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NEEDS FOR ROBOTS AND ADVANCED MACHINES  
AT CONSTRUCTION SITE.  
SOCIAL ASPECTS OF ROBOTICS.

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Abstract:

1. In Germany as well as most likely all over Europe, the currently essential arguments for the use of robots and advanced machines within the building trade are as follows:
  - a) Extreme shortage of skilled workers and apprentices. This shortage is partly compensated by a decreasing demand for construction work.
  - b) Extremely high wages (gross wages are double the net wages)
  - c) Decline of demand - falling prices - high pressure from competitors - constraint of low cost production - constraint of rationalization.
2. The operation of the machine initially led to the following reactions among workers:
  - a) To opposition, i.e. fright of losing their jobs.
  - b) To increased efforts in conventional construction method in order to outdo the performance of the machine.

Today, two years later, the situation is as follows:

1. The fright of joblessness has proved unfounded. On the contrary, we even had to take on additional people.
2. The workers found out the advantages the machine has to their work and health. If e.g. an architect wants traditional construction, they now are even reluctant to comply with his wishes.
3. The quality of machine-made masonry is equal, if not better, than this, which is produced on the building site and in the traditional way. Please have a look on the test certificates of the Stuttgart institution for the testing of materials.

The new construction method hardly affects the planning of any architect or engineer. In his plans he just has to consider the points of separation of the prefabricated parts.

Example for construction site configuration:

The following page shows a schematic example of a construction site configuration with Multistone 8000 for manufacturing prefabricated brick wall sections.

Next to the construction site, resp. around the construction site, a level and smooth concrete strip with rails, about 12 m wide and 70 - 100 m long, is fabricated. On this, the machine produces the required walls in continuous operation. Thus two men are able to produce about 30-35 cubic meters per day.

Using a crane, the walls are either loaded onto a low-loader or lifted directly to its designated position on site. This operating method is recommended for very big construction sites. An assembly crew of 4 men are able to assemble approx. 60-70 cubic meters of wall per day.

The walls can be produced in any length of up to 8m, i.e. the engineer does not have to make any special allowance for this method of construction. He only has to plan the joining points of the prefabricated sections and eventually reinforce these with concrete pillars.

The architect is also able to plan without restrictions because all measurements (windows, doors, ...) can be made without any problems. Good architecture profits from aids which enable a better performance.

The application of Multistone 8000 not only enables larger quantities to be processed, but also achieves equally good or better quality.

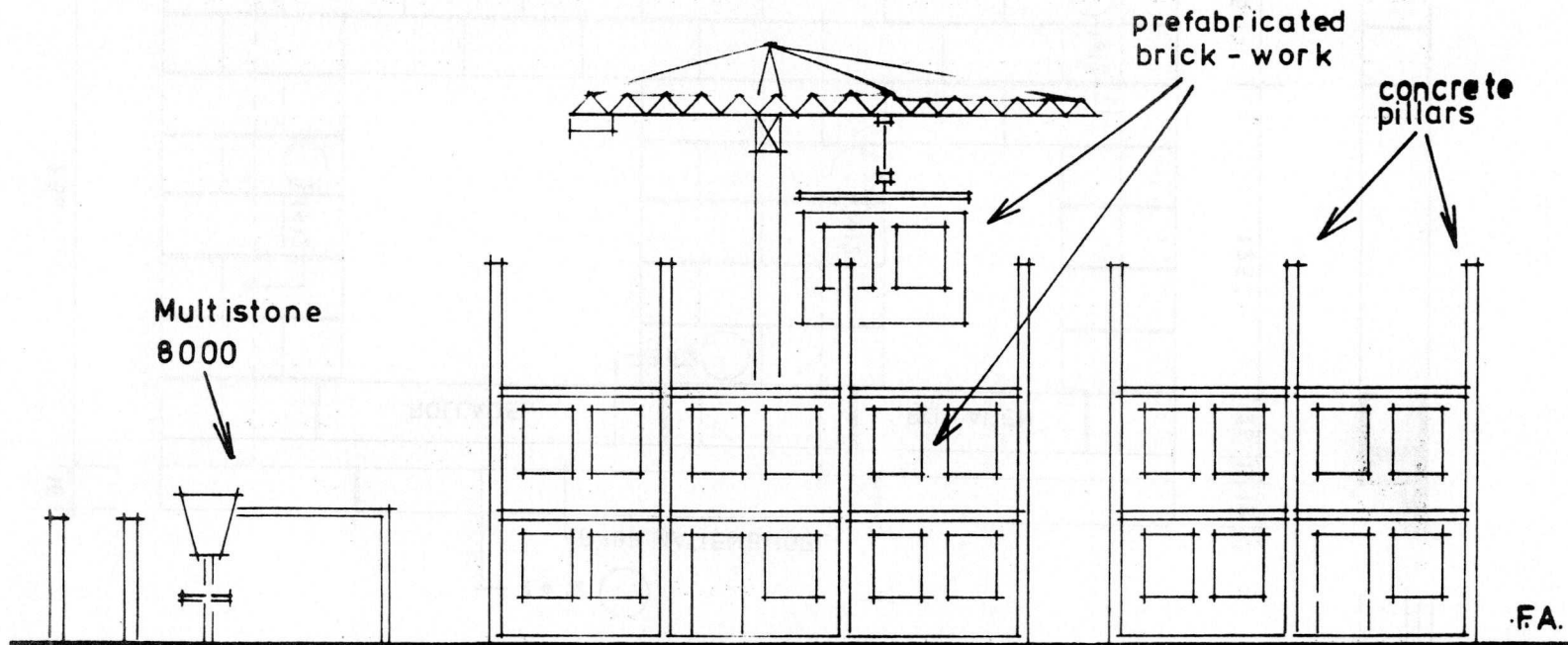
The builder profits from this just as much as from:

- exact preparation of work.
- little slack time on the construction site.
- minimizing of error sources.
- cost reduction through rationalization.
- more accurate calculation of construction sites.

Conventional bricklaying is extremely heavy work at virtually all weather conditions. Lifting and carrying of heavy loads frequently led to damage to the spines (backs) of bricklayers. Now the lifting work is carried out by the machine and takes a considerable part of the load from the bricklayer. Thus a man can achieve a much higher production without a great effort. After the initial skepticism, bricklayers now prefer prefabricated walls in comparison to conventional bricklaying.

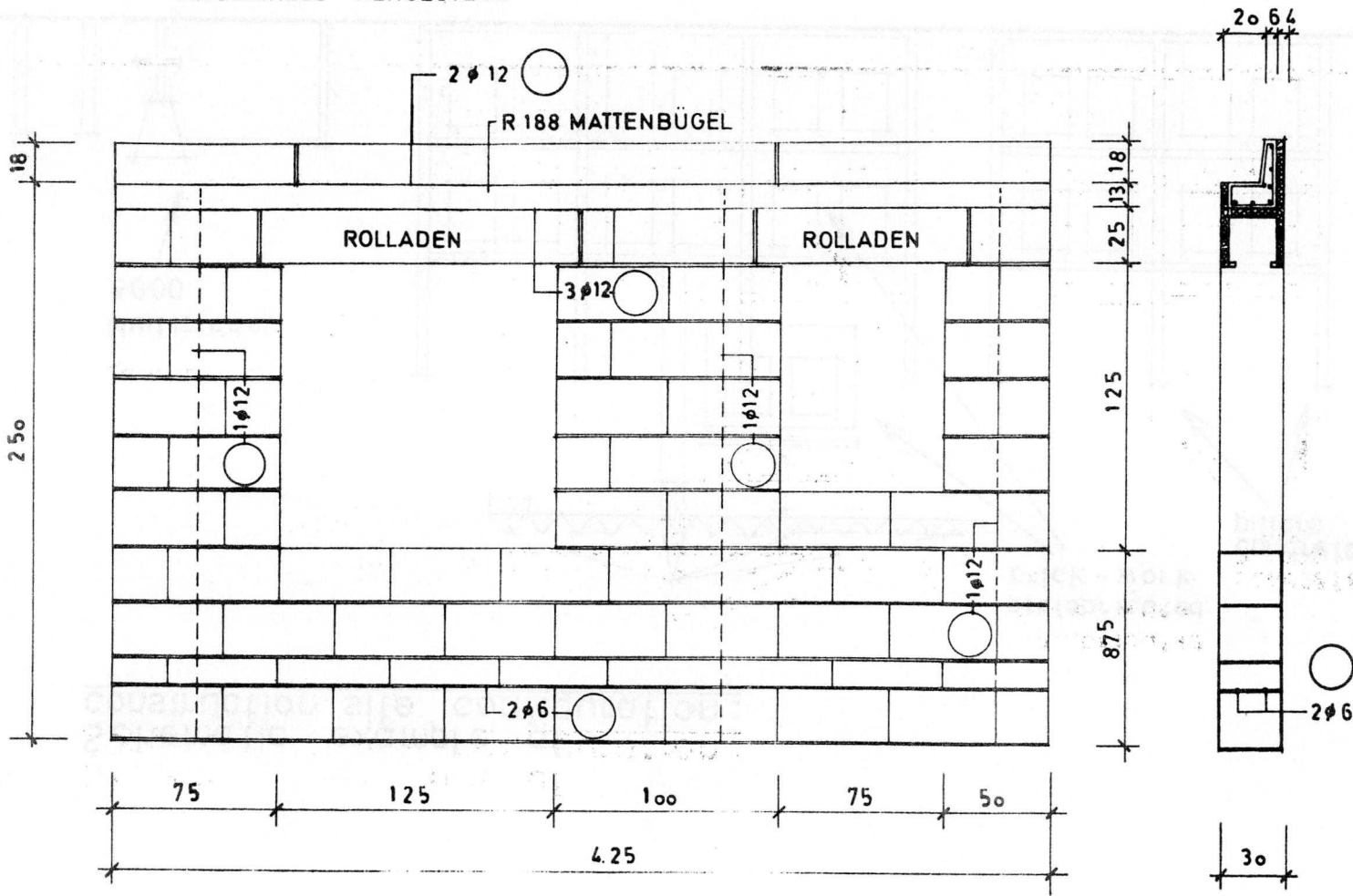
The use of Multistone 8000 simplifies work processes and systems, planning becomes easier and there is no longer a need to improvise on the construction site. I. e. all those partaking in building are able to concentrate on more vital tasks.

Schematic example of  
construction site configuration:



# ZIEGELMAUER

MASCHINELL HERGESTELLT



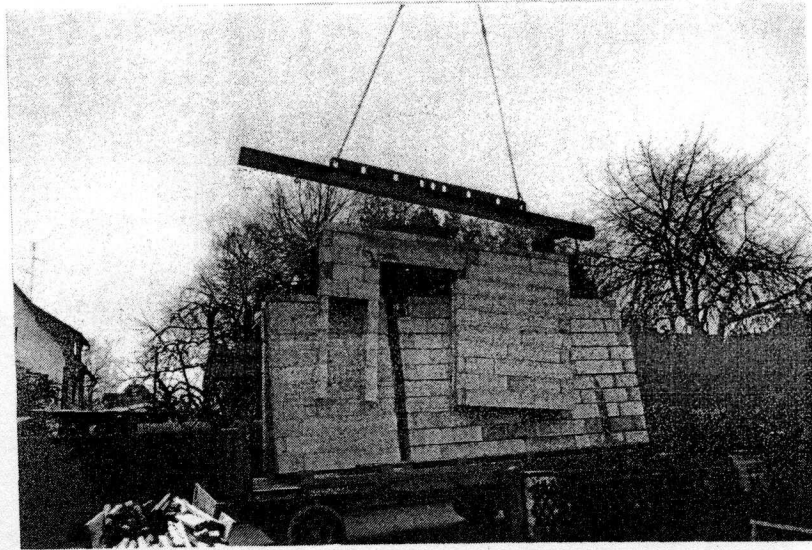


Abb.: 1 Prefabricated walls  
on the low-loader.

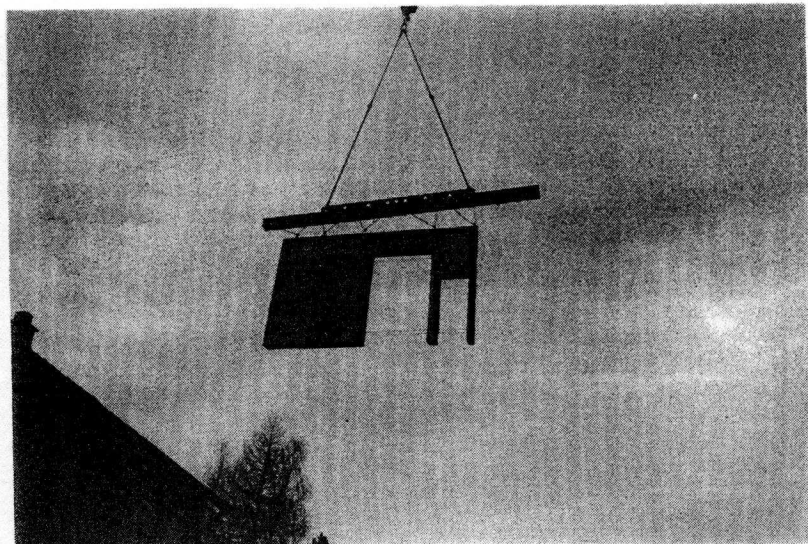


Abb.: 2 Transportation by crane.

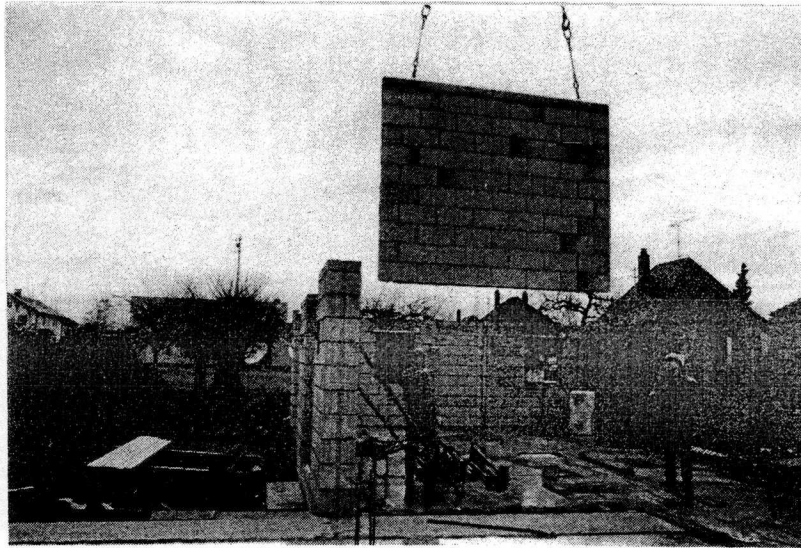


Abb.: 3      The assembling crew at work.

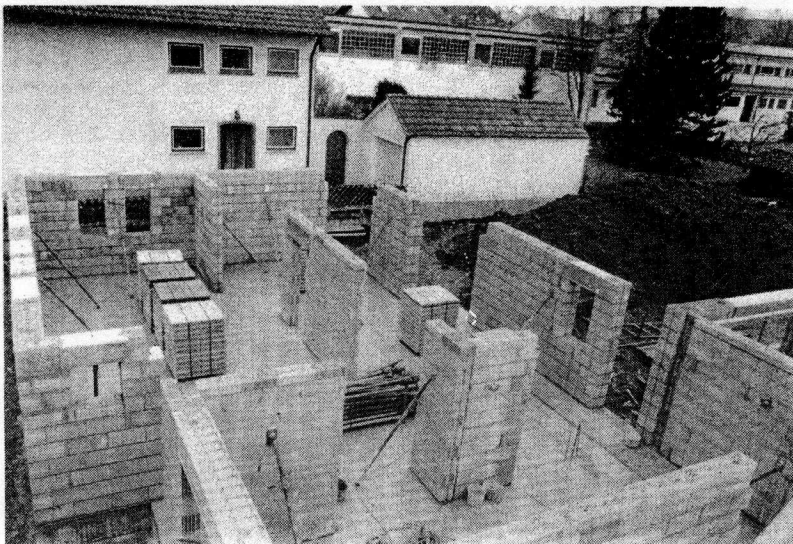


Abb.: 4      The work of four men and three hours  
of working.