

Actively Developing Products that are Eco-friendly

Significantly Improved Yield Rate "Multi-Repair System for LCD Color Filters"



- NTN Is Everywhere You Look -

NTN has developed a multi-repair system that reduces the failure rate (number rejected) by automatically correcting minute defects in the LCD color filter used in LCD screens of television sets and personal computers (joint development with Takano Co., Ltd.).

The size of Color filter boards used in devices such as LCD television sets is getting larger and larger and the demand for LCD television sets is growing and there is an increasing need for defect correction equipment to reduce the failure rate of LCD color filters. There are three major types of defects in LCD color filters, "black defect,"^{*1)} "white defect,"^{*2)} and "particle defect"^{*3)} and thus far there was no single solution to correct all defect types so it was necessary to combine the use of several types of equipment depend-

ing of the type of defect. Because of issues such as investment costs, installation area and correction time when using several different types of equipment, the appearance of equipment that could correct all types of defects was greatly anticipated.

Under these circumstances, NTN developed and commercialized a multi-repair system that can correct the three major defect types of color filters by fusing NTN's "Ink coating technology" and "Laser cutting technology" with Takano's "Tape polishing technology".

We were awarded the Grand Prize in the test/repair category of the "Advanced Display of the Year Awards 2004"^{*4)} in recognition of this outstanding function.



*4) An award given to exceptional products out of all the new flat panel display related products (screen display devices such as LCDs and plasma) released in fiscal 2003.

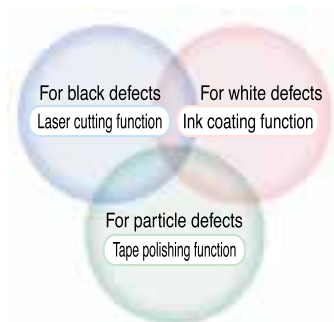
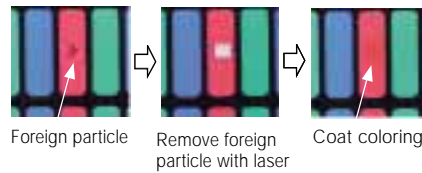


9th Advanced Display of the Year 2004

Color filters are made up of four colors, R (red), G (green), B (blue) and BK (black) and each pixel of RGB is lined up regularly and the border of each color is separated with BK.

- *1) Black defects: when BK is mixed in R, G and B pixels turning it black, or when other colors are mixed.
- *2) White defects: when a pixel is not colored.
- *3) Particle defects: when the colored part of the pixel sticks out of the surface or when a foreign particle is attached and sticking out.

Example of the correction of white defect using ink coating



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Development of Environmentally Responsive Products

- **Ball screws for mechanical automatic transmission electromotive actuator**

Improved fuel-efficiency

Improved fuel-efficiency in mechanical automatic transmission vehicles and operating performance

We began the commercial production of ball screws for electromotive actuators for gear switching in mechanical automatic transmission installed in trucks. The electromotive types allow for a simpler structure than conventional types (air and hydraulic) and by using NTN ball screws we were able to reduce drive train loss significantly and improve the fuel-efficiency of the automobile.

We are currently developing ball screw units for electromotive actuator of control devices surrounding the brakes and engine, and so on.



- **Lightweight compact constant velocity joint "EPTJ"**

Compact & lightweight

World's lowest vibration and lightweight & compact

Constant velocity joints convey the engine's power to the wheels. Through optimal design using computer analysis, we were able to improve vibration characteristics which affect the ride quality (NVH performance) of the automobile (50% reduction in vibration value relative to conventional CVJs) and at the same time made it lightweight (8% reduction relative to conventional CVJs), and compact (4% reduction in overall size relative to conventional CVJs).



- **"Double row thrust needle roller bearing" for car air conditioning and A/T transmission**

Long life, low torque

Attained longer life and lower torque for bearing by making the rollers double row

In recent years, the lubrication conditions for automobile bearings have become increasingly severe and there is a greater need for bearings with longer life. Through the double alignment of rollers and the optimization of the roller shape, we have achieved longer life, lower torque, and lower noise. This contributes to resource and energy conservation.



For car air conditioner compressors



For automatic transmissions

● **"RustGuard™" Improved corrosion-resistance in bearings for steel mill machinery**

Long life

Improved corrosion-resistance and realized 3.5 times longer life relative to conventional goods

NTN attained longer life for bearings used in steel mill machinery used in harsh environments -- such as exposure to excessive water or scales (iron powder). We use special heat treatment and improved resistance to rolling fatigue while improving corrosion-resistance significantly by applying NTN's proprietary manganese phosphate coating.



Wing turbine bearing

High-performance

Proprietary technology incorporated into high-performance bearings

Used in the nacelle (the section where the power generator, accelerator, and brakes are stored) of wind power generators, this technology encourages the use of natural energy. Spherical roller bearings are used for the main shaft, angular contact ball bearings for reducers, cylindrical roller bearings for accelerators, and insulated bearings for power generators (MEGAOHM® series).

● **New Series of Spherical Roller Bearings "S-TITAN™"**

Long life

Adapt long-life steel and optimal design to productworld's longest life and highest dynamic load rating

Spherical roller bearings are bearings with barrel shaped rollers that are self-aligning and used in various industrial machines. By adopting long-life, high-temperature steel for S-TITAN, we were able to increase life by a factor of 30 at a temperature of 200°C and improve load carrying capability by 50% compared with conventional bearings.

