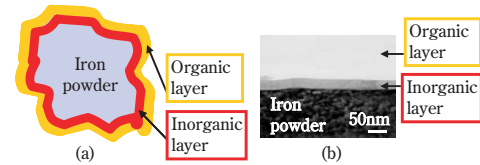


## Feature- I : Material Processing Technologies

### Kobe Steel Research and Development in Material Processing Technologies



**Fig. 1 Magnetic iron powder**  
**(a) Schematic figure of insulating layers covering Kobelco magnetic iron powder**  
**(b) TEM photo of cross section of magnetic iron powder**

Processing technologies including casting, forging and powder metallurgy contribute to global environmental conservation through their high-yield features and high-strength, light-weight products which reduce energy consumption. Kobe Steel is developing these processing technologies in the fields of steel casting and forging, titanium, steel powder and aluminum casting and forging. This issue introduces the latest technologies in this field.

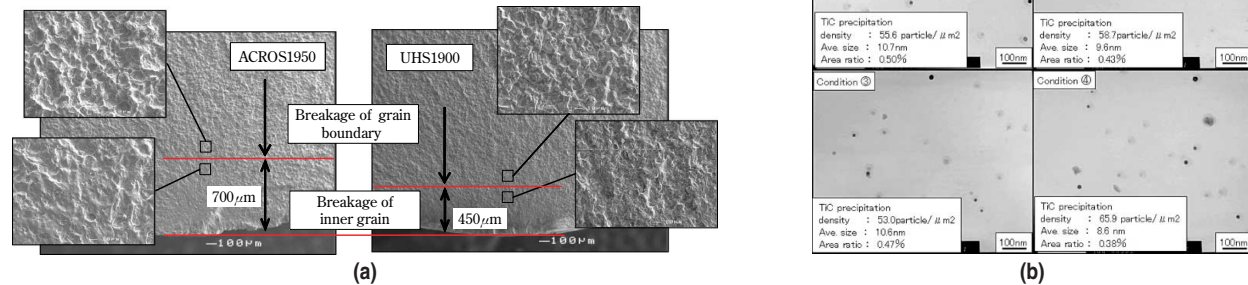
Fig.1 shows the insulating layers covering Kobelco magnetic iron powder. The soft magnetic iron powder required that measures for lowering core loss can be applied to the motor cores in addition to the ordinary noise filter. The new series of Kobelco soft magnetic powder, "MAGMEL<sup>®</sup>," is coated with a double layer of heat resistant insulation on the surface of the iron powder, thereby achieving a high-performance dust core.

## Feature- II : Steel Wire Rod and Bar

### Kobe Steel's Strategies and Products Responding to Current Demand for Steel Wire Rod and Bar

Wire rod and bar steels are widely used in the production of important parts such as automobile engines, and therefore must be highly reliable. In addition, strong measures to protect the environment are also required. In order to understand such demands, a summary of future trends is presented, along with the introduction of manufacturing technologies which help improve the quality of our products, our original new products, and other new technologies.

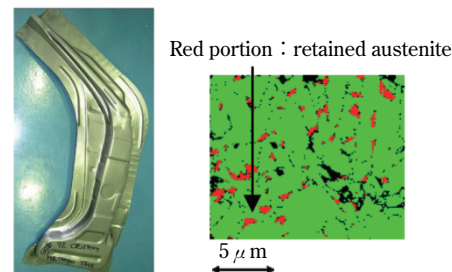
Fig.2 (a) shows the corrosion fatigue fracture surface of high strength suspension spring steel and Fig.2 (b) shows TiC precipitates in cold forged gear steel. These kinds of detailed analyses leads to better understanding of the fracture mechanism which helps to develop new steel meeting the customers' needs.



**Fig. 2 Observation of microstructure and fracture surface**  
**(a) Corrosion fatigue fracture surface of high strength suspension spring steel**  
**(b) TiC precipitates in developed gear steel**

## Feature- III : Steel Plate and Sheet

### Research and Development of Steel Plate and Sheet in Kobe Steel



**Fig. 3 Example of a press part (front pillar) and EBSD image**

Kobe Steel, in prompt response to customer needs, has been continually involved in the research and development of materials and application technologies for steel plate and steel sheet. This special edition introduces the latest developments at Kobe Steel regarding new materials and simulation technologies in steel plate for vessels, construction and bridges and steel sheet for automobiles and electrical appliances.

Fig.3 shows an example of a press part using TRIP-aided Bainitic Ferrite Type 980MPa grade cold rolled steel. The forming of the complicated shape of the press part is made possible by the excellent ductility acquired through the fine dispersion of retained austenite.

The cover includes three sets of pictures representing each feature.

Material processing technologies (Feature I) include Kobelco Steel Powder and the powder metallurgical products (upper left), a titanium alloy forging (middle) of propellant tanks in the HTV (H-II Transfer Vehicle) for transporting cargo to the International Space Station and a crankshaft (bottom) for medium-speed diesel engines for power station and marine use.

Steel wire rod and bar technologies (Feature II) involve roughing trains for bar rolling (lower left), the stelmor line (lower right) of the No.8 wire rod plant and the vertical warehouse (upper left) of the No.7 wire rod plant.

Steel plates and sheets technologies (Feature III) are applied to "TOKYO SKY TREE", a tower trademarked by TOBU RAILWAY CO., LTD., and TOBU TOWER SKYTREE Co., Ltd., opening business on May 22, 2012, and to "Future Steel Vehicle (FSV) by World Auto Steel (2011)". High strength in the steel plate and sheet is required for taller building construction or for a greater weight reduction in car bodies. High-strength steel pipe KSAT630 (which won the Chairman Prize of the Hyogo Industrial Association in the third Hyogo Monozukuri Technical Award, 2010) has been applied to the antenna tower of Tokyo Sky Tree, and advanced high-strength steel with excellent formability is widely utilized for FSV.

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