MECHANICAL LAYING OF CONCRETE FLAGS AND BLOCK PAVING

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A INTRODUCTION

When developing our concrete flag and block paving equipment, the prerequisites were based on the following aspects:

- The laying process should be divided into the following phases: grab
  transportation
  positioning
- The equipment must be flexible in order to facilitate the various types of flags and block paving.
- The equipment must function for the laying of both small and largre objects.
- The equipment must be as cost efficient, as possible.
- The equipment must be easy to use, even for those lacking experience. 30 minutes is the maximum time allowed for the familiarisation of equipment.
- The final result must be of high quality.
- High capacity.
- Ergonomically well designed.

B The Grab Action

As far as we know there are only two methods of grabbing block paving from the pallet - the squeeze technique and the vacuum technique. The problem encountered with the squeeze technique is that you cannot safely grab large stacks of thin block paving as the stack can easily collapse and fall through. The jaws of the grab are also in the way when positioning the stacks. A high degree of precision is required for this particular operation. It is a question of fitting within a millimetre.

We found therefore the vacuum method to be the most superior in every respect. As a result we have developed the technique even further.

Hand Trolley With Vaccum Yoke

This piece of equipment is relatively inexpensive and further more it is very simple to use even for inexperienced personnel. A maximum of 30 minutes is all that is required to learn how to operate it.

Stacks of block paving weighing approx. 130 kg. maximum ca be lifted. Any more and the weight is too great. The trolley can be equipped with a drive motor. If this is the case it is extremely important that the drive function can be disengaged when required. Disengagement takes place during the grab stage and when the block paving is placed in position. During these critical stages millimetre precision is required and this is best achieved using hand assisted power. The yoke has also been equipped with a torsional function. In confined and narrow spaces it is important to be able to tackle the laying of block paving at an angle to the line being lain.

We can also very quickly - max 10 minutes - change the grab tool to suit different types of block paving. We use different grab tools for different sorts of block paving and flag material. It is quite usual to use different sizes of block paving within the same project. Therefore it is extremely important that the equipment is simple and adaptable to the conditions in question.

The vacuum aggregate is driven using either a petrol or diesel motor. An electrically driven motor is also an option but problems can be caused by the electric cable and the electricity supply. The vacuum aggregate and motor are built in one unit. It is quite a simple operation to lift out the unit and place it onto an excavator for example. The aggregate can then be connected to a larger vacuum yoke designed for lifting 1 m2 each phase.

Large Vacuum Yoke On An Excavator

We have the capability of constructing large vacuum yokes for almost any type of block paving. The vacuum yoke is equipped with hydraulic side operating jaws which collect the block paving and centre the yoke. The side operating jaws can, with a high degree of precision, even press the blockpavings half a stage. The yoke is also equipped with a hydraulic rotary servo-mechanism (360°). For permanent use, the vacuum aggregate can be driven by a hydraulic motor. The power is supplied from the excavator´s hydraulic system.

There are several large advantages using the excavator. The operator has been trained to use his machine and already has from the outset, the high capacity and necessary precision required. The machine has cross-country mobility and good radial range even in areas where access is difficult, eg. in the extremities of a building.

E When Should The Various Methods Be Used

For each project a certain amount of preparation time is spent on the machinery and personnel. This preparation costs an agreed sum of money each day.

All that is covered by the term "mechanical laying" is the action of taking the block paving and flags from the pallet and laying them in place. Other tasks such as the raking of the gravel ballast, readjustments, sawing the block paving and laying the joint sand is not included in the mechanical laying process.

As the amount of money required for the preparation of personnel and machinery differs each day, calculations must be made for each individual case as to which method is most cost effective.

General rules are difficult to make. Purely economically, our experience has shown that 80 m2 per day must be lain using the hand trolley in order for it to prove more cost effective than laying by hand.

Using the excavator and the larger laying yoke, an area of at least 250 m2 must be lain each day in order for the excavator to prove more economically viable than the hand trolley. The only considerations made here are economic factors. **The ergonomic advantages must also be looked at closely.**

Price comparison between different laying methods

Capacity in m2/day	Hand laying SEK/m2	Hand Trolley SEK/m2	Excavator SEK/m2
60	70		
80	53	58	
100	42	46	
120		38	
140		33	
160		29	
200		20	35
300		14	23
350			19
400			17
500			14
600			12
700			10

Conclusion

I believe that with the refined and more advanced laying techniques, we have come a long way where machanical laying is concerned.

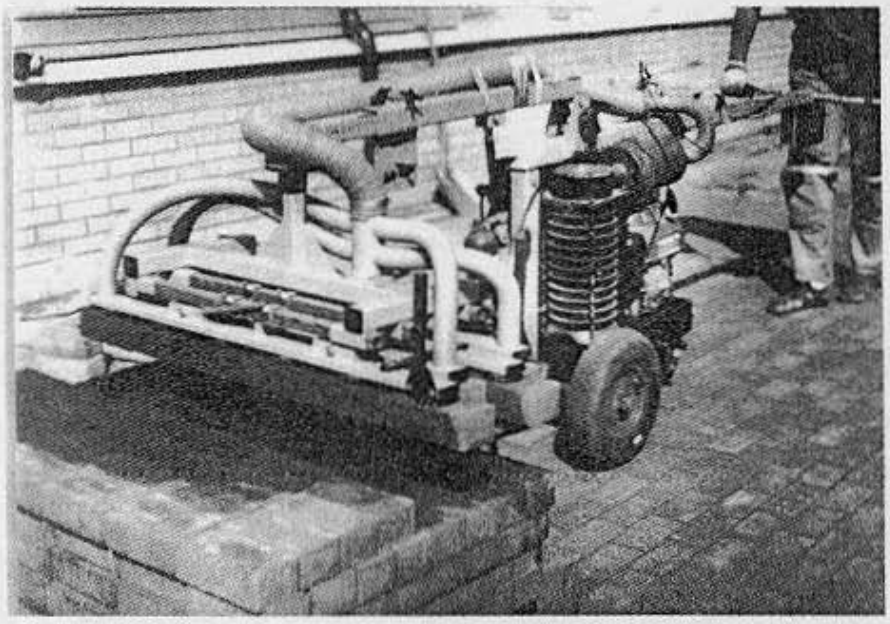
Flexibility - small and large surface areas - the different types of block paving, are all very important aspects. When the job assignment is designed it is important, if possible, that consideration is given to the machanical laying process. The width to be lain must be adapted to the laying units. Cutting the block paving must be avoided.

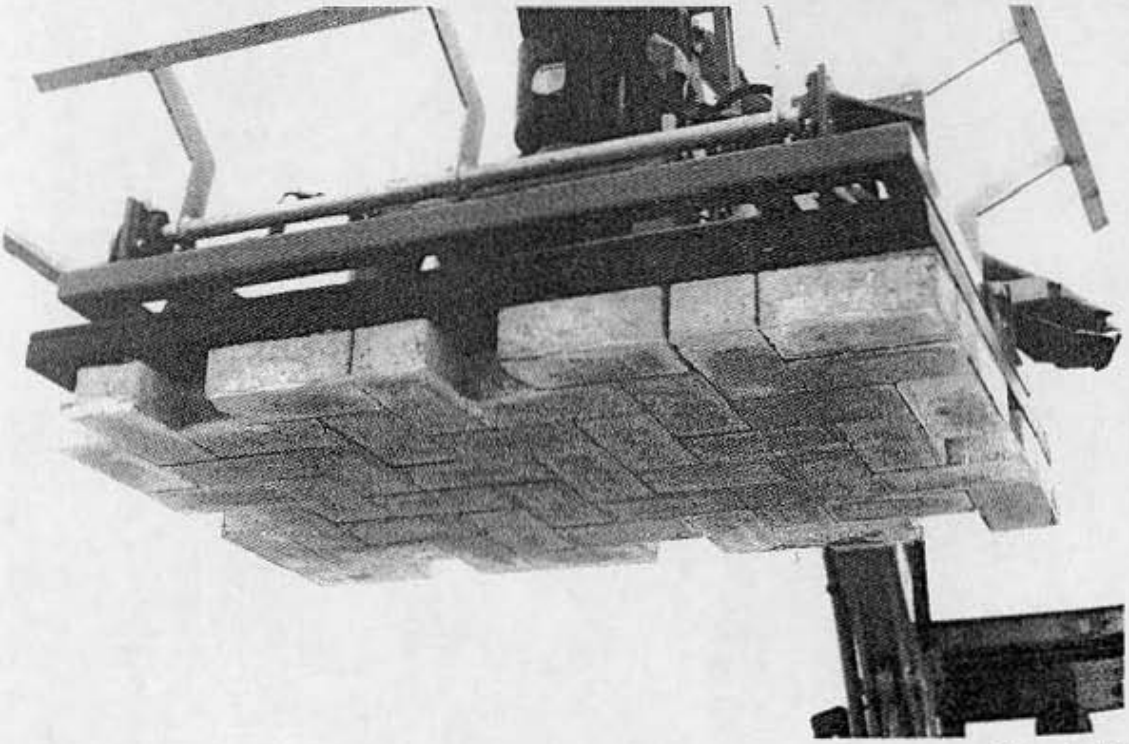
Organisation and planning at the work site are essential. The gravel ballast must, for example, be raked before the laying machines arrive at the site. All working procedures involved must coincide and merge favourably in order to be able to compete with other materials.

We offer and sell with pleasure the equipment which we have developed. I believe most requirements can be satisfied due to the flexibility of our system.

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