Abstract:

Since hot rolled steel sheets for automobile suspension and chassis parts are frequently formed by burring, materials for these applications must possess hole expansionability as well as high strength. "NANOHITEN" is a type of precipitation hardened steel with a soft ferrite single phase matrix and ultra-fine carbides of single nanometer size which successfully satisfies both strength and hole expansionability requirements. "BHT® steel" achieves a very large increase in tensile strength in bak-

in which precipitates are refined to the single nanometer level, thereby satisfying both high hole expansionability and high elongation requirements, and (2) “BHT® Steel,” a strain aging-type high strength hot rolled steel sheet which shows dramatically increased tensile strength after baking treatment.

2.

Baker-Nutting relationship with the matrix, in the same manner as TiC.

3

used as material for hot dip galvannealed sheets, as discussed in the following, the potential uses of NANOHITEN are not limited to chassis parts, but also include auto body structural parts.

On the other hand, a composition design without Si addition, which was mentioned as feature (4), has the effect of improving surface quality.

In general, addition of Si becomes necessary when the strength of a steel sheet exceeds 590 MPa class, but since Si concentrates at the surface, phosphatability is reduced. However, the phosphatability of NANOHITEN, which is completely Si-free, is substantially the same as that of mild steel.

There are also cases in which scale marks (roughness) called “red scale” occur on Si-added steels. This is caused by the oxidized layer of Si which concentrates at the surface. **5** shows the relationship between the fatigue limit in a plate bending fatigue test and the TS of the base material for the respective types of hot rolled steel sheets. The fact that the increase in the fatigue limit is slightly relative to the increase in base material strength when TS exceeds 590 MPa is attributable to this type of surface roughness. Because red scale does not occur in NANOHITEN, as it does not contain Si, an increase in the fatigue limit corresponding to strength can be expected.

Taking advantage of the fact that NANOHITEN is Si-free, it is also possible to use this steel as material for hot dip galvannealing after hot rolling. Based on the fact that “precipitates are stable at high temperature,” as mentioned in feature (3), the mechanical properties of NANOHITEN after galvannealing are virtually unchanged from those after hot rolling. Since C addition is reduced by maximizing precipitation hardening, spot weldability and other types of weldability are excellent and hardening of welds is slight. Thus, NANOHITEN is also advantageous for application to tailor welded blanks (TWB).

Based on the features described thus far, 780 MPa grade NANOHITEN is being progressively adopted in

source of the dislocation, and the external force necessary for movement of dislocations within dislocation groups which have multiplied increases with the dislocation density. It is thought that tensile strength increases since these phenomena cause increased stress during plastic deformation.

As described above, with BHT steel, it is possible to secure a large strength increase stably by baking treatment after press forming.