

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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Tier III emissions regulations for diesel engines newly entered into force in 2006. In conjunction with its overseas subsidiaries, 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 FY2006, 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 environment and economic activities by superior manufacturing technologies. 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 FY2005, Komatsu implemented Environment and Economy through the development of such products as:

- PC200-8 hydraulic excavator, D155AX-6 bulldozer, and other construction and mining equipment compliant with Tier III emissions regulations
- industrial machines such as the large AC servo press.

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

Major Achievements in FY2005

- 1 Development of engine technology "ecot3," which satisfies Tier III emissions regulations for off-road vehicles in Japan, the U.S., and Europe
- 2 Development and introduction to the market of vehicles that satisfy Tier III emissions regulations
- 3 Attainment of objective for FY2005 stated in the medium-term target of development of environmental technology (formulated in 1999)
- 4 Promotion of on-site recycling method by mobile recycling equipment
- 5 Realization of Environment and Economy through development of industrial machinery such as the large AC servo press

Reducing Environmental Impact of Products

Reducing Substances of Environmental Concern

Komatsu has been making efforts to respond to the heightening of environmental conservation awareness overseas as well as reduce substances of environmental concern at an early stage. As one example, Komatsu has since 1990 been taking measures to eliminate products using asbestos and in FY1998 the company conducted response measures to OSHA^{*1} advisories, such as by preparing MSDS^{*2}.

In addition, in FY1999, using substances that were banned under relevant legal and regulatory frameworks^{*3} and substances that were regulated or banned in individual developed countries 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). The company continues to promote reductions in use for those substances approved for limited use in keeping with its medium-term target of development of environmental technology.

^{*1} Abbreviation for the Occupational Safety and Health Administration, the U.S. federal administrative bureau governing occupational safety and health

^{*2} Abbreviation for Material Safety Data Sheet. An MSDS provides information on the chemical nature and means of handling Class 1 and Class 2 designated chemical substances

^{*3} Law Concerning the Examination and Regulation of Manufacture of Chemical Substances Control and others

Substances of Environmental Concern Banned for Use in Komatsu Products or Subject to Reductions

Designation	Number of substances	Name of substance
Banned	5	•PCBs •Asbestos •Specified chlorofluorocarbons •Trichloroethylene •Triethanolamine
To be reduced (subject to limited use)	12	•Mercury •Lead •Cadmium •Arsenic •Selenium •Chromium (VI) •Hydrofluorocarbons •Vinyl chloride •Chloroprene rubber •Halogenated flame retardants •Methyl alcohol* •Hexachlorobenzene*

*Now being considered for reductions

Making All Komatsu Products Asbestos-Free

With regard to construction and mining equipment, including replacement parts, Komatsu has realized a policy of making its products asbestos-free since December 1993, and its industrial machinery has been asbestos-free since 1996. As for other products, the Group has already successfully implemented a policy of Komatsu products being asbestos-free.

Komatsu's state of implementation of its asbestos-free policy has been available for public viewing on its website since August 2005.

Efforts towards Eliminating Asbestos in Komatsu Products

		FY1985	FY1990	FY1995	FY2000	FY2005
Construction and mining equipment	Mass-produced vehicles					June 1993
	Replacement parts					December 1993
	Engines					June 1993
	Hydraulic equipment					March 1992
Industrial machinery, vehicles, and others	Fabricating machineries and stamping presses					January 1996
	Machine tools					January 2002
	Forklifts					March 2004
	Agriculture and forestry equipment					March 2002
Electronics	Temperature controllers					April 1993

The light blue lines indicate the time after which no products using asbestos were shipped.

Life Cycle Assessment (LCA) Calculations

As general guidelines for reduction of the environmental impact of construction equipment, Komatsu set a three-item, medium-term target of development of environmental technology based on LCA (life cycle assessment) in FY1999. Since then, the company has been making efforts to reach that target for each piece of equipment being developed.

- CO₂ emissions reductions have been progressing on schedule with regard to the amount of emissions per unit of operations (determined for each type of equipment) through the use of engines designed to meet Tier III emissions regulations.
- Regarding the recyclability ratio, in order to assess whether or not the target ratio will be met for counterweights in hydraulic excavators, Komatsu is continuing its efforts to organize a system by which end-of-life counterweights are returned and processed.
- As for substances of environmental concern, the company is working to reduce the use of lead solder, which accounts for some 80% of these substances. Komatsu is using aluminum radiators in almost all kinds of equipment now in development (scheduled, for some kinds of equipment).

Turning its sights to targets for FY2010, the company will revise its plan for development of newly-called for elemental technology and undertake an upgrade of its software for calculating indexes.

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

Category	FY2005			FY2010	
	Target	Performance* ¹	Achieved target?	Target* ¹	
CO ₂ emissions	-5%	D155AX-6	-9.5%	Yes	-10%
		PC200-8	-9.2%	Yes	
		WA470-5	-9.3%	Yes	
Recyclability ratio	97% or more	D155AX-6	99.5%	Yes	99.5% or more
		PC200-8	78.8%	No* ²	
		WA470-5	98.9%	Yes	
Substances of environmental concern	-50%	D155AX-6	-95.8%	Yes	-75%
		PC200-8	-88.2%	Yes	
		WA470-5	-99.5%	Yes	

*¹ As compared with FY1998

*² Target expected to be met through the establishment of a system for recycling and processing hydraulic excavator counterweights

PC200/210-8 Hydraulic Excavator

The PC200/210-8, which features the leading-edge engine technology ecot3, is the first 20 ton-class hydraulic excavator in the industry compliant with the Tier III emissions regulations in Japan, the U.S., and Europe. Komatsu achieved a reduction of up to 10%* of fuel consumption through overall electronic controls of engine and hydraulic equipment developed and manufactured in-house.

*Compared with previous Komatsu models in the same class

KOMTRAX and Reports to Facilitate Energy-conserving Operation

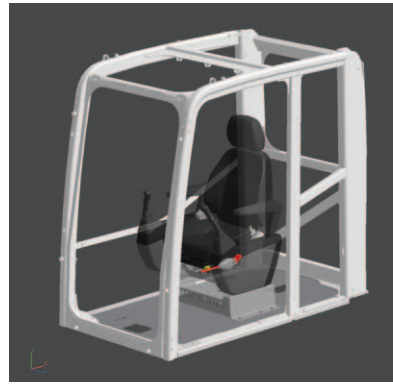
KOMTRAX stands for the Komatsu Tracking System, which uses state-of-the-art mobile communications technology and Internet-based technology to track from one's office such data for construction equipment as the current location, operating information, fuel indicator, vehicle cautionary information, and replacement schedule for consumable parts. KOMTRAX has already been introduced as a standard feature on equipment models. However, the PC200/210-8 boasts an upgraded version of the system.

Komatsu supports the environmental activities of its customers by providing them with reports that contain recommendations for the ideal operating mode, cessation of engine idling, and more, thereby enabling enhanced energy-conserving operation. These recommendations are based on data compiled by KOMTRAX such as length of operation, amount of fuel consumed, operating modes, and distribution of hydraulic pressure, among others.

Operator-friendly Design

Among high-volume production models, the PC200/210-8 is the first hydraulic excavator in the world to have a cab with an embedded structure that protects the operator if the excavator should overturn. It boasts a high ability to absorb shocks, and its durability and impact resistance have been increased dramatically. Featuring a newly-designed cab whose high rigidity and acoustic absorption level have resulted in a level of silent operation that makes it comparable with passenger cars, this model has met the Ministry of Land, Infrastructure and Transport's standards for ultra-low noise emissions.

In addition, the interior of the cab features a 7-inch large-scale multi-color liquid crystal display, significantly improving visibility and operability and assisting in the safety of the operator in various respects.



Hydraulic excavator cab embedded with structure protecting the operator in the event of an overturn

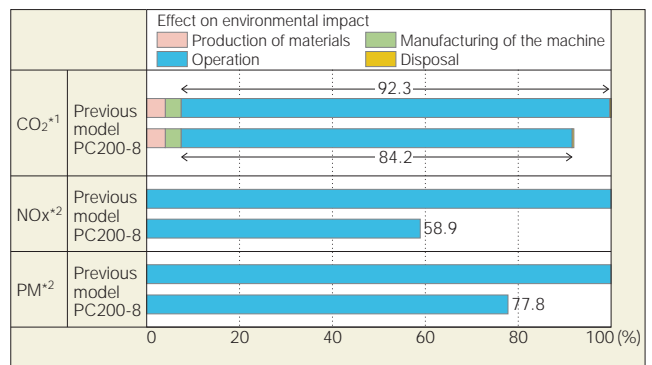


7-inch large-scale multi-color liquid crystal display

Life Cycle Assessment for the PC200-8

When a model of construction equipment is changed, a Life Cycle Assessment (LCA) is conducted in order to manage the emissions volumes of CO₂, NO_x, and particulate matter (PM). Through this process Komatsu was able to confirm that the PC200-8 has brought emissions reductions of 8%, 41%, and 22%, respectively.

Life Cycle Assessment Provisional Calculations for the PC200-8



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

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

D155AX-6 Large Bulldozer

Featuring leading-edge engine technology ecot3, the D155AX-6 is mounted with the innovative Sigmadozer blade, which has substantially boosted dozing operational efficiency. This model increases productivity by 15%.

The Sigmadozer blade is a digging blade with a breakthrough shape derived from completely new excavation theory, utilizing an innovative anterior configuration in which the middle section of the blade excavates and heaps up earth. This increases the amount of dirt concentrated at the central part of the blade and reduces the amount falling away from the dozer at the far ends of the blade. By reducing the digging resistance, the movement of the dirt becomes smoother, making it possible to conduct large-volume dozing through the use of only limited power.

Adoption of Automatic Transmission with Lockup Torque Converter

In addition, through the adoption of an automatic transmission with lockup torque converter with superior transmission efficiency, a 10% reduction*1 in fuel consumption has been achieved.

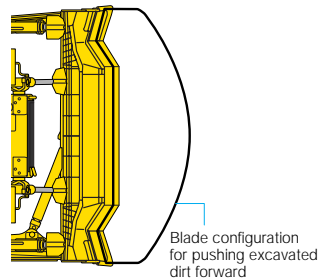
The automatic transmission, which eliminates gear shifting shocks, selects the appropriate level of transmission speed for the operation being undertaken, making it possible to run the dozer with the greatest efficiency at all times. The overall effects result in a 25%*1 jump in fuel efficiency.

Moreover, the D155AX-6 utilizes Komatsu's unique K-Bogie undercarriage system, which already has a successful track record on large-scale equipment, resulting in improved traction and operator comfort. In addition to dramatically reducing both noise and vibration, the newly-redesigned cab structure features ROPS*2 integrated into the cab itself and offers improved side visibility through elimination of the need for ROPS posts, allowing excellent visibility in every direction.

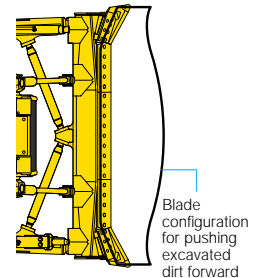
*1 Compared with previous Komatsu models in the same class

*2 Abbreviation of Roll-Over Protective Structures. These structures, attached to the construction equipment, protect the operator during a roll-over by the machine, and are designed to protect a seatbelt-wearing operator from being crushed.

Sigmadozer (D155AX-6)



Semi-U Blade (D155AX-5)



Providing Solutions for Customers' Environmental Activities

Developing Products that Coexist with the Environment

In response to the environmental challenges society faces, Komatsu provides environment-friendly products which coexist with nature as a high-quality and efficient solution created by optimum technology.

Promotion of On-site Recycling Using Mobile Recycling Equipment

To its customers in civil engineering and the demolition industry, Komatsu provides a means of on-site recycling which processes residuals that are generated at construction sites. This on-site recycling allows for effective utilization of residuals so that they are not discharged as waste while enabling reduced impact to the environment, insofar as virgin materials do not need to be brought in. For these reasons, the mobile recycling equipment that enables this on-site recycling is being adopted at a large number of construction sites.

In FY2005, in addition to the release of a new model of mobile tub grinder BR200T, which is very effective at crushing felled trees and demolition wood materials, the company has developed and put on the market the BR80T, a compact mobile tub grinder with a horizontal feeder that is ideal for crushing pruned branches from parks or long items in construction site residual matter. Other environment-friendly products well-received by Komatsu's customers include mobile tub grinders, mobile soil stabilizers, and mobile screens.

Mobile Tub Grinder BR200T-2

The BR200T-1, which can undertake large-capacity processing of felled trees and demolition wood materials, has undergone a full model change. The BR200T-2 features improved hydraulic efficiency through its new hydraulic system, which utilizes a twin-hydraulic motor in its hammer mill, as well as tremendous crushing capacity as a result of an expansion of the inner diameter of the tub. Furthermore, adjustments to the direction of the discharge belt conveyor make it possible to feed materials in a larger area, making it compatible with various workplace layouts. In addition, the BR200T-2 boasts a hydraulic reverse rotation fan that has been mounted on the BR120T to prevent blockages around the radiator grill.



Mobile tub grinder BR200T-2

Mobile Tub Grinder BR80T-1

Komatsu has launched the sale of the BR80T-1 that, despite a compact body, allows material feed at small-scale sites, such as when dealing with tree prunings in parks. The BR80T-1 features a horizontal feeder, making it useful in shredding long objects. The hydraulic drive flail cutter and the feed belt conveyor, which automatically controls the supply volume based on the loads of materials supplied, makes it possible to conduct high-efficiency crushing. With an operating weight of about 6 tons, and a body with a total length of 6,270 mm, total width of 1,960 mm, and total height of 2,395 mm, this compact model enables crushing operations to take place even in sites with limited workspace.



Mobile tub grinder BR80T-1

Efforts for Reuse and Recycling

Promoting the Reman Business

The Reman business consists of remaking used machine components 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 installed at seven of its operation bases around the world. "Reman," an abbreviated version of the word "remanufacturing," offers the 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 recycling and reuse of components helps save resources and reduce waste

Providing Reman-related Information

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

the world. Komatsu is thus promoting its Reman operations at the global level and facilitating the active use of reused and recycled items.

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. Four of the Centers acquired certification by FY2004 and the one in Australia acquired it in December 2005. The remaining two are aiming at acquiring it within FY2006. Furthermore, even at the five Centers that have already acquired certification, further environmental conservation efforts remain ongoing through daily operations and activities for inspections for maintaining and renewing certification.

Future Efforts

To increase the reuse rate of used components (parts), Komatsu is making efforts to improve further its recycling-related technology and reducing the amount of disposed parts through the development and introduction of recycling-related machines and technology as well as through the development of parts restored to an ideal size and parts designed exclusively for future use as remanufactured parts.

Efforts in the Industrial Machinery Division

Development of the Large AC Servo Press

The large AC servo press, developed jointly with Toyota Motor Corporation, replaces the clutch brake and pneumatic die cushion used in conventional mechanical presses with an AC servo drive, substantially increasing production capacity by about 1.35 times (compared with previous Komatsu machines). In addition, the large AC servo press enjoys the following superior features compared to conventional mechanical presses:

- Utilization of the servo motor recovery function leads to a 40% decrease in electricity consumed
- The servo motor allows control of the sliding speed and the touch speed to the die assembly can be reduced, resulting in a 20dB decrease in noise
- The drive has been simplified wherever possible, leading to improved maintainability
- The size of the press has been reduced by 50%, contributing to more effective use of space in customers' plants.



Large AC servo press

Life Cycle Assessment Provisional Calculations for the Large AC Servo Press

Life cycle assessment (LCA) provisional calculations of CO₂ emissions reduction effects were conducted on the large AC servo press.

Provisional calculations of the CO₂ emissions reductions per unit of production showed that compared to conventional mechanical presses, a significant reduction of about 34% is achieved due to the smaller size of the press, resulting in less input of materials, less processing and waste, and less electricity consumed during operation. In addition, it is possible to reduce the number of necessary lines by one-third as a result of increased press productivity. Combined with the reduction in the size of the press itself, it is possible to decrease the overall space required for the press line by about 43%, and there are cases of electricity required at the plant for lighting, air conditioning, and compressors being reduced by 64%.

Life Cycle Assessment Provisional Calculations for the Large AC Servo Press (Per unit of production)

