



December 2012

Hitachi Construction Machinery Co., LTD.

• “Strategic Advanced Elemental Robot Technology Development” Project (FY2006-FY2010)

Dual-Arm Construction Machinery, Expected to be Active in Sites of Building Deconstruction



In cities throughout Japan, many of the buildings that were built during the period of high economic growth are reaching their final years of endurance. It is not rare that these buildings do not meet the earthquake resistance standards, and rebuilding is being hurried. Additionally, according to the “Construction Recycling Act”, dismantling operators are obligated to separate construction waste at deconstruction sites and recycle the separated materials. The separating process is mainly done manually, and is becoming an issue in terms of efficiency and ensuring safety.

From such social background, NEDO has implemented the research and development project for a “Construction Waste Processing Robot System” capable of safely and efficiently dismantling buildings and separating the waste thereof. The project took place in 2006-2010, and as a result, Hitachi Construction Machinery Co., Ltd. developed the “ASTACO NEO”, a construction machine having two arms, and started the sales of this in September, 2012. The two arms are asymmetrical, and are characterized in that the right arm operates as the main arm while the left arm acts as an assisting arm. A 10-13 ton attachment designed for excavators can be mounted on the end of the right arm, while the left arm is capable of being equipped with a 4 ton attachment. The array of attachments needs to grab objects with a “grappler”, cut steel frames, etc. with a “cutter”, crush concrete or asphalt with a “pressurized crusher”, and carry gravel or waste with a “bucket”, and these can be interchanged according to needs.

Prior to sales, the machine was active in Minami-Sanrikucho and the city of Ishinomaki in Miyagi Prefecture, both of which are affected regions of the Great East Japan Earthquake, and was able to gain an operation record. The machine is scheduled to continue being active in dismantling work of buildings and at scrap processing sites, etc.



In a dual-arm machine where one arm crushes or excavates while the other arm supports, the loads on each of the arms greatly differ. (photo taken of a prototype)



A cargo container drifted by the tsunami and blocking a road in the city was disassembled and separated on the spot to be transported. (Ishinomaki City)



Metal scraps from construction structures and foundations complicatedly intertwined with each other were finely cut and separated to be transported. (Minami-Sanrikucho)

Q. Why did this project start?

The development of industrial robots began in earnest in Japan since the 1980s to resolve issues due to an insufficient labor force and other factors. As a result, Japan emerged as the leading "robot specialist" on the world stage. Meanwhile, the country also faced numerous social issues such as a decreasing birthrate and aging population, tough international competition and anxiety over with regards to major disasters. With a viewpoint that advanced robotics technology used in various fields can help to resolve social issues, the "Development of Strategically Advanced Robot Elemental Technology" Project began from FY2006. This project was split into three different fields: "Next-generation Industrial Robots"; "Service Robots" and "Special Environmental Robots". "Hitachi Construction Machinery Co., Ltd." and "Tokyu Construction Co., Ltd." conducted research and development into "Construction Type Industrial Waste Disposal and Processing Robot System" in the "Special Environmental Robots" field to develop the world's first dual arm construction machinery.

Q. What was the aim of the project?

The aim of the project was to help maintain and improve the competitive edge of Japan's robot sector by developing advanced robotic systems and elemental technology, and applying those to a wide range of products in fields other than robots, such as automobiles and home information appliances. A "mission" was defined for each field factoring in the future market and social requirements. Research and development into the "Construction Type Industrial Waste Disposal and Processing Robot System" progressed based on set development objectives, namely identification methods of waste materials generated when dismantling buildings; technology for efficient, safe and highly reliable dismantling and selection work; usable on dismantling work sites; development of next-generation manipulators with the same environment resistance as construction machinery; and development of human interfaces that can be used by workers on site.

Q. What is the role of NEDO?

Project operation and management was updated by organizing committee meetings, technical review sessions and requesting the opinions of outside specialists, with project progress reports provided by the project leader to narrow down the project for each mission. To suit the state of research and development progress, NEDO reviews the mission details and implementation framework to provide support for the appropriate management and implementation of the overall project.