Upholding our image as a technology-driven company, we are responding at the industry-leading Kajima Technical Research Institute to customers' increasingly complex and diverse needs. Through research and development, we continue to lead in new market creation, contribute to stronger competitiveness, and boost profitability and quality.



## **RESEARCH AND DEVELOPMENT**

## **Topic 01**

Development of Kajima Micro Blasting Method: a Foundation Demolition Method With Less Noise and Vibration Kajima has developed the Kajima Micro Blasting Method, a demolition method used to smash underground concrete with micro-quantities of explosives, thereby significantly reducing noise and vibration.

The number of urban building construction projects requiring the demolition of exist-

ing structures has risen in recent years. Due to limited space, a breaker is used to demolish underground structures, which ends up causing lots

of noise, vibration, and dust. Although a demolition method using explosives can crush large concrete structures in an instant, it is seldom used in demolition work on urban sites.

The hallmark of the Kajima Micro Blasting Method is that it uses micro-quantities of explosives to form fissures that slice concrete, rather than massive amounts to pulverize it. By opting to use detonating fuses, which contain only small amounts of explosive material, the new method reduces the required amount of explosives to less than one-tenth that of traditional blasting methods.

Conventional approaches continuously generate significant noise and vibration. In contrast, this method takes place in an instant, resulting in less noise and vibration in and around the demolition site. It also eliminates the need for large heavy machinery, allowing for a reduction in CO<sub>2</sub> emissions versus conventional methods. Moreover, buried and aboveground sections can be demolished simultaneously, enabling shorter construction periods.



Reinforced concrete before blasting

Reinforced concrete after blasting

Cutting through steel rods



KAJIMA Technical Research Institute website http://www.kajima.co.jp/english/tech/katri/index.html

## **Topic 02**

## Development of Dual-Armed Unpacking Robot for Cross-Industrial Technological Development

Kajima and Yaskawa Electric Corporation (Yaskawa Electric) have joined forces to develop Japan's first automated unpacking system.

In Japan, securing the proper labor force in a declining labor

pool and the push to boost cost competitiveness have in recent years spurred calls for a revolution in production methods in the manufacturing industry. At plants producing pharmaceuticals and other chemical products and those involved in food production, packages containing raw materials are unpacked prior to entering the production area in order to prevent paper dust from ending up in products on the production floor. Because packaged materials come in many shapes and sizes, unpacking is often complex, meaning this work had to be done manually until now. To solve this issue, Kajima and Yaskawa Electric, viewing production line automation as a means to revolutionize this process, developed an automated system to unpack raw materials using a dual-armed robot.

This system, compatible with packaging of different sizes and shapes, automatically unpacks cardboard and paper packaging. Using multiple hands, the robot crosscuts the package exterior based on its spatial orientation, removes the raw materials, then breaks down and collects the remaining packaging. Furthermore, a range of onboard sensors detects uncompleted work and allows for retries.

Today, Kajima and Yaskawa Electric continue to conduct research in this field, with the hope of eventually seeing similar systems applied to processes where automation is desired outside of unpacking.



Dual-armed unpacking robot



MOTOMAN-SDA20D dual-armed robot