Concrete block paving today

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Introduction

THE FACT that a congress spanning several days was being arranged on concrete block paving has given me the opportunity to take a look back into the history of concrete structural members by way of introduction. For how long have concrete structural members (or, as they say in English, Concrete Products, or in French, Produits en Beton) actually been manufactured?

The material as such had, as far as I know, been created in Paris as early as 1753, with the following definition:

> "Concrete is a coarse mortar which is manufactured from one or more mortar formers, admixtures and water in an intimate mixture."

As far as I was further able to deduce, the first finished concrete parts were produced in England in 1837. There was a surplus at that time from an English factory; namely a dwarf manufactured from concrete.

The rapid progress made in the cement industry in the second half of the last century then led to the development of a significant concrete products industry. From this period mention may be made of bricks in the USA, quarry tiles for pavements in East Germany, roof tiles in southern Germany and ferro-concrete pipes (as they were then called) in France. It is interesting, whatever the subject concrete paving block refers to, that Adolf Leonhard, in his book *Von der Cementware zurn konstruktiven Stahlbeton-Fertigteil* (from the cement product to the structural reinforced concrete finished part), which was published in 1965, did not even mention this product.

It is also interesting to recall that, when I was strolling through Wiesbaden in 1957 at the time of the 2nd International BIBM Congress with the father of the present BIBM President, Mr Wettern (the subject of our discussion dealt with a visit permit for a study group as part of a specialist study trip to England and the final date of the visit), there were absolutely no concrete paving blocks to be seen in our beautiful spa on the Taunus, assuming that any serious thought at all had been given in the Federal Republic to their manufacture and use. The bituminous pavement - and in someareas still the natural stone paving - then dominated the scene; the market for our manufacturers and contractors was limited to the traditional products such as pavement slabs, kerbstones etc.

The picture changed radically for the first time for us Germans when, five years later, we were staying in the Netherlands, on a study trip. In fact, concrete paving blocks already existed there, but only in rectangular format; but they were in extensive use. The discussions which were conducted on this observation within our group led to the conclusion that the Dutch soils must indeed have been very well suited for this new type of covering, but that for a variety of reasons a transfer to German conditions would seem impossible, even in the long term. As I remember, one of the reasons mentioned was that such a concrete paving consisted in practice of the positioning, side by side, of small elements with many joints, a solution which should in principle be avoided to prevent the penetration of surface water.

Appearances were deceptive, not only in the case of our observations in Wiesbaden, but also in the case of the transfer of conditions from our neighbour, the Netherlands. In the intervening time, concrete paving has been used consistently as the most variable means of manufacturing road surfaces, squares and paths, to an extent never dreamt of, so that we may speak of a triumphal march without equal. Thus last year, the production output of the firms concerned in the German Federal Republic reached the respectable figure of no less than 8 million tonnes! One of the main reasons for the ever-increasing use of this material is probably its universality: concrete paving is suitable, as you all know, for the construction and shaping of pedestrian and cycle paths just as it is for the construction of squares and parks. However, it is also suitable for various industrial applications. Plants in automotive firms, repair shops, filling stations, etc. are predestined applications. Finally, however, concrete paving has also been used successfully in the construction of heavily trafficked (busy) roads.

One precondition for this positive development was firstly the rational production of concrete paving blocks with efficient, initially manually operated, then semi-automated and finally fully automatically operated production machines, whether the simple stationary or mobile (egg-layer) machines, or the more recent multilayer stationary or mobile machines. In all cases the main precondition was met, namely a consistent product of high quality, with output as high as possible. A further precondition that was then imposed was the drawing up of quality guidelines - i.e. standards. In the Federal Republic the relevant DIN standard 18,501 exists for this product. It was published in 1964 and is at present being revised and adapted to the latest developments in the technology. In both versions the compressive strength of the concrete in the blocks - according to the stresses to be expected - was set very high, and over the years this has proved correct.

One difficulty in producing such a material standard was that, right from the start, a very large number of design variants or systems was found. If there were then only just under 100 examples about 10 years ago, i.e. after the introduction of the first version of the standard, there are today over 200 paving systems on the market in the Federal Republic. However, from the point of view of test engineering this situation has been brought under control; in particular, the new test method established in the revised wording for determining compressive strength leaves plenty of room for all possible variants.

With us there is much discussion on the pros and cons of such a large number of concrete paving types. Most interested parties would advocate either a reduction in the number or a tightening of the overall programme. I am personally of the view that in our free market economy we should only laydown regulations where absolutely necessary. However, concrete paving blocks do not, in my opinion, belong to the products for which this urgent necessity would apply. On the contrary, the number of products on the market would fully support the enthusiasm for this new means of construction. The fact that the chaff is being separated from the wheat, as we say in Germany, is essentially an element which cannot be underestimated, nor can it in any way be judged negatively. However, what can be established is that some systems have gained a very prominent position on the market and may almost be referred to as "market

leaders". The third aspect of the expanding introduction of concrete paving blocks is the nature and the method of selling them.

We have been explaining to our member firms in the associations for years the need to research new markets and serve gaps in the market, and we are increasingly blamed for the fact that our product range is allegedly not really suitable for such modern methods, but in reality this is not at all true! In the case of the concrete paving blocks being discussed here, there can in no case be any talk of their not being suitable. On the contrary, this product seems to me to be almost predestined for modern sales methods, as the success achieved must prove.

If we compare the rest of the range of concrete structural members to concrete paving stones - and in doing so include, for example, concrete pipes, hollow precast concrete blocks and solid bricks, together with pavement slabs and kerbstones - it must be admitted, that no other product has been able to make its mark on the market as much as the concrete paving block.

Almost every day we hear of new methods and applications; I only mention, as examples, the construction of inner areas in industrial premises, schools, conference rooms, and also entrance halls in residential buildings, etc. A specialist in the industry once said that if we could succeed in covering only 10% of the areas covered up till now with other materials - and here he is probably thinking particularly of the bituminous pavement - with paving stones, then this would at the same time double our production. This is a clear challenge and should be taken seriously.

In this case a number of positive arguments can be put forward. A Stuttgart landscape architect spoke recently on this subject in our trade journal *Betonwerk und Fertigteil-Techrtik.* He mentioned the following as advantages of concrete paving:

(a) standarised and monitored quality,

(b) a wide range of varieties and hence a wide range of possible designs and constructions,

(c) resistance to escaping oil and petrol,

(d) impossibility of the growth of roots, thistles, bindweed etc through the paving stones by contrast to bituminous paving,

(e) resistance to frost and thawing salts without sensitivity to high temperatures, and

(f) economic price.

If all these positive features are evaluated, it is my considered opinion that the concrete paving block has very good future prospects. In my view it might also be used as a concrete roofing tile, which at the beginning of the 1950's assumed a highly subordinate role in the range of substitute products, and which was not given any real chance of success on the market, but which today - at least in the German Federal Republic - may be regarded as a prominent "market leader".

It is my personal conviction that in these efforts we should not confine ourselves exclusively to the use of concrete paving as the sole covering material for the areas to be constructed. Indeed, combinations are also quite conceivable and possible with different systems. Thus artistically produced rosettes and areas may also be constructed. But I think that a combination with other materials, such as natural stone, clinker or even wood may offer attractive possibilities. In this connection the question is raised again and again as to whether colouring of concrete paving is advisable. If you want to hear my opinion on this, then I take a positive view of the combinations mentioned, but only when there is a guarantee that discolouring can be avoided with certainty. In any event, the availability of a wide variety of colours for pavement coverings increases the number of positive arguments q uite clearly in favour of a further variant!

When, shortly before the 9th International B1BM Congress in Vienna, I was looking for two days at works and construction sites in the Stuttgart area with Paul Morrish - the Australian expert on the cement and concrete field who is well known to us all - in order to gain a general picture of the situation, a large number of varieties and design examples was seen. This is especially true of the applications already discussed, and again of the construction of the outer offices in exhibition halls, school centres, administration buildings, etc. It was in this particular area that it became quite clear how interesting concrete paving can be constructed by skilful moulding, by combination with other materials and by suitable colouring, and how beautiful and interesting the overall effect is. Paul Morrish was impressed by this, in my opinion, but he was particularly interested in the increasing trend in the Federal Republic towards manufacturing and installing larger prefabricated or precast paving areas, where the individual elements are interconnected by so-called "theoretical fracture points", which easily withstand transport to the construction site but which fracture and break into pieces on being vibrated later after being laid, and thus produce the same finished effect as if individually laid, except that the speed of laying and laying efficiency is much greater. This is a development which should also be carefully watched, for it must be admitted that the cost of labour in laying individual elements is still very high.

Ladies and gentlemen, you will hear from prominent experts a number of details on the manufacture, use and testing of concrete paving stones in the course of this 3-day Conference here in Newcastle. My introductory statements are an attempt to indicate the development so far seen in the field of concrete paving. They are also, and at the same time, intended to represent a kind of "on the spot examination". They are finally to a certain extent aimed at the future. Truthfully speaking, 1 am not afraid for the future of concrete paving stones. There is much to do - let us get started!