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The rising level of attention being directed to environmental protection issues has led to increasingly strict regulations related to automobile energy consumption and the use of chlorofluorocarbon (CFC) refrigerants. Thus, responding to environmental issues has become one of the most important tasks facing manufacturers of car air-conditioning compressors.

The Compressor Division is engaged in R&D programs aimed at reducing fuel consumption, lowering product weights, and developing new refrigerants. At all stages from R&D through manufacturing activities, we are maintaining efforts to reduce the environmental impact.

The Compressor Division focuses on the development and manufacture of the compressors that are the core components of car air-conditioning systems. Our compressors are used by automobile manufacturers throughout the world, giving the division the top share of the world market for such products.

Our swash-plate-type variable displacement compressors, compressors with integrated clutch functions, and other compressor models are helping reduce energy consumption and smoothly control the temperature of automobile interiors. Our exclusive technologies are helping improve motorists' comfort significantly.



▲ Assembly line for 7S series compressors

Development and Design

Research in Compressors That Use Approved and Natural Refrigerants

Previously, car air-conditioning systems generally used CFC-12 refrigerant, but CFC-12 was eventually identified as destructive and joined a list of specified CFCs prohibited due to their ozone-depleting effect. Toyoda Automatic Loom Works was the first company in the world to begin shifting to the use of HFC-134a, a substitute CFC that does not have an ozone-depleting effect. Our division had completed that shift by the end of 1994.

Because it has been noted that HFC-134a contributes to global warming, however, we are proceeding with research in compressors that use natural refrigerants that have minimal environmental impact.

Large Cut in the Volume of Organic Solvent Emissions

Some compressor components are coated with paint containing organic solvents, and vaporized solvent is emitted during the process of drying those components. In response, Toyoda Automatic Loom Works has developed new materials and shifted to new painting methods that have enabled it to reduce the volume of solvent emissions per newly manufactured compressor 85%.

Variable Displacement Compressors That Help Reduce the Energy Consumption of Automobiles

We have developed compressors that are much lighter and more efficient than previous models. Moreover, by adopting new compressor structures that allow for the continuous control of refrigerant discharge volumes—from 100% to 0%—our division has enabled the use of optimal refrigerant capacities. Such products make it possible to reduce the amount of motor fuel that is required to power a compressor. Variable displacement compressors also reduce the engine burden when cars are accelerating or ascending, thereby improving automobile performance.



▲ 7SBU16 continuously variable displacement compressor

Production

Manufacturing Facilities Created In-House Enable the Supply of World-Class Products

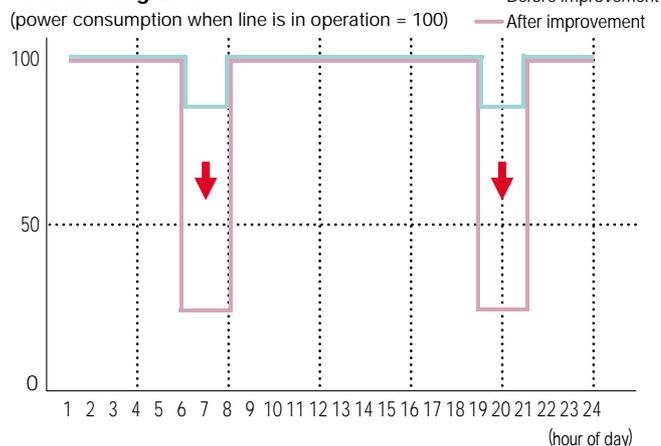
As top-quality products are made at first-class factories, we design and create our own manufacturing equipment while aiming for the best combination of energy efficiency and productivity.

Improved Energy Efficiency Due to the Identification of Energy Loss Points on Machining Lines

Looking at its compressor machining lines, our division noted that even when such lines were halted, the uninterrupted operation of related equipment kept the electric power consumption of some lines as high as 80% of the level recorded when the line was in operation. By installing calendar-timers and additional controller

circuits, we have arranged for related equipment to be shut off when the machining lines are not operating. This has cut the amount of energy lost 92%, which corresponds to a drop of approximately 10 tons per month in CO₂ emissions. We are now applying this energy-efficient approach to other lines.

Electric Power Consumption of Machining Lines



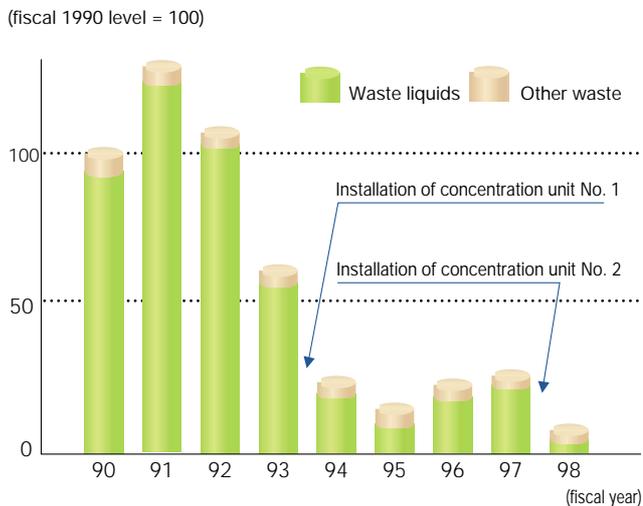
▲Compressor machining line

Introduction of Liquid Concentration Units Brings Sharp Drop in Waste Product Volume

The cutting and cleansing fluids as well as other liquids used on compressor machining lines result in the generation of waste liquids that account for approximately 80% of all the Compressor Division's

waste volume. By creating additional temporary storage pits and installing liquid concentration units, we have cut the volume of waste liquids to less than 20% of the fiscal 1990 level.

Waste Product Volume



▲Liquid concentration unit