

Providing Products and Services that Coexist with the Environment

Komatsu provides optimal environment-friendly solutions through its safe and innovative products and services.



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Promoting Ahead of the Era Product Development in Environmental Conservation and Safety Measures

Tier 3 emission standards for diesel engines entered into force in Japan, the U.S., and Europe in January 2006. In conjunction with its subsidiaries outside Japan, the Komatsu Group acts in concert to introduce new kinds of machines to the market at the global level. In addition to compliance with various regulatory regimes, Komatsu seeks to create environment- and people-friendly products that incorporate enhanced fuel efficiency, reductions in vibrations and noise, and improvements to machine operator environments, among other achievements. Furthermore, with regard to reductions in substances of environmental concern, we have strengthened our activities, setting forth medium-term objectives that are ahead of the trends in developed countries.

In FY2007, as we continue with these activities, Komatsu will be actively making efforts towards product development that looks ahead to the next generation of environmental conservation and safety measures.

Environment & Economy

Komatsu's Environment and Economy means that it provides satisfactory solutions for both environmental impact reduction and economic efficiency through superior manufacturing technologies with *Monozukuri*. Developing environment-friendly products must be done at competitive cost. Otherwise, these products cannot establish a presence in the market and will not contribute to reducing environmental impact. In FY2006, Komatsu implemented Environment and Economy through the development of such products as:

The WA600-6 wheel loader, PC128US-8 hydraulic excavator, and other construction and mining equipment compliant with Tier 3 emission standards, which became effective in 2006.

Industrial machinery such as the large AC servo press.

These efforts resulted in increased user-friendliness as well as in reductions in CO₂ emissions.

Major Achievements in FY2006

- 1 Expanded development of environment-friendly construction equipment (GALEO Series)
- 2 Development and market launch of vehicles equipped with diesel engine technology "ecot3," which satisfies the Tier 3 emission standards for off-road vehicles that became effective in 2006
- 3 Promotion of on-site recycling method by mobile crushers/recyclers
- 4 Realization of Environment and Economy through development of industrial machinery such as the large AC servo press
- 5 Development of industrial vehicles such as electric hybrid forklift trucks

Reducing Environmental Impact of Products

Substances of Environmental Concern Banned or to Be Reduced for Use in Products

Responding to the heightening of environmental conservation awareness around the world, Komatsu has been redoubling its efforts from an early stage to reduce substances of environmental concern, such as asbestos and lead. In addition, in FY1999, using chemical substances banned under Japan's Law Concerning the Examination and Regulation of Manufacture of Chemical Substances Control and developed countries' regulations as a base, Komatsu stipulated its own list of substances banned from use and substances approved for use only in limited circumstances (see chart below) and began comprehensive control of substances of environmental concern. The company has implemented reductions in use for those substances approved for limited use in keeping with its medium-term targets for development of environmental technology.

Furthermore, in response to the enactment of the EU regulation addressing Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) in FY2007, Komatsu plans to review the list of

Substances of Environmental Concern Banned or to Be Reduced for Use in Products

Designation	Number of substances	Name of substance
Banned	5	•PCBs •Asbestos •Specified chlorofluorocarbons •Trichloroethylene •Triethanolamine
To be reduced (subject to limited use)	13	•Mercury •Lead •Cadmium •Arsenic •Selenium •Chromium (VI) •Hydrofluorocarbons •Vinyl chloride •Chloroprene rubber •Brominated flame retardants •Polycyclic aromatic hydrocarbons •Methanol •Hexachlorobenzene

substances approved for limited use and change the designation of certain substances to be "reduced" or "banned" as appropriate. Through cooperation with suppliers, the company is strengthening control of substances of environmental concern in products as well as engaging in the creation of a control system

Life Cycle Assessment (LCA) Calculations

As general guidelines for reduction of the environmental impact of construction and mining equipment, in FY1999 Komatsu set medium-term targets for development of environmental technology based on Life Cycle Assessment (LCA). The first step was the company's target for FY2005, which all major equipment types except for hydraulic excavators have already attained. In addition to implementing horizontal development for other equipment types, the company is pushing ahead to its second step target for FY2010 by advancing the development of elemental technologies.

The company is working to further decrease the amount of CO₂ emissions per unit of operations through the use of engines designed to meet Tier 4 emission standards, which will become effective in 2011. The company aims to reach its recyclability ratio target through the use of chlorine-free hoses and its reduction target for substances of environmental concern through the use of chromium (VI)-free and other options.

Medium-term Targets for Development of Environmental Technology Based on LCA (Set in FY1999)

Category	FY2010 Target*
CO ₂ emissions	-10%
Recyclability ratio	99.5% or more
Substances of environmental concern	-75%

*As compared with FY1998

PC128/138US-8 Short Tail Swing Hydraulic Excavator

Equipped with a new-model engine featuring ecot3, the latest diesel engine technology, the PC128/138US-8 meets Tier 3 emission standards, which became effective in 2006. Besides having an economy mode that emphasizes fuel efficiency, this vehicle boasts other functions to assist in conserving energy, including "ecogage" and cautions during idling. Clearing the noise standard in Japan, the strictest in the world, this machine is designed to take into account the surrounding environment during operations, thereby representing a step forward in environment-friendliness.



PC138US-8 short tail swing hydraulic excavator

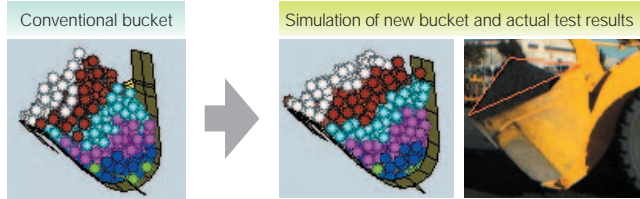
WA500/600-6 Wheel Loader

To make the WA500/600-6 a vehicle that is both environment- and operator-friendly, Komatsu considered from various angles what a loader should be and put that into concrete form. The vehicle is equipped with Komatsu's leading-edge ecot3 diesel engine technology, putting it into compliance with Tier 3 emission standards, which became effective in 2006. This vehicle has also resulted in greater fuel efficiency during operation by coupling that engine with a large-capacity torque converter.

■ A 20% Increase in the Work Capacity per Unit of Fuel

The WA500/600-6 achieves energy savings during load and carry operations through the torque converter with lock-up transmission. Besides being able to travel within a job site, the excavated load can be transported as is, making it possible to reduce conventional dump truck usage. Moreover, improvements to the shape of the bucket make it easier to dig, resulting in an 11% improvement in loading efficiency compared to the previous model.

Enhancements in Loading Efficiency through Improvements to the Bucket

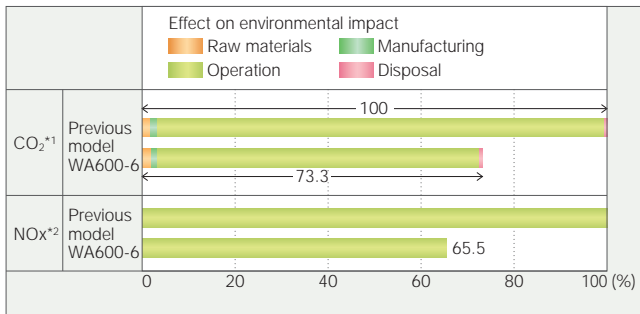


The combined result of these various energy saving technologies is that the work capacity per unit of fuel has increased tremendously, jumping 20%.

■ Life Cycle Assessment for the WA600-6

When a construction equipment model is changed, a Life Cycle Assessment (LCA) is conducted in order to manage the emissions volumes of CO₂ and NO_x. Through this process Komatsu is able to confirm that compared to the previous model, the WA600-6 has brought emissions reductions of approximately 27% and 34%, respectively.

LCA Provisional Calculations for the WA600-6



*1 For CO₂, the LCA of the previous model is set as the index level of 100%.

*2 For NO_x, a comparison of emissions volume is conducted, with the volume of the previous model indicated here as 100%.

Topics

Provisional Calculations of Total CO₂ Emissions Reductions for Komatsu Construction Equipment in Operation in Japan

For most kinds of construction equipment, over 90% of the CO₂ emitted over the course of their lifecycle is generated during the usage stage (see the graph entitled "LCA Provisional Calculations for the WA600-6").

That is why Komatsu has focused on improving fuel and operational efficiency in its construction equipment. The company has conducted provisional calculations for the volume of CO₂ emissions reductions in the usage stage for Komatsu construction equipment operated in Japan compared to a fiscal 1990 base year.

Calculation Method

For all Komatsu construction vehicles currently in use in Japan (hydraulic excavators, wheel loaders, bulldozers, dump trucks, etc.), the volume of CO₂ emissions reductions in the usage stage were calculated provisionally, assuming a transition from the FY1990 fuel consumption level to an improved level that is in compliance with Tier 3 emission standards, which became effective in 2006.

Assumptions for Making the Calculations

The number of vehicles of Komatsu construction equipment in operation in Japan was derived by using as a base the number of vehicles

sold in Japan, broken down by type of equipment and fiscal year of sale, and then making calculations after determining a period for operations. The rate of utilization for each type of equipment was determined based on the size of the equipment.

As for CO₂ emissions volume, fuel consumption was determined for the type of equipment within each size grade that was serving as the base for calculations, using the depreciation schedule established by the Japan Construction Equipment Manufacturers Association; other vehicle types were converted using their rated flywheel horsepower. CO₂ emissions reductions volume was calculated on the assumption that all Komatsu construction equipment underwent a transition from 1990 models to models that comply with Tier 3 emission standards, which became effective in 2006, and, as a result of changes to environment-friendly models, have improved operating efficiency per unit of fuel consumed.

Results of the Provisional Calculations

CO₂ emissions reduction volume (during operation): 540,000 tons per year (a reduction of 17.3% compared with FY1990)

Reducing the Environmental Impact of Industrial Machinery and Vehicles

Development of a Large 3000 ton AC Servo TR Press

By replacing the drive and die cushion used in a conventional mechanical press with an AC servo drive, the world's first large 3000 ton AC servo TR press achieved a substantial increase in production capacity of 1.2 times the capacity of previous Komatsu machines. This has made it possible to realize tremendous gains in energy conservation, resource conservation, and lowered noise and vibrations, to a degree that conventional mechanical presses have never attained.

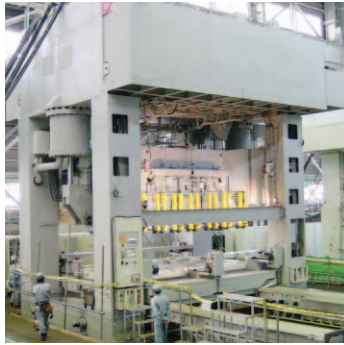
■ Features of the Large 3000 ton AC Servo TR Press

Through a free-motion mechanism, high-speed forming of processing-resistant materials (such as high-tensile steel) is possible. Touch speed to the die assembly can be reduced, resulting in a 20dB* decrease in noise.

Utilization of the servo motor regenerating function leads to a substantial decrease in electrical energy used.

The drive has been simplified wherever possible, leading to greater ease of maintenance.

*A 20dB decrease in noise means the acoustic pressure drops by 1/10 and the strength of the sound (sound energy) drops by 1/100.



Large 3000 ton AC servo TR press

Development of a Large B-class AC Servo Press

Following on the development of a large A-class AC servo press in FY2005, Komatsu developed a large B-class AC servo press. As with the A-class model, the AC servo drive has resulted in enormous gains in energy conservation, resource conservation, and lowered noise and vibrations, to a degree that conventional mechanical presses have not been able to attain.



B-class AC servo press

Electric Hybrid Forklift Trucks

In recent years, even for forklifts, advances have rapidly emerged towards powering the vehicles with batteries so as not to release emissions. However, electric-powered vehicles have a number of shortcomings, such as short operating times between charges compared with engine-powered vehicles, decreasing power to the vehicle as battery energy is consumed, long recharging times, and difficulty in refilling the water.

To resolve these issues, in May 2005 Komatsu Utility Co., Ltd. launched electric hybrid forklift trucks that feature two systems for electrical power, with an electrical storage device known as a capacitor in addition to the conventional battery.

■ Saving Energy by up to 20%*

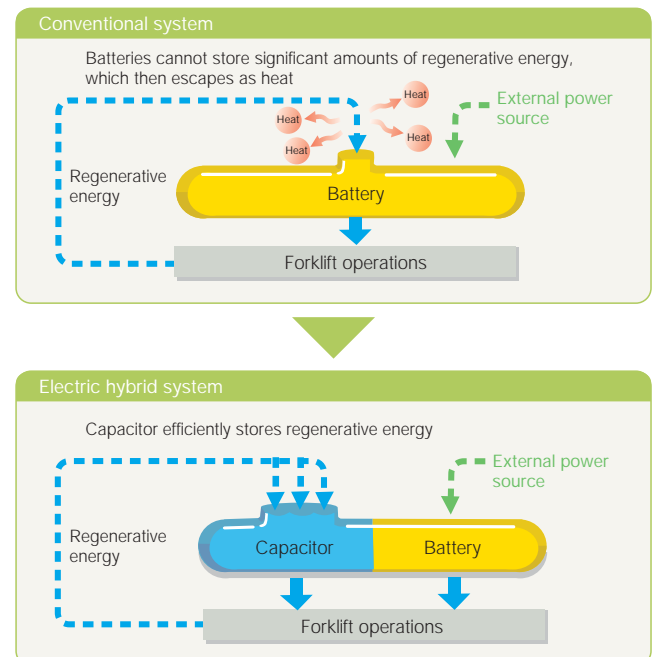
Taking advantage of its ability to efficiently store and release electrical energy in no time, a capacitor can quickly store the regenerative energy that is lost as heat in conventional electric-powered vehicles. The two systems for electrical power are selected automatically as the situation

demands, reducing power consumption and thereby saving energy by up to 20%*. In addition, the output voltage is controlled so that even as battery power is consumed, the speed does not decrease, enabling the vehicle to maintain its powerful operating capacity.



Electric hybrid forklift truck FB15HB

Energy Savings through Electric Hybrids



■ Dramatically Expanded Operating Times with Short Recharging Times

Existing electric-powered vehicles have had maximum continuous operating times of about six hours, while recharging has required ten hours. Electric hybrid forklifts employ rapid auxiliary charging by means of an inverter-type battery charger, and the FB15HB is capable of operating as long as 11 hours* after a one-hour rapid auxiliary charge.

In addition, this model features a sealed battery to eliminate the need to refill the water, the most burdensome task in battery maintenance. Moreover, with its motors entirely AC-powered and a reduced need for consumables and replacement parts, this vehicle pursues greater energy savings all around.

*Varies according to operating conditions

Providing Solutions for Customers' Environmental Activities

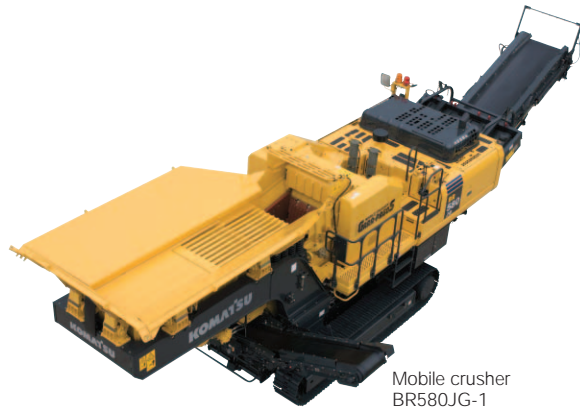
Promotion of On-site Recycling Using Mobile Crushers/Recyclers

By utilizing the sophisticated technology and depth of experience it has built up over the years, Komatsu develops excellent environment-friendly products that coexist with nature in order to propose efficient solutions to the environmental challenges facing society. For example, the company provides a means of on-site recycling that recycles the residuals generated from construction and civil engineering projects at the site where they are generated. By using mobile crushers/recyclers—recycling equipment—it is possible to lessen the generation of waste materials at construction sites and thereby save resources and reduce CO₂ emissions. These mobile crushers/recyclers, which contribute to environmental preservation, are now in use at numerous construction sites.

■ Mobile Crusher BR580JG-1

Komatsu will launch its large-scale mobile crusher BR580JG in FY2007. The BR580JG-1 has undergone a complete model change from the BR550JG, a type of mobile crusher/recycler in the 50-ton class that crushes and recycles rock, pieces of concrete, slag, and other residuals on site.

This model, changed after a six-year interval, satisfies Tier 3 emission standards, which became effective in 2006, and features enhanced operability and ease of maintenance. Furthermore, the BR380JG has succeeded in strikingly improving its cost performance through innovative features such as the well-received fully automatic discharge setting adjustment system and a function to protect the hydraulic crusher.



Mobile crusher
BR580JG-1

Efforts for Reuse and Recycling

Promoting the Reman Business

The Reman business consists of remaking used machine components of construction and mining equipment such as engines and transmissions into components of the same quality as newly-manufactured ones by various processes and supplying them to the market. The Komatsu Group is promoting the Reman business at Reman Centers located at seven of its operation bases around the world.

"Reman," an abbreviation of "remanufacturing," offers customers the following benefits.

The same quality and performance as those of new components are guaranteed.

The cost of a "remanned" component is lower than that of a new one.

A proper level of inventory of "remanned" components permits reducing the idle time of construction equipment.

The reuse and recycling of components helps save resources and reduce waste.

A new Reman company was established in Jakarta, Indonesia in January 2007 to provide "remanned" components globally. The Group will promote reuse and recycling activities in new regions for "remanning" operations as well as in existing regions.

■ Providing Reman-related Information

Komatsu has set up "Reman-Net," networking Reman Centers around

the world. Komatsu is actively using this network to develop Reman operations at the global level and to reuse and recycle items. Komatsu considers Reman-Net to be an important source of information over the long term in developing components.

■ Acquisition of ISO14001 Certification by Reman Centers

The seven Reman Centers around the world have been pursuing ISO14001 certification in order to promote environmental conservation. Five of the Centers have acquired certification and the remaining two Centers in the U.S. and South Africa are working to acquire it in the near future. Further environmental conservation efforts are moving forward through daily operations and activities for inspections for maintaining and renewing certification.

■ Future Efforts

To further increase the reuse rate of used components (parts), Komatsu is making efforts to reduce the amount of disposed parts through

the development and introduction of recycling-related machines and technology, and

the further improvement in its recycling-related technology by developing parts restored to an ideal size and parts designed exclusively for future use as remanufactured ones.

In addition, the company is carefully considering the future of the Reman business in regions not currently covered by existing Reman Centers in an effort to further advance its recycle and reuse activities.