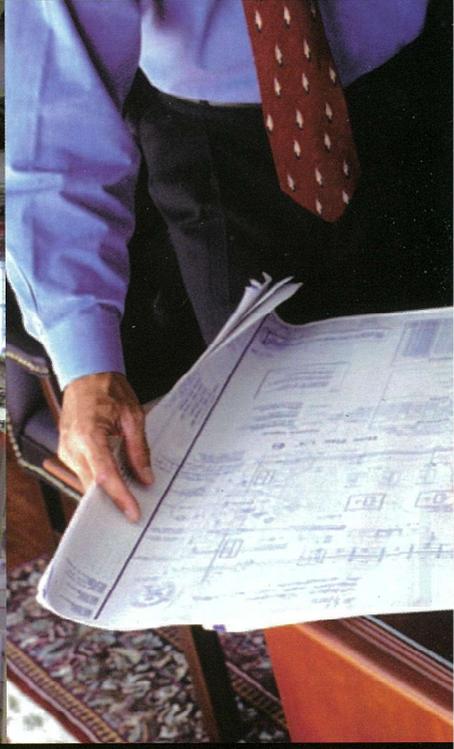




**TOYOTA FORMS**  
Molds for Precast Concrete

Japanese  
**MONOZUKURI**







# ***Make It Better***

***with Toyota Kohki***

***"Monozukuri Spirit"***

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What is one of the reasons for the high quality of "made-in-Japan" products?

We provide all-out effort and high-technology for our customers, even to the point of being invisible with meticulous care. This customer-oriented service and high-tech design of our proud engineers is the driving force of "Monozukuri Spirit".

We are proud to be known for "The Toyota Kohki Way" in the field of forms, plant equipment designer and manufacturer for the precast concrete industry. Innovative and flexible ideas, customer-oriented designs, ease of use, durability, safety, high productivity and precision with no compromise...

This is the Toyota Kohki "Monozukuri Spirit"

Now it's time to meet Toyota Forms.



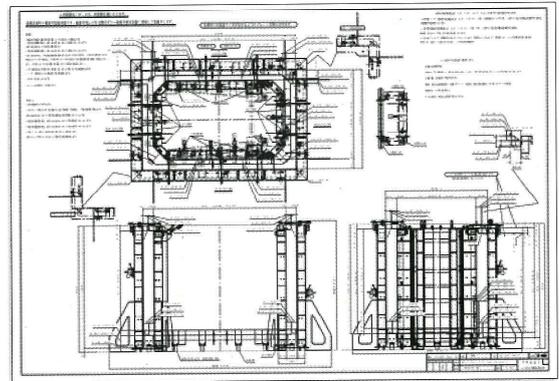
# Design Technology Makes Toyota Forms Superior

## Original Design Process and CAE

The innovative ideas and design skills are the basis of Toyota forms. Since 1966 Toyota Kohki has made tens of thousands of forms used in the precast concrete industry. With our years of experience and know-how, we offer you the best solution for meeting your demands in precast forms.

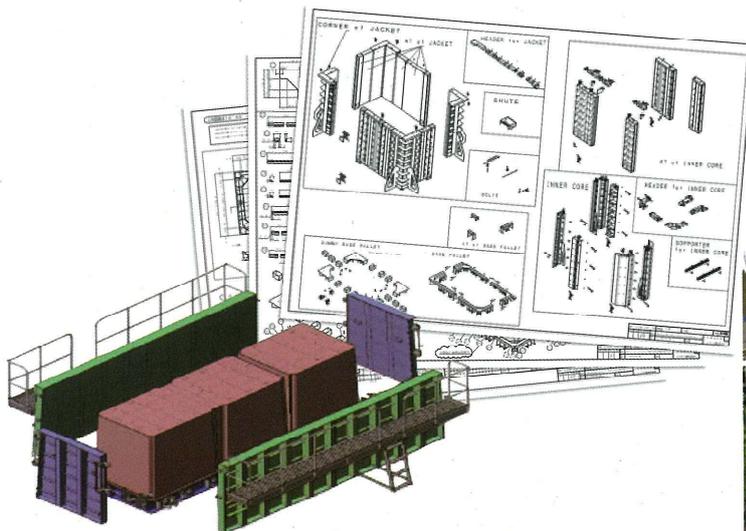
### • Design Process with 2D/3D CAD System

We have developed unique design processes using 2D/3D CAD systems. Our unique and innovative designs help keep the high functionality, durability, and safety in all of our forms. Toyota Kohki engineers continually pursue unique and innovative design ideas that enable the forms to have maximum productivity and efficiency.



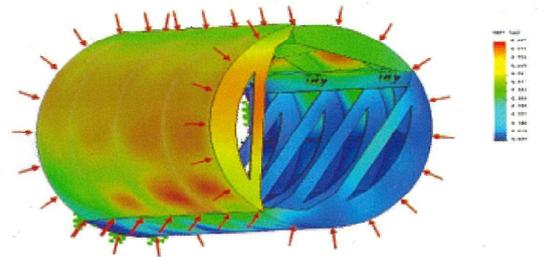
### • Continuous Know-how

Years of production systems and design processes that use our own theories and leading-edge technology have succeeded in handing down our "know-how" to the next generation of engineers. Our engineers continue to strive to grow the best team by maximizing our expertise and know-how.



### • FEM Analysis

The Finite Element Method (FEM) for structure, vibration, fluid, and thermal analysis is applied to every Toyota form optimizing the design.





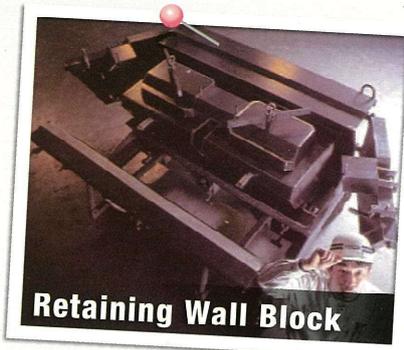
## Product Introduction

# Forms for Precast Concrete Products

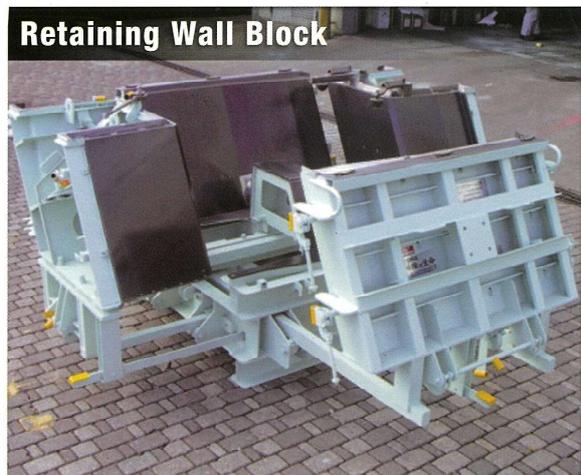
### Guarantee of Ease of Use and High Quality

Precast concrete products are widely used for infrastructure, construction sites, roads, retaining walls, river erosion control and drains all over the world.

Since the foundation of Toyota Kohki in 1966, we have manufactured tens of thousands of custom built precast forms responding to customers and civil needs. Toyota forms set the standard for quality in Japan and around the world.



Retaining Wall Block



Retaining Wall Block



WC BOX 2 People



Precast Lavatory

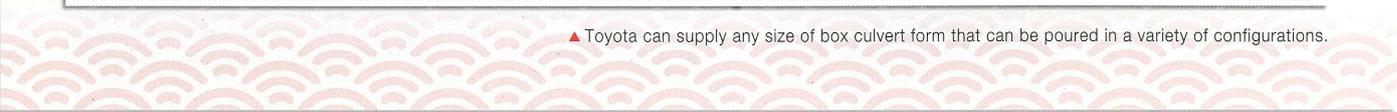


Box Culvert  
(4 direction adjustable)



Box Culvert

▲ Toyota can supply any size of box culvert form that can be poured in a variety of configurations.



## Product Introduction

# Forms for Precast Concrete Products

The forms below are designed with straight walls and include the Toyota "one-touch" collapsible inner core. The base pallets are adjustable which allow the product to be poured in various heights. Another option is the ability to produce various wall and base thickness by using the same form. These forms can be stripped in just a few minutes regardless of the product size. ▼



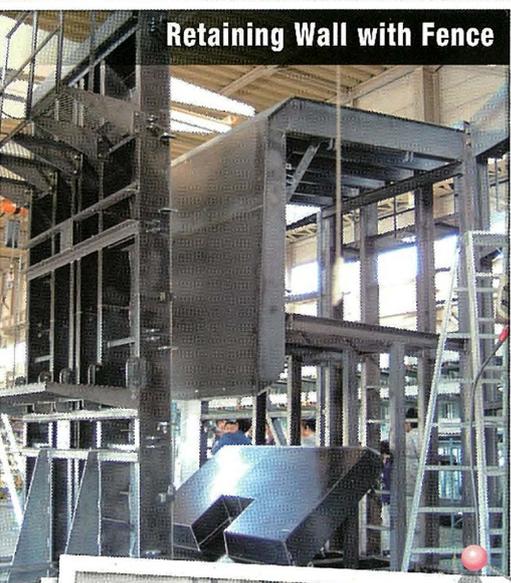
High-way Tunnel Floor



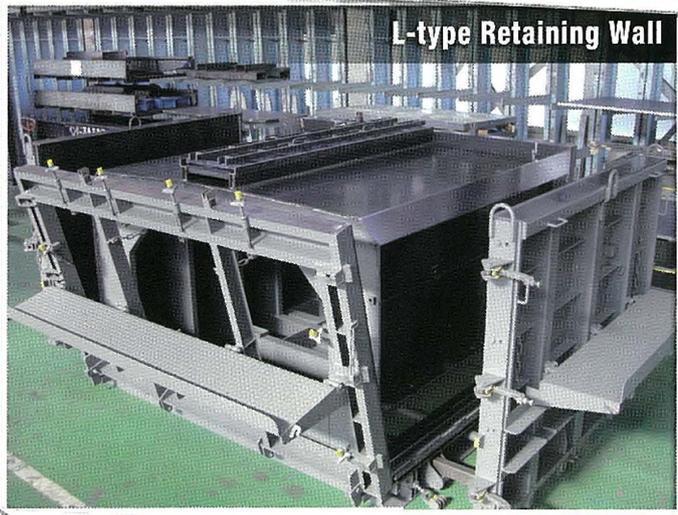
Water-side Block



Retaining Wall with Fence



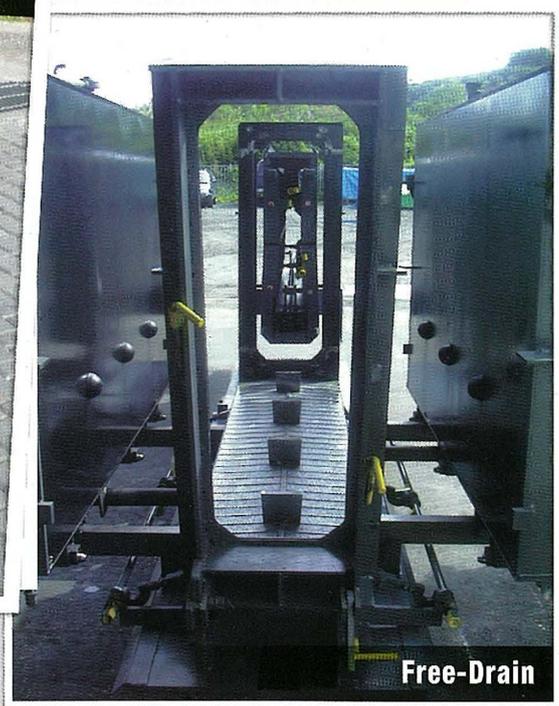
L-type Retaining Wall



Egg-Shaped Drain



Free-Drain



**Egg-shaped roadside drain**



**Products at stockyard**



**Construction site**



**Completion of construction**



All of the inner cores can be opened and closed by touching hand.



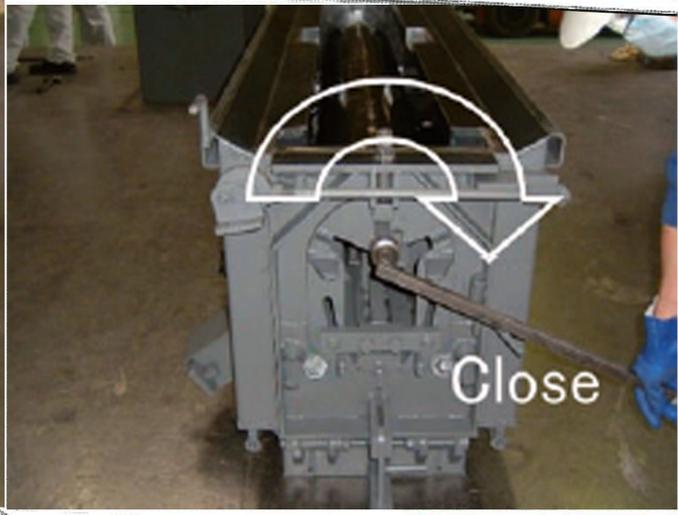
Roll-back type inner core



Open



Close



The inner core is hanged upon on one side by a sliding rail assembly.



## Product Introduction

# Industrial Machines and Equipments

### Providing Our World Class Services for Manufacturing Precast Concrete Products

Toyota Kohki design techniques are not just for high quality forms but also for industrial machines and equipment used to optimize production efficiency. We provide a total solution from design concept to finished product for manufacturing and production equipment.

- **Taking Advantage of Rich, Long Term Experiences and Knowledge from Concrete Manufacturing End Users.**

Toyota Kohki, specialists of precast concrete forms, have developed rich experiences in manufacturing concrete products. The close relationships we have with end users have been used to enhance our special skills and services to maximize efficiency of our designs. Our customers are guaranteed the best in designs and services of equipment for manufacturing various types of wet cast concrete products.

- **Advanced Design Skills and Technology**

As well as the design processes of forms, we design and manufacture reliable machines and equipment by using 2D / 3D CAD system and FEM analysis. With high quality design and manufacturing technology we have developed, we offer the world class services and production equipments for customers' satisfaction.



### Examples of Industrial Machines and Equipment

- Wet-cast Production Equipment; FMS Line Equipment, Pouring Machine, Automatic Stripping Device
- Other Equipment for Industrial Automation Devices





## High-Tech Engineering for Complicated Design

- **Original Design Process with Use of 2D/3D CAD System**

Experienced and innovative engineers make it possible to design complex shape and structure of forms. Finite Element Method (FEM) simulation is used commonly in the process of designing the forms.

- **Custom Designed**

We provide the best solution for the forms and equipments to meet each customer's needs with advanced technology.

- **Over 45 Years of History, Over Tens of Thousands Forms**

Toyota Kohki has made its mark on the history of the development of precast concrete industry in Japan since its foundation in 1966. Toyota forms have been delivered all over the world for more than 20 years. Our experience brings innovative changes to the concrete manufacturing industry with cultivated know-how and experience.



## High Productivity and Efficiency

- **Coveted Forms By Form Operators**

Features of Toyota forms are its ease of use when stripping, setting, and cleaning. Toyota forms are well thought out designs for operators and enable the ability to save time, labor and operating cost.



## Quality Control

- **Watertight Inspection**

Inspection of every form by filling it with water to check for leaks is the norm. This quality control proves the accuracy of Toyota forms.

- **Form Accuracy**

The quality of forms is crucial for the dimensional accuracy and finish of the concrete products.

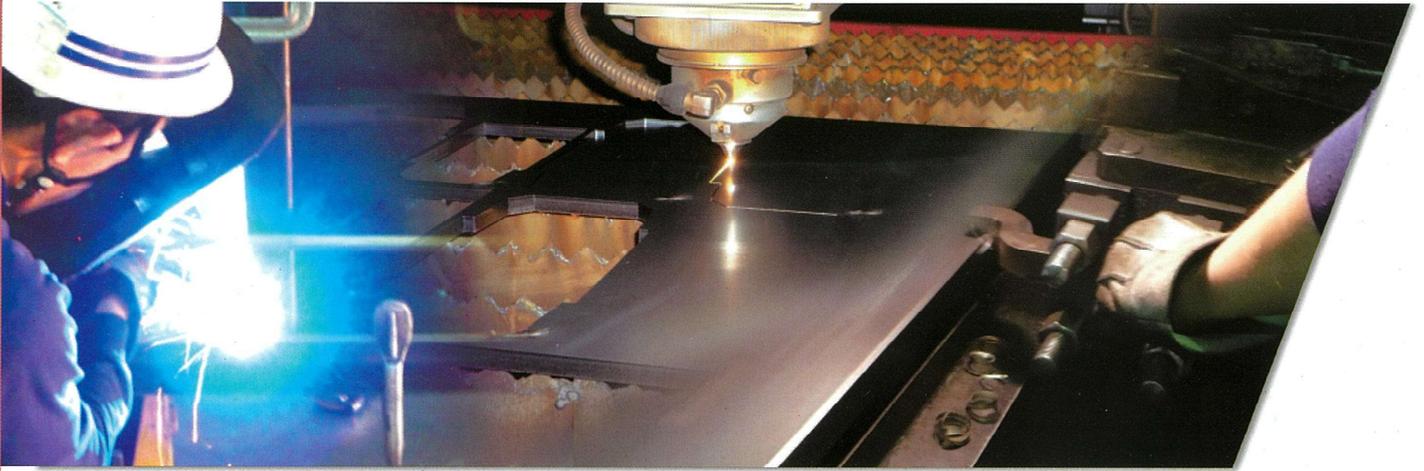


## Point 4

### Integrated Production System

- **All the Processes of Manufacturing in Toyota Factories**

All the operation processes of designing, machining, and assembly have been done in house by our own hands and personal responsibility at our own factories. Each form has a manufacturer employee code on it. This system enables us manufacture the high quality of Toyota Kohki forms. Skilled and experienced Toyota Kohki employees are proud of their craftsmanship in each form.



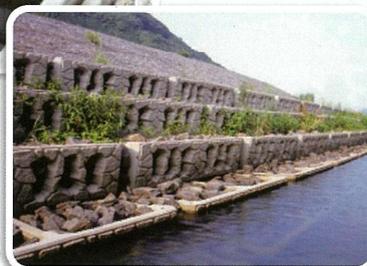
## Point 5

### Rich Experiences in Exporting

- **Better Quality , World Wide**

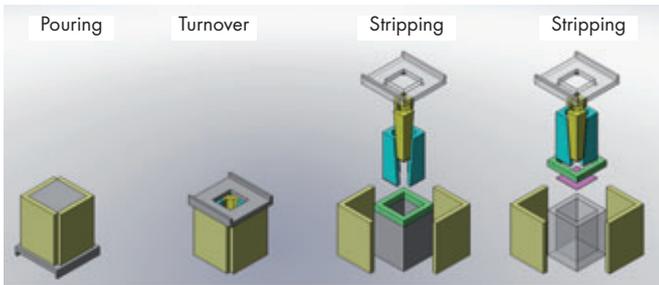
With over 20 years of experience in exporting, Toyota Kohki provides the highest quality forms and our “monozukuri” spirit all over the world.

#### Examples of Concrete Products Manufactured by Toyota Forms



# Effectively form technology

Toyota Kohki Co., Ltd., a precision precast concrete mold manufacturer, is able to meet the demands of complex and diverse precast concrete products used at Japanese civil engineering jobsites on a daily basis. With decades of cultivated know-how, skills, and experiences, Toyota Kohki has been one of the leaders in Japan and offers durable and precise molds to the precast concrete industry.

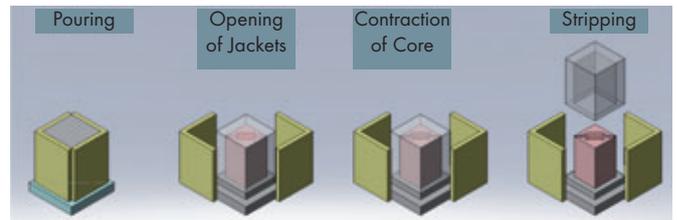


One of the operational methods for stripping with no taper

Generally, one side opened box type products such as drain inlets, septic tanks, or electrical hand holes have a tapered inner core for stripping. However, some of them need to have a no taper designed core.

One of the operational methods for stripping such products with no taper is to pour the concrete upside-down, turn the concrete product over together with the form after curing, unbolt all the setting bolts, and take away all the form parts such as outer jackets, form base, inner cores, etc. This process takes a long amount of time with a lot of danger and hard work.

Hydraulic cylinders are widely used to contract and expand the inner core for such type of forms, especially in the U.S. and some European countries. Use of hydraulic cylinders helps to enhance the productivity and safety by one-touched inner cores. However, if the forms are not sealed with rubber or other materials damage often occurs to the hydraulic cylinders by concrete leaking. It also damages the form when closing by hydraulic cylinders if the form is not



Toyota forms have made it possible to contract and expand the non-tapered inner core by using no hydraulic cylinders but mechanics.

well cleaned. Even if the form is sealed with rubber, it is still a problem for maintenance of the cylinder due to the concrete leaking caused by the lack of form precision.

Forms absolutely effect on the quality of the precast concrete products in terms of accuracy, appearance and durability. Toyota Kohki design and manufacturing engineers consider every design aspect to insure the most from every form, such as user-friendly operation, safety, and accuracy. However, the top priority is still the ease of cleaning of the form. The cleaning of the form directly influences the accuracy of the concrete product and the durability of the form.

Toyota forms have made it possible to contract and expand the non-



Toyota forms have a high reputation from operators due to the user-friendly design



*The quality of the form for precast concrete directly leads to the quality of the finished products*

tapered inner core by using no hydraulic cylinders but mechanics. All the process to collapse the inner core is done by turning a lever, which takes only few seconds regardless of the size of the form.

Every Toyota form is sealed with rubber and inspected for water-leaks. They are water tight regardless of the forms complicated design. This directly affects the manu-

facturing productivity and reducing maintenance operation and cost.

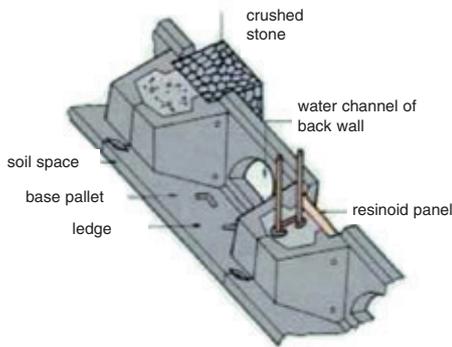
This kind of the forms are provided all of in Japan and overseas as well. Barger & Sons, a precast concrete manufacturer in the U.S. has used Toyota forms and improved their productivity, as well as the quality and total cost. Toyota forms have a high reputation from many operators due to the user-friendly design.

Since the quality of the form for precast concrete directly leads to the quality of the finished products and productivity, it is an important element for the concrete products manufacturer to consider when purchasing a form. The price of a form itself is certainly the main factor when, however from a long-term standpoint, product quality, productivity, safety, durability and maintenance should be all counted as the cost of the form.

You can check out Toyota molds at the following link: [www.cpi-tv.com](http://www.cpi-tv.com) (find "Toyota Forms")

# Green-Retaining wall

The society faces many problems such as air pollution, destruction of the ozone layer, global warming caused by the use of the fossil fuel, and rising crime due to the urban congestion. To help these problems tree-planting projects by using the Green-Retaining wall were started about 30 years ago in Japan.



*To unify the segmented blocks, concrete is poured in the spaces between the blocks next to each other after laying*

In Japan, where plains occupy only 25% of its land mass, many retaining walls are needed especially in the housing land development areas and road construction sites. Accordingly, the Green-Retaining wall was developed for environmentally friendly and comfortable living spaces. In addition green is considered as a color which has an effect on making people feel at ease and healthy.

The Green-Retaining wall reported in this issue is developed by Nippon Ryokusei Co., Ltd. and is constructed throughout Japan. In 1993, this became a government-sanctioned concrete product in recognition of over 1 million square meters of their achievement.

The Green-Retaining wall is green landscape concrete block that is widely used in road

side, river side, housing land development areas and as prevention for cliff landslide occurring in the process of civil engineering and building construction.

The Green-Retaining wall is a product used for creating green landscape by planting trees, flowers, or grasses. Compared to the existing traditional retaining walls, the Green-Retaining wall has a superior structure strength to endure storm rainfall by typhoons and earthquakes, regardless of types of soil and soil pressure. To unify the segmented blocks, concrete is poured in the spaces between the blocks next to each other after laying. This enables the Green-Retaining wall to stack or pile to over 30 meters high.

As a hollow concrete block, Green-Retaining wall is not only well drained after heavy



Mold for Green-Retaining wall elements



Green-Retaining elements at the stockyard



Green-Retaining wall under construction



The Green-Retaining wall is green landscape concrete block ...



*... that is widely used in road side, river side, housing land development areas*

Since the quality of the form for precast concrete directly leads to the quality of the finished products and productivity the precision of the form is crucial. Toyota Kohki CO., Ltd got engaged in this product from the start and made a great effort to better the product and its design. Precast concrete form manufacturers play an important role for product development.

Toyota Kohki Co., Ltd. participated in the bauma 2010 show and attracted many visitors. They will also exhibit at the bauma China 2010 show, held in Shanghai in November.

rainfall, but also has the ability of water retention. That is, this product does not require irrigation or watering plants even in drought conditions.

Some local governments in Japan have appointed the Green-Retaining wall as an environmentally friendly concrete product and it can be found throughout Japan.

# Precast concrete roadside drain in Japan

Toyota Kohki Co., Ltd., is a skilled, high tech, technical and precision precast concrete mold manufacturer. They are able to meet the demands of complex and diverse precast concrete products used at Japanese civil engineering jobsites on a daily basis. With their cultivated know-how, skills, and experience, Toyota Kohki has been the leader in Japan and offer durable and precise molds to their customers. The following is an example of a wet cast concrete mold designed and manufactured by Toyota Kohki.

Roadside drains are still in great demand in Japan. Especially the U-shaped design, Japan Industrial Standard (JIS) products have been used widely for many years. However, integral lid style roadside drains were designed and started being used about 25 years ago and now occupy a large portion of the market. The special feature of the drainage product is the shape of the inner core. There are several designs such as Oval-shaped, rectangular-shaped, heart-shaped and egg-shaped drains.

The egg-shaped drains is one of the most commonly used products throughout Japan. The egg-shape is considered the best shape

for water flow to let waste and debris in drains flow evenly with minimal amount of rainfall. The egg-shaped drains have developed into many various types. An example of the product is "Slit type". This design has a slit on the top slab of the product to gather drainage on the road. Another example is a "Permeable Pavement type" which is constructed under the coarse aggregated asphalt pavement.

It was 25 years ago that this shape of the drainage products began to be able to be manufactured with high productivity using a wet cast concrete molds. Toyota Kohki made this possible by innovating the "one

touch" collapsible inner core (See Fig 5.), and spread the egg-shaped drains all over Japan. The shape of the concrete product becomes more and more complicated due to the market needs. To meet the needs mold technology is getting more important. Moreover, precast concrete manufacturers are expected not only to just manufacture the products but also to enhance the productivity and the quality. The role of mold manufacturers has become crucial for the advancement of concrete product.

Since its establishment in 1966, Toyota Kohki, a mold and plant equipment designer and manufacturer for precast concrete has



Fig 1: Egg-shaped roadside drain products



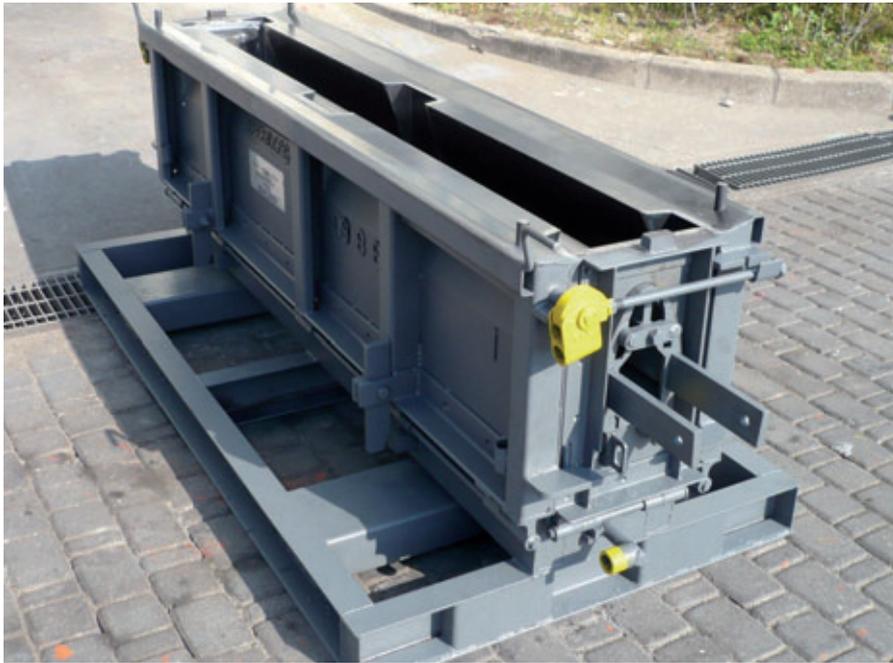
Fig 2: Products at stockyard



Fig 3: Construction site



Fig 4: Completion of construction



reputation from customers not only in Japan but around the world.

Toyota Kohki will exhibit at Bauma 2010, held in Munich, Germany during April 19-25, 2010. The egg-shaped drain and other molds will be exhibited at booth stand number C1.512. You can also see a movie of Toyota Kohki at [www.cpi-tv.com](http://www.cpi-tv.com) (Go to "precast concrete" box and find "Toyota Kohki").

*Fig 5: Mold for the egg-shaped roadside drains*

been contributing to the development of the precast concrete industry in Japan as the leading mold manufacturer.

The water tight, high durability, high productivity, and easy-use designs of Toyota Kohki molds gain trusts and a positive

# Mold for integral drainage

Because of diversified products designs, various purposes, design complexity, and high-standard quality control, wet-cast concrete products have been more widely used than dry-cast concrete products throughout Japan. Along with the intense product design development and the product quality control, productivity and quality of molds have naturally been developed and cultivated over the years. Toyota Kohki Co., Ltd. seeks to develop its quality and technologies to respond these high standard demands. In their over 45 years long experiences, what they have been researching is how they can provide workers/operators the Toyota's molds that are easy and safe to operate, long-life to use, and easy to de-molding, setting, and cleaning.



Fig. 1: All the inner cores are able to be collapsible in one-touch by hand

In this issue, the mold for integral drainage (lid-integral type drainage) which largely constructed in Japan is introduced. As shown in the figure 1, various types of integral drainages have been designed and manufactured throughout Japan. Recently water-permeable roads are popularly con-

structed. A new designed drainage has the ability that allows the permeated water from the road to be flowed into the drainage through its side holes. To manufacture this type of the integral drainages, the easy operation of the inner core plays such an important role in the whole productivity. All



Fig. 2: Mold with roll-back type inner core



Fig. 3: The inner core is hung from one side with sliding rail

the inner cores shown in figure 1 are able to be collapsible in one-touch by hand. This enables to separate the inner core from the

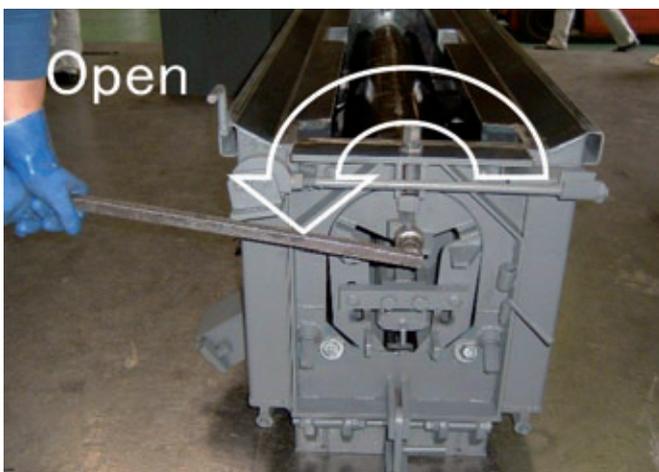


Fig. 4: the inner can be closed....

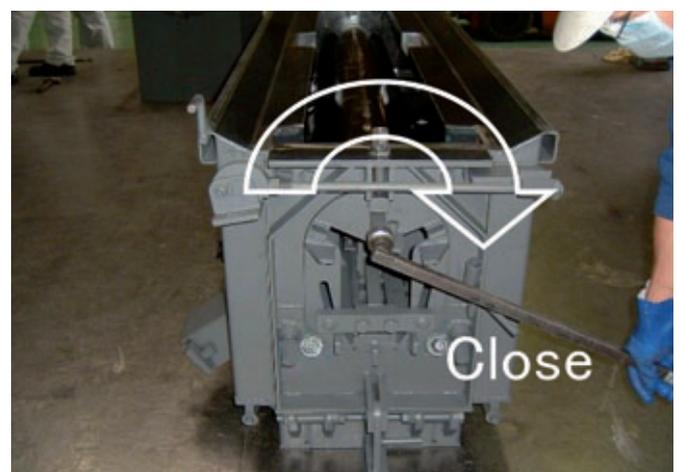


Fig. 5:...and open in one-touch by hand

concrete, and make it easy to demold. There are many ways to move the inner core away from the concrete product, such as roll-back type (by human hand), automatic type (by a special machining), or gooseneck type (by a crane depending on the individual customers' requests. The molds shown in figure 2 and 3 are with the roll-back type inner core. The inner core is hung from one side with sliding rail. This makes easy and safe to demold and clean.

As shown figure 4 and 5, the inner can be opened / closed in one-touch by hand and hydraulic device is not needed at all. Since the operation has been done by human hand, it can be easily realized if any inappropriate situation occurs such as a case that clogs are left due to the poor cleaning.

The molds are all with gasket rubber to prevent the concrete from leaking. Replacing the gasket material is only the necessary maintenance for this type of mold. This is why Toyotaforms can be used for many years as long as the molds are well-cleaned. Moreover, many artifices and innovations can be found throughout the

Toyotaforms such as demolding of the side hole-formers for gathering the permeated water from the road and slit-part on the base pallet of the mold, or any for better precast concrete products.

Since its foundation of 1966, Toyota Kohki has been developed its technologies and contributed to the concrete industry as a leading mold manufacture company in Japan. Toyotaforms that is water-tight, high durability, high productivity, and ease of use, now have widely been used more and more countries.



## >> Company Profile

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Fukushima Plant



Yoshinogari Plant



Head Office:Tokyo



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