



# Reducing the Environmental Impact of Business Activities

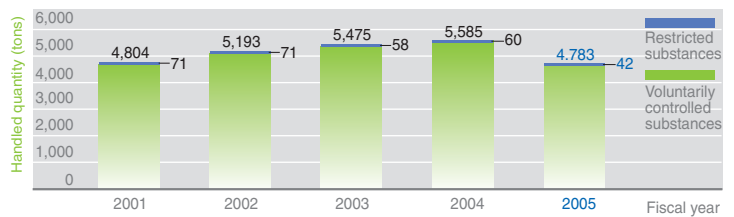
## Control and Reduction of Chemical Substances Used at Production Plants

One of the environmental impacts of production activities is the emission of chemical substances. Although chemical substances are indispensable for the production process, they can have a grave effect on the environment if they are not controlled in an adequate way. The Oki group is well aware of this effect and therefore working to control and reduce chemical substances.

### Control of Chemical Substances

We identify chemical substances used at production plants with a serious effect on the environment and control them by classifying them into three types: prohibited substances (95 substances), restricted substances (92 substances) and voluntarily controlled substances (389 substances). The quantity of chemical substances handled in fiscal 2005 decreased by 14.5% compared to fiscal 2004. It was the lowest quantity of chemical substances handled in the past five years.

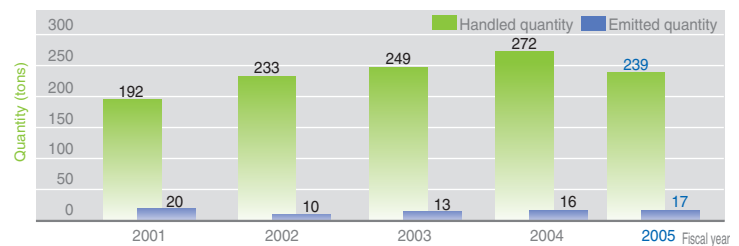
● Transition in the Quantities of Chemical Substances Handled



### ● Substances Subject to PRTR

The PRTR (Pollutant Release and Transfer Register) system is a method to track the emission of substances with a serious effect on the environment. Ahead of the law, the Oki group started efforts for the PRTR system in 1997, following the "PRTR Guidelines" issued by four organizations in the electric equipment and electronics field. We were able to cut the quantity of substances subject to PRTR in fiscal 2005 thanks to efforts in the Oki group to reduce restricted substances and voluntarily controlled substances. We will continue our efforts for further reduction.

● Transition of PRTR Results



● PRTR Results of Fiscal 2005 (Sites Subject to the System in Japan)

(Unit: tons)

Chemical Substance	Handled Quantity	Emitted Quantity				Transferred Quantity	
		Air	Public Water	Soil of Operational Sites	Sub-total	Transferred to the Sewage System	Brought to the Outside of Operational Sites
Hydrogen fluoride and its water-soluble salts	183.43	0.09	4.29	<0.01	4.39	<0.01	41.32
2-aminoethanol (monoethanol)	22.03	3.96	<0.01	<0.01	3.96	<0.01	18.06
Xylene	17.89	3.73	<0.01	<0.01	3.73	<0.01	14.17
Nickel compounds	6.12	<0.01	0.03	<0.01	0.03	<0.01	1.06
Toluene	5.59	4.81	<0.01	<0.01	4.81	<0.01	0.78
Pyrocatechol	1.40	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acetic acid 2-ethoxyethyl (ECA)	1.14	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	1.06	<0.01	<0.01	<0.01	<0.01	<0.01	0.67
<b>Total</b>	<b>238.67</b>	<b>12.59</b>	<b>4.32</b>	<b>&lt;0.01</b>	<b>16.91</b>	<b>&lt;0.01</b>	<b>76.07</b>

### ● Managing the Selection of Chemical Substances

We have built a mechanism where, before employing a new chemical substance, we evaluate its effect from safety, disaster prevention and environmental aspects. Chemical substances that do not comply with the employment standards are not purchased. We further built a system to understand how much of the chemical substances put into the manufacturing process are ultimately emitted in waste gas, waste water, or waste material. Based on these data, we pursue activities to reduce their use through process improvements, to switch to substitutes with a lower environmental impact, or to completely stop using them.

### ● Elimination of Lead in Electronic Devices

The surfaces of semiconductor packages or optical component pins are plated with solder that contains lead. In fiscal 2002, Oki succeeded in developing a technology that allows eliminating lead from this solder coating. We installed equipment that supports lead-free solder at our production plants in Japan and took it into operation. For switches, we also succeeded in developing a lead-free solder and coating line in fiscal 2004, and built a mass production system.



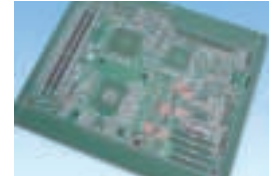
Switch soldering equipment with support for lead-free soldering



# Reducing the Environmental Impact of Business Activities

## ●Control of Chemical Substances in Printed Circuit Boards

Oki Printed Circuits Co., Ltd. is working on a complete shift to solder-free boards and lead-free boards. In the manufacturing process, we strive to cut the used quantities of chemical substances contained in chemical copper plating solution or Black Oxide (B/O) treatment\*<sup>1)</sup> solution. For example, we changed the soft etching solution used in the chemical copper plating and other processes to reduce the frequency at which the treatment solution is renewed.



Electronic circuit board

\*1) B/O Treatment: A treatment of roughening copper surfaces by creating a layer of copper oxide.

## ●Elimination of Lead in Solder

We finished the development of reflow furnaces with component temperature control\*<sup>2)</sup>, of new flow soldering equipment\*<sup>3)</sup> and other manufacturing technology in fiscal 2003.

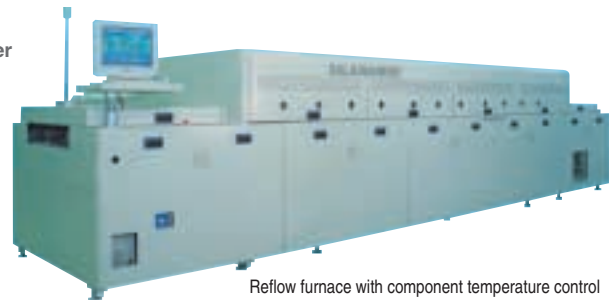
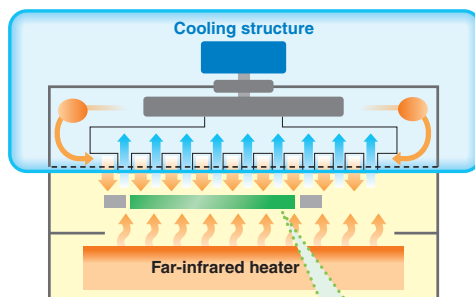
\*2) Reflow: a method where soldering is done by applying heat after printing cream-like solder onto the electronic circuit board and then mounting the parts. The automatic soldering equipment using the heat-method is called reflow furnace.

\*3) Flow: A soldering method of inserting electronic components as they are into the electronic circuit board, fixing them with glue, and then passing the board through molten solder.

## ●Reflow Furnace with Component Temperature Control

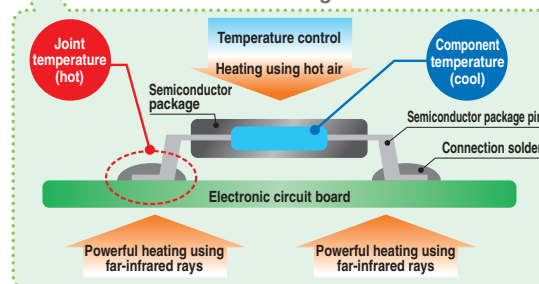
Together with Furukawa Electric Co., Ltd., we developed Component Temperature Control Reflow Technology, a new heating technology that allows automatic soldering of heat-sensitive electronic components using ordinary lead-free solder with a high melting temperature. With the new method, conventional designs and components can be switched to lead-free solder consisting of tin, silver and copper at low cost, without having to change the manufacturing process.

### ●Structure of a Reflow Furnace with Component Temperature Control and Support for Lead-free Solder



Reflow furnace with component temperature control and support for lead-free solder  
(Photograph courtesy of Furukawa Electric Co., Ltd.)

### ●Sectional Diagram of a Printed Circuit Board



## ●Equipment to Detect Impurities in Lead-free Solder

Together with the measuring equipment manufacturer MALCOM COMPANY LIMITED, Nagano Oki Electric Co., Ltd. developed equipment that constantly detects metallic impurities in lead-free solder used for flow soldering equipment. Even lead-free solder contains very small quantities of lead and other impurities. And it happens that with the soldering, metal from the connecting parts of the electronic components melts and mixes with the solder, so that impurities reach concentrations exceeding the standards. These impurities can cause cracks in the soldering portions and other quality defects. This is why we installed equipment to detect impurities at our soldering line to enhance the quality in the lead-free soldering process.



Detection equipment location at flow soldering equipment (solder bath)



Equipment to detect impurities in lead-free solder