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# Advantages by using integral drainages

In Japan, many types of the drainage products are developed by the precast concrete manufacturers and the integral drainages (the lid is integrated with the gutter) became the mainstream types in urban area recently. There are many advantages by using integral drainages instead of traditional gutter with lid - no risk of accidents caused by the lid dropping, no noise when vehicle or pedestrian passes on the gutter, easy to put design on the top surface which gives high additional value and a better landscape, etc. On the other hand, there are also some disadvantages for the normal integral drainages such as difficulty in making - narrow deep element, slope inside the element for water flow, curve sections and difficulty in cleaning and maintenance, etc.

In this issue, "Free Drain" which resolved the above disadvantages will be introduced.

As shown in figure 1 and 2, Free Drain is a typical integral drainage with box section. The top surfaces of the drain can be designed in various different shapes/patterns by changing the designed base pallet of the mould to meet the customer's needs. For example, the standard pattern has a paving block design on the top surface which blends with the surroundings, and furthermore gives antislip effect as well.



Fig. 1

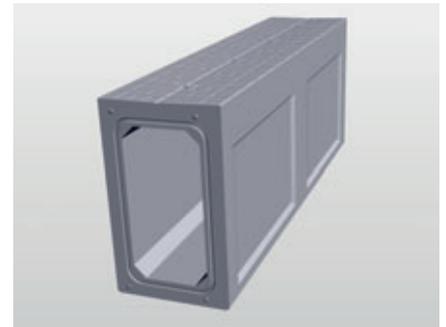


Fig. 2

Figure 3 shows the imaging of the water flow slopes. Sloped Invert Blocks are set into the integral drainage for the water flow slope and they are manufactured by a special mould as shown in fig 4. The thickness and slope of each invert block vary from each construction site. Since each block is fully order-made, the capacity of the mould dimension adjustment is the key to manufacture such kind of the product at low cost. With Toyotaforms, no attachment part is needed to modify their slope/thickness and it is flexible to make any variation easily.

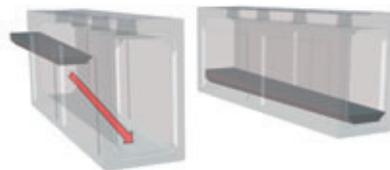


Fig. 3

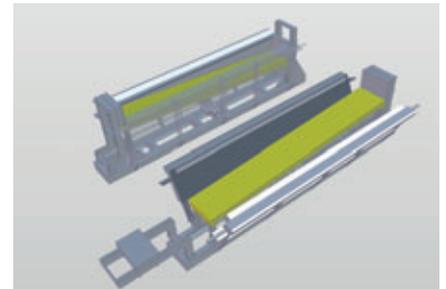


Fig. 4

As shown in fig. 5 and 6, there are some special vertically long products in the lineup (W 300 mm × H 1200 mm). These narrow deep drains are often used together with the Sloped Invert Block for making the water flow slope in reverse direction of the road gradient whenever necessary. It was technically difficult to make such kind of mould for vertically long integral drainages with high productivity. However, the developed skills of Toyota Forms made it possible,



Fig. 5

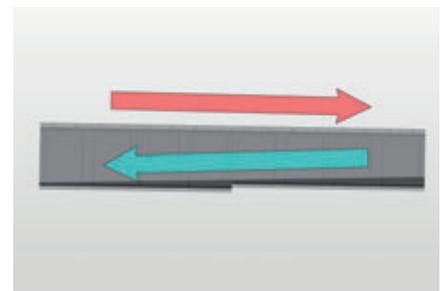


Fig. 6

Figure 7 and 8 are products for curve section. The most distinctive feature of this product is that it is possible to make the curve section flexibly. Normally, curve angle varies depending on each installation location; at intersection, roundabout etc. Traditionally, the standard products are cut diagonally or some short straight products are laid roundly with some gap between the joint sections for making curve.

It takes a lot time and waste a lot of materials to cut the standard product or fill the gap with mortar at last.

The mould showing at fig 10 is for flexible curve section products. The curve angle can be flexible adjusted without using any attachment parts and the height of product can also be adjusted.

To manufacture the precast concrete products described above with high productivity and quality, what kind of the mould to be chose is the most important factor. The realization to make complicated precast concrete products, depend entirely on the moulds.

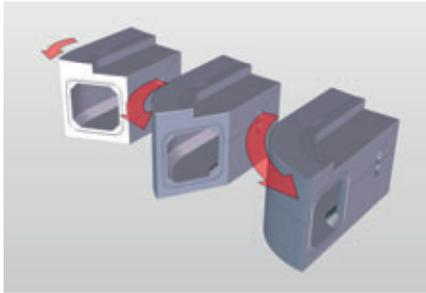


Fig. 7

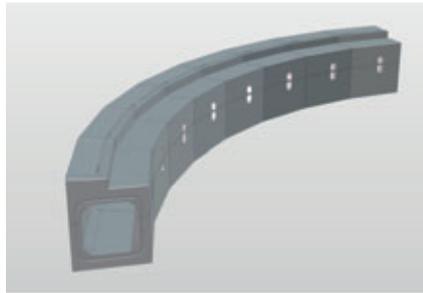


Fig. 8

The products introduced on this issue belong to Takei CO., LTD. They have a lot of construction achievements giving a great contribution to the society with more than 500 km of construction experience since Free Drain release.



Fig. 9

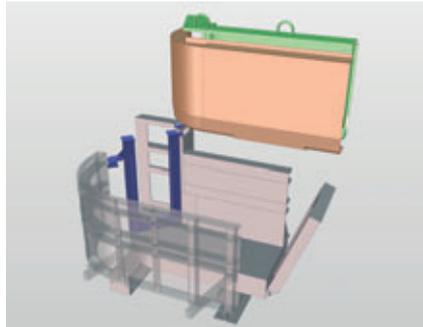


Fig. 10

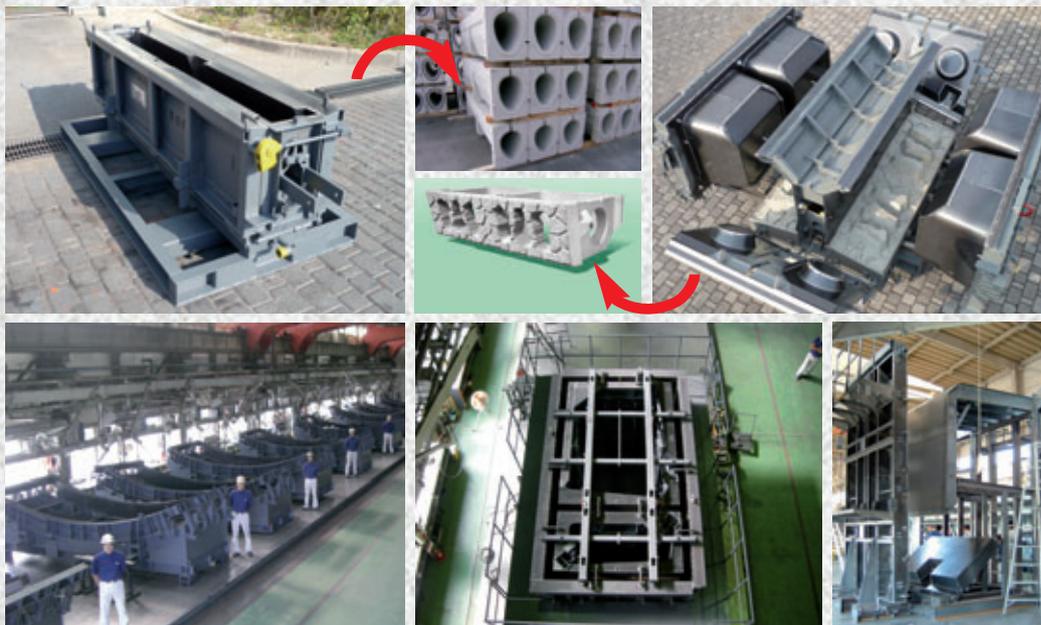
FURTHER INFORMATION



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