

## Engineers' round-table discussion — for prevention of global warming

# Towards environmentally friendly designs, the various thoughts of engineers

Cutting CO<sub>2</sub> emissions to prevent global warming is a global issue. We endeavor to reduce CO<sub>2</sub> emissions right from the stage of development, taking into consideration product LCA\*. We asked our engineers what they think and feel under the circumstances.

\*Life cycle assessment

—“You always have to consider the global environment in your work. So what is your awareness while working?”

**Aihara:** In the field of hydraulic excavators, first of all, we think about reducing energy consumption and improving fuel consumption. Customers stress the importance of fuel consumption to reduce running costs, and our job is developing products responding to the requirements. We have been putting a lot of effort into hydraulic systems since a long time ago to raise efficiency, reduce weight and enhance work efficiency.

**Arai:** I am working on the engines of hydraulic excavators. Improvements in fuel consumption are very important. For each model change, we pursue better fuel consumption, and this effort has not started only recently.

**Moriya:** Hi-OSS (see p16) is a type of environmental conservation system which recycles by-products generated at construction sites, on site. I understand that we are contributing to reducing CO<sub>2</sub> emissions together with transportation cost cut and consideration to the vicinities.

**Oki:** At the Technical Research Center where I work, we have finally put a battery-driven excavator into practical use, which we started developing in 2004. This excavator is a good example of our latest efforts to prevent global warming. I have started thinking about reducing CO<sub>2</sub> emissions a lot since I was involved in this development,

**Aihara:** Customers are very interested in electrically



ZX70B, battery driven excavator



EX5500E-6, electrically driven ultra-large excavator

driven construction machinery. An electrically driven EX8000, an ultra-large hydraulic excavator weighing 800 tons, is requested to us.

—“How do you reflect the requirements of customers with high environmental awareness in your product development?”

**Arai:** Customers' opinions of current products are reflected in the development of following products. After the sales launch of new products, we designers visit customers, together with employees from the Corporate Quality Assurance Division, to hear their opinions. We understand the requirements of customers during such visits.

**Fujita:** Sales engineers at various sales offices also receive opinions of customers and pass them on to the works. When delivering products, engineers go to the place of delivery to check the use of the products at the worksite, and often find small improvements to make.

**Moriya:** The Hi-OSS I am working on is a special system. We cannot receive opinions easily. So we have to visit customers who are using the system to hear their opinions.

**Arai:** We often go abroad to hear customers opinions because our sales outside Japan are 73 percent of our total sales.

**Sasaki:** Almost all of the ultra-large dump trucks which our department deals with are sold outside Japan. As dump trucks get bigger, there is increasing demand for combined use

Attendees Interviewer: Tohatsu Environmental Research Institute Ltd.



**Mitsuo Aihara**  
Senior engineer  
Mining & Heavy Equipment Division

**Yasushi Arai**  
Engineer  
Construction Equipment Division

**Hideki Moriya**  
Senior engineer  
Recycling System Division



**Takatoshi Oki**  
Researcher  
Technical Research Center

**Kensho Fujita**  
Engineer  
Application & New Product Division

**Takashi Sasaki**  
Engineer  
Mining & Heavy Equipment Division



ZX50UE-2, 2-way eco-excavator  
(jointly developed with Kajima Road Co., Ltd.)



EH3500, ultra-large dump truck  
(Incorporating bullet train technology)

of electricity to raise their efficiency. We are responding with the AC drive system, in which the engine powers a generator to produce electricity. Running costs, including the cost of fuel, become more economical as trucks get bigger. So the use of large trucks reduces CO<sub>2</sub> emissions. In the future, we want to develop a hybrid system with batteries and a system to use regenerated energy. We need light, cheap batteries to do this.

**Oki:** Although systems have already been devised, we have not solved problems relating to weight and price. So we are not sure yet whether customers will use battery driven large construction machines.

**Fujita:** The response for battery driven machines is good, but problems are price and battery capacity. Customers often ask us how long batteries last. We need to meet customer requirements.

—“Hitachi Construction Machinery has a target of emission neutral. What do you think about environmentally friendly designs based on the LCA of products?”

**Aihara:** Extending the lifetime of machines, including their components, reduces the energy required for maintenance and production. It is vital to think like this for environmentally friendly designs.

**Arai:** Improving efficiency is the principal target. To meet this, the fuel consumption of engines must be improved and the efficiency of the hydraulic control system must be raised. Concerning improving hydraulic efficiency, the ZX200-3 incorporates patented technology whereby the weight of the front is used when lowering the boom and oil pressure is returned to the boom circuit. This model was awarded as an excellent energy saving machine\* in February 2007 because the increased efficiency by not burning fuel to move the boom reduces environmental impact. The model was top for fuel consumption in a survey by a Dutch magazine. We will further enhance our sophisticated hydraulic control technology, which is original and our forte.



ZX200-3, hydraulic excavator

**Oki:** I agree. Hydraulic control is our core technology. Although introducing electrically driven machines is important to raise performance, we should not neglect improving our hydraulic technology.

**Aihara:** The balance between performance, durability and cost is important in product development. We are always careful with this balance to ensure that



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durability is not weakened to raise performance, or that weight and price will not rise to achieve better durability.

**Sasaki:** We want to offer the same functionality at cheaper prices and pursue a balance of performance and quality.

**Fujita:** The Application & New Product Division wants development speeded up. It is sometimes necessary to supply products which do not meet customer requirements one hundred percent and then improve the products based on the opinions of customers.

**Moriya:** It is true that listening to customers is most important. By listening to customers, we can avoid developing products which satisfy us, but do not satisfy the customers.

—“Finally, please tell us about your hopes and dreams as engineers.”

**Oki:** We lead other companies in hydraulic technology. I want to exploit this advantage and develop systems with higher efficiency.

**Fujita:** It is still difficult to spread the use of battery driven machines because of the constraint of battery capacity and cost. First, I want to increase the number of electric construction machines which use commercial power supplies.

**Sasaki:** We are going to sell dump trucks fitted with the AC drive system. In the future, I want to fill mines all over the world with our dump trucks.

**Moriya:** We have just started working to export Hi-OSS and are performing demonstrations in Australia. The value of Hi-OSS we are proposing will be tested outside Japan.

**Arai:** I think regulations relating to fuel consumption will be stricter in Japan. I believe that improving engines and hydraulic systems by raising their efficiency is our social responsibility. We should make constructive efforts, taking the tightening of regulations as business opportunities.

**Aihara:** We have just lined up ultra-large construction machines. Although exports and shares of ultra-large construction machines are favorable, we will continue to steadily improve the life cycle cost, including fuel consumption, which is of most concern to customers.

—“Thank you very much.”

\* The Excellent Energy Saving Machine, Chairperson's Award for fiscal 2007 was presented by the Japan Machinery Federation.