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JFE Steel has developed two new high strength hot-rolled steel sheets which provide excellent performance in automobile suspension and chassis parts: (1) "NANO-HITEN," a new precipitation-hardened high strength hot-rolled steel sheet in which precipitates are refned to a size of several nanometers, giving the material an excellent balance of elongation and the hole-expansion ratio, and (2) "BHT steel sheet (bake-hardenable steel with tensile strength increase)," a new strain-aging type high strength hot-rolled steel sheet which features low strength and high formability during forming and a large increase in tensile strength after paint baking, resulting in a higher fatigue limit and improved crash-worthiness. This paper describes the features and properties of these new products.

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As a measure to reduce energy consumption, reduction of vehicle weight is very important as well as improvement of effciency adoption of a new system in the power train.[1)] Consequently, reduction of body weight, which accounts for approximately 25% of total vehicle weight, has become an important technical issue.[2–4)]

On the other hand, with strengthening of automobile collision safety regulations and the start of public disclosure of crash test results, automakers are developing bodies with excellent crashworthiness. However, the weight of these bodies tends to increase due to the increase in sheet thicD a o k

tance in collisions.

This paper introduces two new high strength hot-rolled steel sheets developed by JFE Steel for use in automotive suspension and chassis parts: (1) “NANO-HITEN,” a new precipitation-hardened high strength hot-rolled steel sheet in which precipitates are refned to the size of several nanometers, giving the material both high elongation and a high hole-expansion ratio, and (2) “BHT steel sheet,” a new strain-aging type high strength hot-rolled steel sheet which makes it possible to increase tensile strength substantially by paint baking.

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Because complex deformation modes including stretch-forming, burring and other types of stretch-fange forming are frequently used in press-forming underbody parts such as the suspension and chassis, a suffcient balance of elongation and the hole-expansion ratio is required in high strength hot-rolled steel sheets. To realize these properties, JFE Steel began development of a TS780 MPa grade high strength hot-rolled steel sheet based on a new metallurgical concept, and succeeded in developing and commercializing a new sheet with unique properties, NANOHITEN (Nshee

with a size of approximately 3 nm have precipitated in rows. EDX (energy dispersive X-ray spectrometer) and ICP (inductively coupled plasma atomic emission spectrometer) analysis identified these precipitates as (Ti, Mo) C.

Cfdrob 0 shows the results of a measurement of the **reduc**tion in tens**ile** pe**r**ty

base material increases. However, when the strength level exceeds 590 MPa, conventional hot-rolled sheets show a smaller increase in the fatigue limit relative to the increase in the strength of the base material. In contrast, fatigue strength corresponding to the strength of the base material can be obtained in NANOHITEN. This is attributed to the satisfactory surface roughness obtained in NANOHITEN by reducing the amount of Si addition.

TS780 MPa grade NANOHITEN is being increasingly adopted, particularly in chassis and arm parts, based on the outstanding features described above. At present, it is in mass production at a level of several 100 tons per month, and expansion in its range of applications is expectcexcet 0st x ct0sv ttttv o aw ta

due to the contribution of increased strength attributable to strain age hardening in addition to work hardening. When converted to the increase in the tensile strength of the as-produced sheet, this contribution of strain age hardening to the increase in absorbed energy corresponds to approximately 60 MPa. This shows that the

2) Ohashi, Masaaki. Future trend of automobile and the high strength sheet steel. Tetsu-to-Hagané. vol. 68, no. 9, 1982, p. 1136−1146.
3) Okubo, Norio. Vehicle weight reduction and automotive material. J. Jpn. Soc. Technol. Plast. vol. 21, no. 229, 1980, p. 92−104.
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