



COMPARATIVE :

MACHINE MADE PLC AUTOMATED SYSTEM

Vs

WET / HAND CAST MANUAL SYSTEM

Pave Espania has been manufacturing concrete pavers and other precast products since 1999. Quality and consistency is our main focus. We source the best aggregate, use ultratech 53 grade cement, and use the best pigments available in the market.

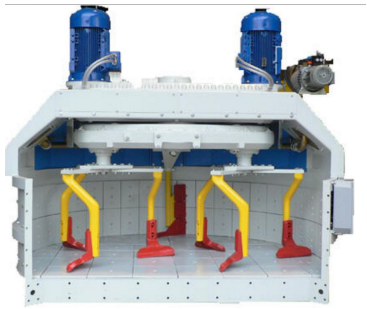



We have executed over 300 projects over the last many years ranging from residential, commercial, institutional etc. We have undertaken projects for hotels, hospitals, schools, industrial zones, roadways and a whole lot of other applications for individual homes and farms.

Our production facility is extremely versatile and diverse, allowing us to manufacture all kinds of precast concrete products. Our product range varies from paver, kerbstones, blocks, drain channels and other precast products.

Pave Espania upgraded its manufacturing facility to meet international standards by setting up two entirely automated plants imported from Germany.

Our production facility has the capability to produce both through a PLC based automated system as well as through wet cast labour intensive methods. However the product lifecycle and quality between the two varies greatly.

Below is a concise comparison between both methods. One is a method that is used internationally in the most developed nations of the world (Europe, USA, Japan, Korea), while the other is a labor intensive method that has been successful only in India (due to abundance of labor).

PLC AUTOMATED SYSTEM	WET CAST MANUAL SYSTEM
High strength products	Substantially lower strength
<p>Uses a semi-dry concrete and therefore minimises water cement ratio (w/c < .35). Raw materials are dosed by batching plants to ensure consistency and strength. Automated dosing of: Cement, sand, aggregates, water and chemicals.</p>	<p>Uses wet concrete. Raw materials are added into the cement mixer by unskilled labour and there are no controls to ensure the correct design mix/ strength. Manual dosing of: Cement, sand, aggregates, water as per labors judgment:</p>
<p>Raw materials are mixed in planetary mixers that have multiple mixing arms to ensure thorough mix of all raw materials.</p> 	<p>Raw materials are mixed in pan and drum mixers that are now outdated but yet being used.</p> 
<p>Moulds are high-grade steel and relatively expensive. (Rs. 3-6 lakhs). One mold is cast from one solid block of steel ensuring consistency and long lifecycles. The high precision moulds do not deform and produce consistent size of products. The finish of pavements come out extremely even.</p> 	<p>Moulds are extremely cheap (Rs.35-1000) and made of polyurethane or ABS plastic. One mold is used to cast one paver at a time. Plastic/ PVC moulds deform very quickly and start producing deformed products with complete inconsistency in sizes.</p> 

In our MASA/Zenith type machines , Hydraulic pressure is coupled with very strong vibration resulting in highly dense and high strength products.



Uses only vibration with liquid concrete filled in rubber moulds. The compressive strength of products is always a big question.

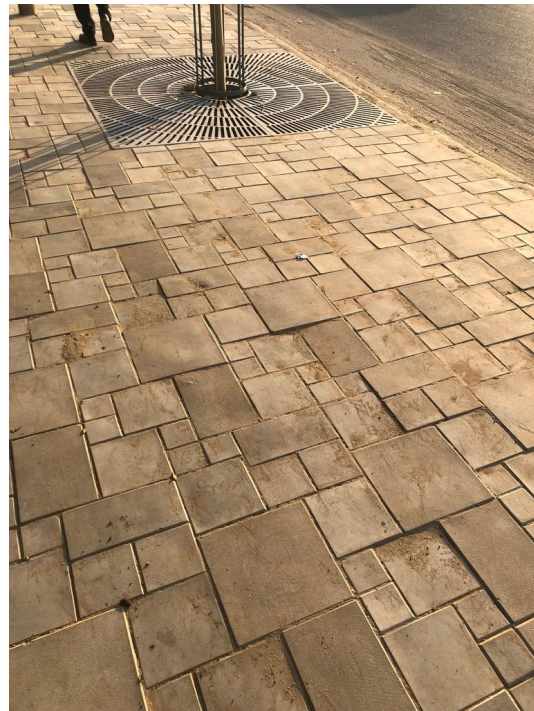


All faces of the finished product are moulded in the machine (including the bottom surface). Product dimensions are highly accurate.



(Even settling due to dimensional accuracy on all faces)

Products always have one unmoulded face (bottom surface). Product dimensions cannot be guaranteed due to variable settlement of concrete.



(uneven settling due to dimensional inaccuracy on all faces)

Kerbstones/Drain Channels do not require any jointing mortar in between each piece . This gives a much superior look without the ugly mortar patches. They can be made in any color of concrete to match the color and finish of the paving material

Since each side meets at a 90 degree angle. This reduces construction and curing time immensely.



(jointless curbstones)

Kerbstones/Drain Channels require mortar in between every joint as the sides do not meet at 90 degree angles.

This cause ugly mortar patches between each piece. High maintenance as concrete always looks dirty.

Construction and curing time takes much longer.



(curbstones must be fixed with jointing mortar)

Consistent quality, monitored to ensure compliance with national/international standards. Each product is made with dual layer to ensure a far longer lifecycle of the paver. The top layer (wearing layer) is consistent throughout the product.



Variable quality – national/international standards virtually non-existent. Even if the product is made with a dual layer, the process is not able to ensure longer product lifecycle. There is no consistency in the top layer of the product as it runs off onto the sides, causing the top layer (wearing layer to get minimized in thickness)





(wearing with heavy trucks)



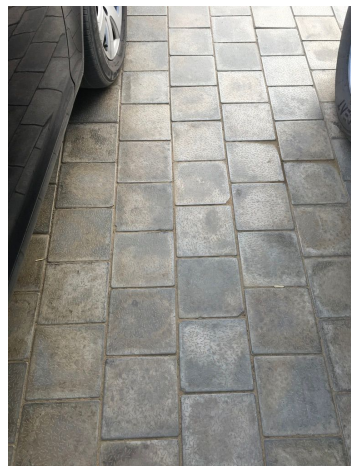
(wearing with foot traffic
Defence colony market)

Products look better over the course of time and do not look degraded or patchy due to negligible variance between each batch of products manufactured. A consistent top layer ensures even wearing and gives the product a great look even after multiple years.

Products look shiny in the beginning, however within 6 months time the products starts degrading and becomes patchy due to the extreme variance in quality between each lot. Abrasion does not happen evenly as no wet cast product can have a consistent top layer.



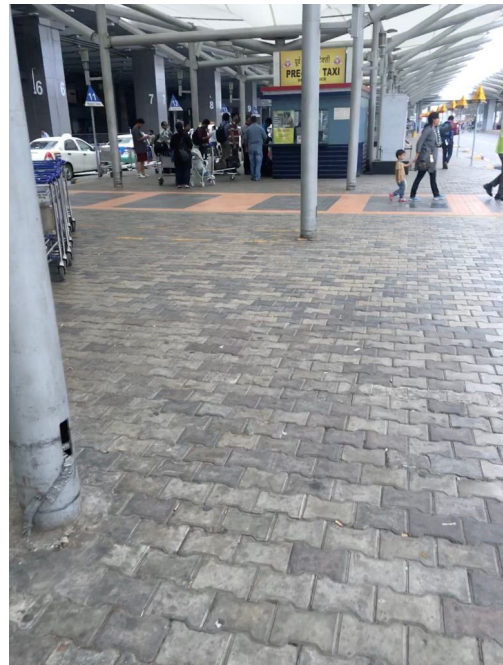
(car parking area)



(car parking area)



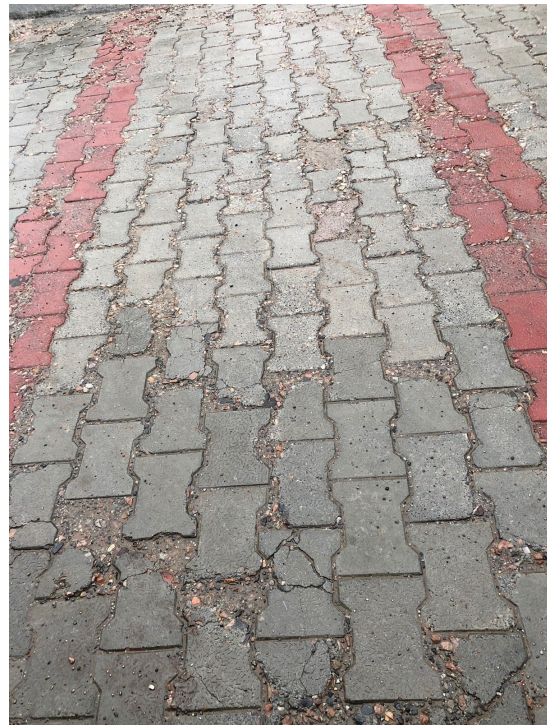
(walkway)



(walkway)



(roadway / walkway)



(roadway / walkway)



Same sampling done by Pave Espania
Machine Made Paver



Sampling done at customer site by
rubber mould . Outcome after one rain
cycle



Densely packed concrete with 10mm
and below aggregates. Substantial top
layer for wearing surface.



20 mm aggregates used. (against the IS
standard). Top layer is non existent

Nomenclature of PLC Machine made products:

Cement concrete pavers manufactured by PLC based Automated Block / Paver making machine having compression and vibration both in sequence using multi cavity precision steel moulds. The mixing of the concrete must be done with proper measured quantities of raw material including cement (through an automated batching plant) and mixed in an automatic Planetary Mixer to give uniform mixing and quality of concrete as per required strength. The paver must be manufactured in two layers. First the bottom layer must be filled and then the top layer must be filled. Top layer must have uniform thickness of 5-6 mm. The finished paver requires a rough finish on the top surface to provide better traction and less slippage of pedestrian / traffic movement.

Extract From Indian Road Congress: IRC:SP:63-2004 (page 15)

MANUFACTURE OF PAVING BLOCKS

The method of manufacture of paving blocks has an important bearing on the quality, durability and level of finish - dimensional tolerance, etc. all of which reflect on the ultimate performance of the block pavement during service. **At the very outset, therefore, it is to be emphasized that hand-casted concrete blocks are unacceptable for use and that an appropriate plant should be used which would make it possible to apply high pressure together with controlled vibration.** Adaptation of production facilities designed for high quality hollow masonry blocks, though feasible, is not as economical and efficient as the use of purpose designed machinery for paving block manufacture. Essentially, the manufacturing process involves compacting concrete, in a steel mould clamped to a vibrating table, by hydraulic pressure.

Concrete is fed into the mould from a hopper by a drawer - if a second hopper is added, a block can be made of two kinds of concrete having "backing" and "facing" surfaces. In the "facing" of the block, the top 5mm has greater amounts of cement and sand to make it more durable and skid resistant, and extra pigment is added for the coloured face vis-a-vis the rest of the block. In the first stage of compaction, pre-vibration is effected by running the vibrators attached to the vibratory table, the frequency generally being in the range of 50 to 100 Hz. In the second stage of compaction, compressions pressure is applied to the tamper heads, also fitted with vibrators for a high level of surface finish. Blocks are extruded from the mould by forcing down the tamper heads, after the vibrating table is disengaged from the mould. The blocks thus prepared are stacked either in a single layer or multiple layers for curing, depending on the plant used, being single or multi-layer.