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Sanyo Special Steel Co., Ltd.

Development of Sanyo Ultra Refining Process (SURP)

- Producing steel with even higher cleanliness, using technology that provides refined control over the composition of non-metallic inclusions –

Sanyo Special Steel Co., Ltd. (head office: Himeji-shi, Hyogo, President: Shinya Higuchi) has developed the Sanyo Ultra Refining Process (SURP), marking additional progress in our efforts to produce ultra-high-cleanliness steel.

We have already developed the Sanyo New Refining Process (SNRP), which improved greatly the fatigue life of steel. Our ultra-high-cleanliness steel is well regarded and is used in many critical components where reliability is a priority.

Now, with the increasing demand for minimized and light-weight components, reliability is an even higher priority for steel products. Responding to the rapidly rising need for long life and reliability, particularly in bearings and other rotating parts, we developed SURP as a process that brings major improvements in the cleanliness of steel by using inclusion control technology to further reduce the frequency of large non-metallic inclusions, which can have a negative impact on the fatigue life of steel.

◆Background and special features of development of high-cleanliness technology

In the past, we established the Sanyo New Refining Process (SNRP), using electric furnaces, ladle furnace refining (LF), RH vacuum degassing and vertical-type continuous large-section-bloom caster. This allowed us to supply ultra-high-cleanliness steel with dramatically improved fatigue life. SNRP is a process that allows the mass production of high-quality ultra-high-cleanliness steel by ensuring that optimum conditions are steadily and continuously provided for the refining of steel and the prevention of contaminants. It not only reduces the volume of inclusions, it also controls (reduces) the size of large inclusions.

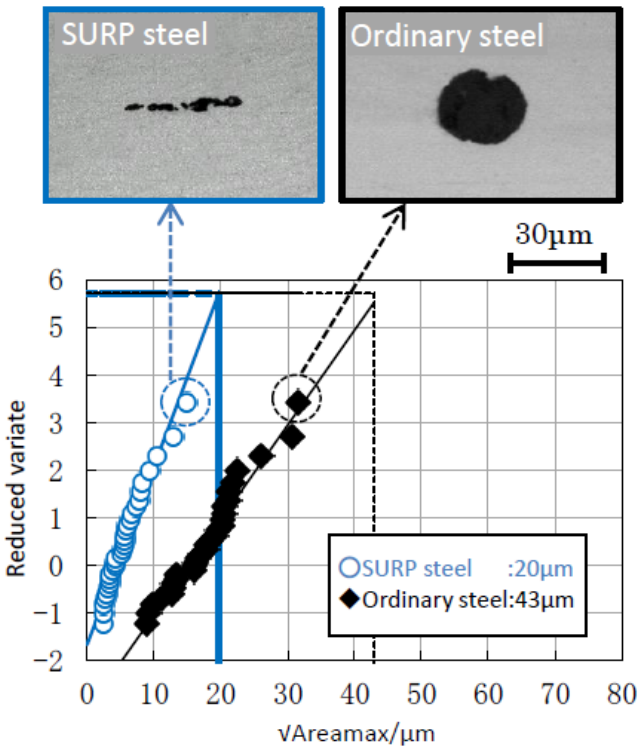

Fig. Example of extreme value statistical result of hardening steel

SURP is based on SNRP, and carries that technology forward to even higher standards of cleanliness. We have been investigating the relationship between manufacturing conditions and inclusions, discovering new ways to reduce the frequency of large inclusions by means of controlling their composition (type, quantity and fraction of their trace components). Based on this expertise, we have developed SURP, helping to reduce the frequency of large non-metallic inclusions by adding to the inclusion-control technology of SNRP, which is a technology for further reducing the size of non-metallic inclusions.

Prime examples of suitable applications for SURP steel are bearings and other rotating parts for high-speed rail train components, wind turbines, and industrial equipment, which involve heavy loads that require stable operation in extreme, severe lubrication environments. The use of SURP in these rotating parts is a response to design needs for higher reliability and maintenance-free operation.

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