparation du sol brut</td>
<td>2 pers</td>
<td>3- Matériels de base (à mortier)</td>
</tr>
<tr>
<td>2- Chargement du malaxeur</td>
<td>2 pers</td>
<td>Malaxeur-bandeau (moteur hydraulique)</td>
</tr>
<tr>
<td>(tige claire/eau)</td>
<td></td>
<td>MK 300T</td>
</tr>
<tr>
<td>3- Alimentation de la presse</td>
<td>1 pers</td>
<td>Presse semi-automatique</td>
</tr>
<tr>
<td>4- Commande de la presse</td>
<td>1 pers</td>
<td>(moteur diesel)</td>
</tr>
<tr>
<td>Régulations, contrôle des blocs</td>
<td></td>
<td>GEO 500 Semi-Bloc</td>
</tr>
<tr>
<td>5- Manipulation - stockage des blocs (encombrement)</td>
<td>2 pers</td>
<td>2- Equipements complémentaires</td>
</tr>
<tr>
<td>(encombrement)</td>
<td></td>
<td>(disponibles ou réalisés sur plan),</td>
</tr>
<tr>
<td>TOTAL MAIN D'OEUVE</td>
<td>-8 personnes</td>
<td>Abs pour cure des blocs/bâche</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Brossettes - peiles - pioche.</td>
</tr>
</tbody>
</table>

B - ANALYSE ÉCONOMIQUE

B-1 PRODUCTION MOYENNE JOURNALIÈRE
- Débit malaxeur: 1,5 tonnes/heure
  Temps effectif de travail: 6,5 heures
  Durée de gache: 15 à 15 minutes.
- Débit de la presse: 1,8 tonnes/heure
  Temps effectif de travail: 5,5 heures
  Temps de cyclage: 15 secondes.

PRODUCTION MOYENNE JOURNALIÈRE: 10 tonnes
NOMBRE DE BLOCS 29,5/14/(9) 1350 blocs
Poids moyen: 7,5 kg.

B-2 CONSOMMATIONS JOURNALIÈRES

a) Matières
- Pour 10 tonnes de blocs produits
  - eau d'appui (6%): 600 litres
  - sol brut humide avec 30% de refus au tamisage: 11,6 tonnes
  - ciment 4,5% du poids total humide: 450 kg.

b) Énergie
- P.E.D.
  1 moteur diesel 12CV. Consommation 3 litres/h.
  Durée de fonctionnement: 7 heures
  Consommation journalière gas-oil: 21 litres.
41. DESTINATION

Fabrication de briques pleines dont la production maximum est de :
- 2 000 briques par heure, soit environ :
- 3 000 000 de briques par an.

42. TYPE DE PRODUCTION

La production de briques est réalisée à partir d'argile moyenne dont l'humidité est de 15 à 18 %, sans broyage particulier.
Les mélanges argile-sables sont également utilisés.

43. AVANTAGES

Les groupes UNIPRESS sont mobiles et peuvent se déplacer dans les usines près des fours et des carrières.
Ils sont autonomes et peuvent être alimentés par diesel ou électricité.
Les puissances absorbées sont faibles.
Ultrabloc’s new Impact series of pressed-earth block machines represents over 20 years of experience in the field. Ultrabloc pressed-earth block units are similar to adobe, but are 3-4 times stronger, only need 4-6% moisture, and can be laid in the wall immediately after manufacture. Designed and built for trouble-free operation and easy maintenance, the low-profile Impact models need no special dirt-loading equipment and can be hauled by compact or truck. Hydraulic power-take-offs run a dirt screen, available separately.

Instructions on machine operation and maintenance, soil analysis and preparation and suggested building systems are included with each machine.

**FEATURES**

- Precision-machined to ±.015”
- Special steel alloy in mold cavity
- Heavy-duty parts of stainless steel
- Industrial hard-chrome components
- Rust-proof cowlings
- Adjustable mold depth
- Special non-stick press-foot
- Top-quality engine and hydraulics
- Standardized replacement parts
- Hydraulic power-take-offs

**OPTIONAL EXTRAS**

- Dirt screen with hydraulic motor
- Log-splitter attachment

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>IMPACT 1</th>
<th>IMPACT 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEED TO DRAWER</td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td>Automated</td>
</tr>
<tr>
<td>OPERATION</td>
<td></td>
</tr>
<tr>
<td>Block Size</td>
<td></td>
</tr>
<tr>
<td>3.6’ x 6.4’ x 12’ (91 x 145 x 305cm)</td>
<td>3.6’ x 6.4’ x 12’ (91 x 145 x 305cm)</td>
</tr>
<tr>
<td>AVE. BLOCK WT.</td>
<td></td>
</tr>
<tr>
<td>16 lbs. (7.26 kg)</td>
<td>16 lbs. (7.26 kg)</td>
</tr>
<tr>
<td>MACHINE DIMENSIONS</td>
<td></td>
</tr>
<tr>
<td>h. 46” x w. 80” x d. 111.5” (117 x 153 x 350cm)</td>
<td>h. 46” x w. 80” x d. 111.5” (117 x 153 x 350cm)</td>
</tr>
<tr>
<td>MACHINE WT. appx.</td>
<td></td>
</tr>
<tr>
<td>2200 lbs. (996 kg)</td>
<td>2650 lbs. (1202 kg)</td>
</tr>
<tr>
<td>ENGINE</td>
<td></td>
</tr>
<tr>
<td>Yanmar diesel 7hp./crank start</td>
<td>Yanmar diesel 10hp./self-start</td>
</tr>
<tr>
<td>CYCLE CAPACITY</td>
<td></td>
</tr>
<tr>
<td>1600/8 hrs.</td>
<td>2400/8 hrs.</td>
</tr>
<tr>
<td>1860/8 hrs.</td>
<td>2400/8 hrs.</td>
</tr>
<tr>
<td>BLOCK PRODUCTION</td>
<td></td>
</tr>
<tr>
<td>Single/3500’</td>
<td>Double/each 2000’</td>
</tr>
<tr>
<td>AXLES</td>
<td></td>
</tr>
<tr>
<td>COLOR</td>
<td>white/blue trim</td>
</tr>
</tbody>
</table>

Ultrabloc's new Impact series of pressed-earth block machines represents over 20 years of experience in the field. Ultrabloc pressed-earth block units are similar to adobe, but are 3-4 times stronger, only need 4-6% moisture, and can be laid in the wall immediately after manufacture. Designed and built for trouble-free operation and easy maintenance, the low-profile Impact models need no special dirt-loading equipment and can be hauled by compact or truck. Hydraulic power-take-offs run a dirt screen, available separately.

Instructions on machine operation and maintenance, soil analysis and preparation and suggested building systems are included with each machine.

Prices and specifications subject to change without notice.
The Terrablock System

When you’re building from the ground up

"The Terrablock System of earth-wall construction is a process which I think will revolutionize the housing industry worldwide. It is the ideal technique when you’re building from the ground up.”

Arnold Portman

Once Terrablock walls have been built, a fast-drying chemical sealant is readily applied by brush, roller or spray. The walls are then ready for a finishing coat of plaster or other mortar, which can be finished in any texture or pattern desired. Protected in this way, the terrablock wall remains stable.

The Terrablock is probably the most cost-effective wall building block in the world. The raw material is virtually abundant and not likely to escalate in price. The production of Terrablocks is also efficient. Running on between 12 and 18 liters of fuel, the Terrablock Duplex can produce enough materials to build the walls of a 12-foot square dwelling.

12-inch Terrablock walls are:

- Non-Toxic
- Sound Proof
- Chemically Stable
- Fireproof
- High Thermal Insulation Value
- Extremely Durable
The Terrablock System of earth-wall construction, commonly known as adobe, is probably the simplest and most cost-effective home-building technique in the world. The Terrablock System virtually eliminates the labour intensive, time consuming drawbacks of adobe construction, while maintaining all of adobe's extraordinary properties and characteristics as a building material.

The Terrablock Duplex Machine

The key to the Terrablock System is the Terrablock Duplex Machine. This single piece of equipment transforms common soil into a building material of superb quality. The machine itself is compact, portable, uncomplicated, reliable, automatic and energy efficient.

The Terrablock Duplex uses hydraulic pressure, up to 5,590 P.S.I., to produce stable and dimensionally uniform blocks that can often go directly into a wall without any curing or drying time. Terrablocks can be grout-bonded, laid with a traditional mortar, or dry-stacked.

The Terrablock Duplex is simple to operate and maintain. Apart from its diesel power plant, it has only three main moving components. The entire production process, governed by a specially designed computer that controls sequence logic down to the millisecond. This computer is also self-diagnostic and monitors all functions.

Starting and operating is a simple one-man task. As long as the hopper remains loaded with soil, the Terrablock Duplex will automatically produce six to ten Terrablocks per minute, creating enough material in one hour to construct a 100 cubic foot (2.83 cm) wall.

The hopper holds enough earth for ten minutes of continuous operation, and can be loaded by any method, from a crew with shovels to a front-end loading tractor. A heavy duty screen filters out foreign debris and large rocks; vibrating devices insure a consistent flow of soil into block moulds.

The Terrablock Duplex is powered by a 43 Horsepower Isuzu diesel engine, noted for its reliability, durability, and fuel efficiency. It can run continuously for an hour on approximately 3 liters of diesel fuel. It is equipped with a heavy duty heat exchanger to ensure reliable operation in extreme heat.

Terrablocks: The End Product

Soil with a natural moisture content of 4 to 14% is ideal for the Terrablock System and can be hydraulically compressed into stable building units by the Terrablock Duplex Machine, usually without additives. It is estimated that 94% of all readily available soils fall within the acceptable range.

Terrablocks are easily laid by specially designed tongs from the machine's conveyors directly into the wall, or they can be stacked for future use. Since Terrablocks are dimensionally uniform and have a perfectly flat bedding surface, they can be dry-stacked, a technique that does not require a skilled mason or mortar, provided the blocks are properly levelled and set on a suitable footing.
Features

- Fully automatic operation, controlled by Automat 15 computer.
- Hydraulic system has a capacity of 150 U.S. gallons (566 l) of oil, continuously filtered to 10 microns by a permanent filter.
- Integrated hydraulic-oil cooling system.
- All hydraulic components are industrial grade.
- Powered by 43 H.P. Isuzu diesel engine with a heavy-duty capacity radiator, specially fitted with integrated heat exchanger.
- All valves fitted in heavy duty bronze with internal chrome ball for long life.
- Permanent heavy duty grizzly screen on hopper filters out rocks and foreign debris.
- Two automatic vibrators keep soil moving at a constant rate through throat of hopper.
- Frame made of heavy gauge tubing with extreme strength and rigidity.
- All welds are full penetration by metal inert gas process for superior strength and vibration resistance.
- Block molds heat treated to Rockwell B hardness for wear resistance.
- Tandem leveling axles with electric brakes.
- Four standard automotive tires with heavy duty six-ply rated tires.
- Two ten foot U-shaped conveyors made of galvanized steel.
- Large volume built-in accessory compartment.
- Stuffed with metric, fractional, and Allen wrenches.
- Painted in industrial white enamel for maximum solar reflection.
- Fully warrantied against defects in materials and workmanship when maintained per specifications for 1,000 hours of operation or one year.

Dimensions and Specifications

- Machine size: 17-feet (5.18m) long by 7-feet 6-inches (2.29m) high by 7-feet 10-inches (2.30m) wide. Fits into standard size shipping container.
- Weight: Approximately 0,000 lbs (3,629kg), excluding oil.
- Hopper capacity: 84 cubic feet (3.85cm).
- Hydraulic oil capacity: 151 U.S. gallons (566 l).
- Hydraulic pressure: Variable (up to 1,190 P.S.I. to 1,475 P.S.I. (535 Kg/cm² to 850 Kg/cm²).
- Electrical system: 24 volt D.C. with two 12 volt storage batteries.
- Fuel consumption: Approximately 3 liters of diesel fuel per hour.
- Block size: Width, 12-inches; height, 4-inches. Both dimensions accurate to 0.005 inches. Entire block flat and square, length approximately 10-inches (250mm).
- Rate of production: Finished Terrablocks produced at the rate of six to ten blocks per minute.
HANS SUMPF Brick Machine

are to be out of service for any length of time.
The brick molding method used will depend on the availability of labor and its cost, and the production schedule required. In some labor intensive areas it is possible that hand molding with multiple forms might be acceptable. However, most large scale projects will require a mechanical molding machine. Although many different machine designs have been proposed for this purpose, the most efficient yet developed is the **Hans Sumpf** Brick Mold Machine invented by Mr. Hans Sumpf of Fresno, California (U.S. Patent 2,524,683, October 3, 1950). Figure 3 shows the plan of this machine. The machine is operated on a flat field area which has previously been scraped smooth. As the engine (8) moves the machine along, a sheet of paper (63) is rolled out on the soil surface to give a clean surface to the bricks that will be deposited on it (64). This paper, which is usually a Kraft type, may not be needed in all situations. Other parting agents like straw or leaves spread on the surface could be used. The stabilized mud mix is placed in the hopper (31) by a small dump truck from the pup mill. The molding machine is stopped for a short period and the multi brick mold (24) is lowered hydraulically on to the paper covered soil. The hopper is then moved back and forth several times across the mold to fill the cavities completely with mud mix and screed off the top to give a smooth surface. The mold is then lifted to leave a "nest" of bricks, and the machine is rolled ahead to a new spot and the process repeated. The mold is sprayed occasionally with water to eliminate any mud hanging up on the mold walls and to ensure the production of uniform bricks.

Many thousands of bricks can be produced each working day with this machine. It is important to note that the Hans Sumpf system for brick production is highly efficient and is designed so that soil, mud and bricks are moved the least possible amount. The bricks are turned on edge after a few days to speed drying, but are left in the field where they are cast until completely cured. The following pictures, Figure 4, show the Hans Sumpf plant in operation.

C. **Bricks By Pressure Molding**

We wish to consider this process separately from the conventional wet molding method because special techniques are required to use asphalt products as stabilizers in making pressed bricks. This is because pressure molding must use a soil mix that is relatively "dry," while conventional molding uses a much wetter mud mix. Generally portland cement is the best choice for compressed bricks as
Figure 3. Brick Molding Machine
Our machines are automatic, hydraulically controlled, and powered by a diesel or electric motor. They produce earth bricks stabilized with cement or lime or fly ash. The materials required are typically 95% soil, with a 15%-30% clay content, and 5% cement, which are readily available in any country. The stabilizing gives great strength (8.2 MPa average compressive strength) and durability, but bricks can be made from 100% soil unstabilized if stabilizers are unavailable or considered too expensive. Walls can then be sealed against weather with a variety of readily available sealants.

The machine can be mobile and is light enough to be towed anywhere by a four wheel drive. The main ram exerts 120 tons of pressure on each brick. Machines can be made to produce any size brick or one machine to produce a variety of sizes e.g. 12” x 10” x 5” (350/hour), 3” x 9” x 4” (1400 per hour), 2” x 10” x 5” (2500 per hour). The whole process is automatic and can be organized with as few as two people for the whole operation. Soil is fed in one end by a front end loader (or the machine can be designed for loading by a large team of labourers) and bricks emerge ready for use at the other end. Soil with a low moisture content (2-8%) is quite suitable and no firing is required.

The bricks are selling well in Australia. We are just commencing a project for the Fiji Housing Authority to build an initial 50 plus houses, but expect this to extend into many more with our special anti-hurricane anti-earthquake design for which our very dense bricks are particularly suitable. In the first six months of this year we expect to have machines also in India, China and Zimbabwe as we already have orders from those countries.

We are interested in co-operating with developing countries not only to supply the machines, but also to assist with any help required in the production of bricks and construction of shelter appropriate to whatever locality. The present cost of the machine is $45,000 (Australian) ex factory.

Our main aim is to mass produce low cost housing in developing countries.
The following list of addresses is also the mailing list of this study. It includes a wide variety of institutions, in all parts of the world, comprising appropriate technology information centres, with question and answer services; education, training and research institutes that specialize in soil constructions, or generally in building in developing countries; development aid organizations; and publishers of journals and bulletins on appropriate technologies or Third World development issues in general.

Many of these institutions have been extremely cooperative and generously provided the author with information and advice, for which he is most grateful. Some of the other recipients did not respond to previous requests for information, but it is hoped that they will now be able to do so, or at least comment on this study. It is also hoped that this document, or parts of its contents, are passed on to other interested institutions and individuals, so that as many people as possible can benefit from it and possibly contribute further material for the final publication.

### E U R O P E

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Planning and Building in the Tropics
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Name and address of institution: _________________________________

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We have received your report on "Soil Block Presses" (Aus der Arbeit von GATE, February 1986) and wish to make

[ ] no comments.
[ ] the following comments:

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