



JFE

JFE880NH 900MPa grade

JFE's Micro-Alloyed Steel Rods



JFE Steel Corporation

As alternative for 900 MPa grade quenched-and-tempered alloy steel, our micro-alloyed steel, JFE880NH, is suitable for a variety of uses, such as industrial machine tie-bars, various rotation shafts, output shafts, pins, etc.

1. JFE's micro-alloyed steel, JFE880NH

- (1) We can guarantee the tensile strength of 880 MPa. Therefore, it is a good alternative to quenched-and-tempered steel, SCM435, SCM440.
- (2) A wide range of dimensions are available from 45 mm to 190 mm in diameter. The production over 190 mm is possible upon special request.
- (3) We can guarantee straightness within 1 mm/m.

2. Advantages of applying micro-alloyed steel

- (1) The energy intensity can be greatly reduced by omitting the quenching and tempering processes.
- (2) The straightening process which would follow the quenching process is omitted. Likewise, the stress relieving process which would follow the straightening process becomes unnecessary.
- (3) Lead times can be reduced greatly by the omission of the processes described above. Furthermore, the number of man-hours for inventory control, process control, production control, and quality control can be greatly reduced.
- (4) Because the material is uniform throughout a cross section, the cutting depth and the shape can be chosen without restriction.

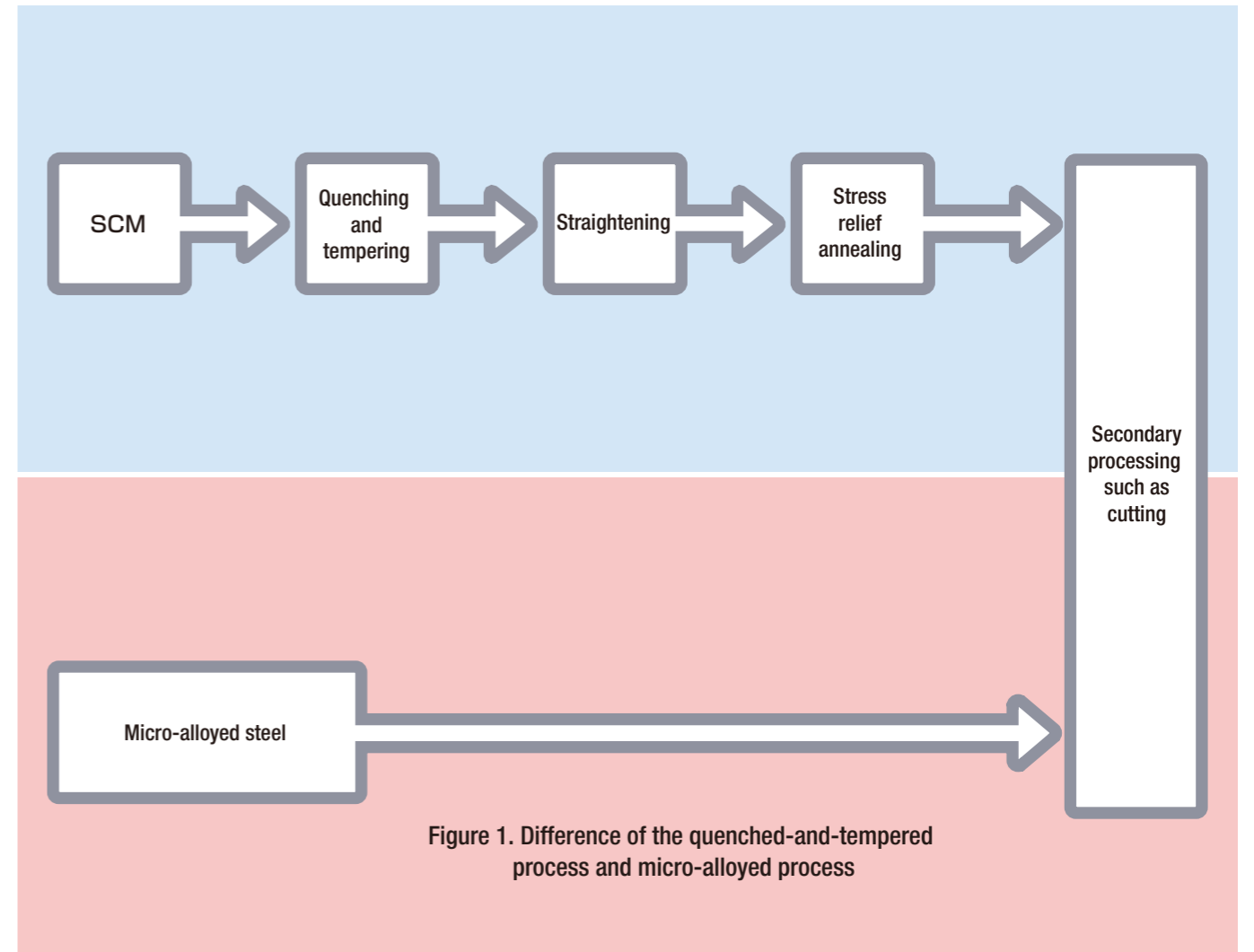


Table 1. Chemical component of micro-alloyed steel JFE880NH

(mass%)

		C	Si	Mn	P	S	Cr	Mo	V
JFE880NH	Upper limit	0.50	0.30	1.60	0.020	0.050	0.30	-	0.250
	Lower limit	0.46	0.10	1.30	-	-	0.10	-	0.150
SCM435	Upper limit	0.38	0.35	0.90	0.030	0.030	1.20	0.30	-
	Lower limit	0.33	0.15	0.60	-	-	0.90	0.15	-

JFE 880NH (900MPa Grade)

3. Properties of the steel

● The material properties of JFE880NH are uniform throughout a cross section, whereas those of quenched-and-tempered steel, SCM are heterogeneous with the difference between the quenched hardened layer and non-quenched core area. The difference becomes greater as the diameter of the steel rod increases. Therefore, as the diameter increases, the benefit of the micro-alloyed steel JFE880NH increases. (Figure 2)

● The yield point and elongation gradually decrease as the diameter increases. Guaranteed properties: tensile strength at any diameter, 880 MPa or greater; elongation, 15% or greater; hardness, 258 or greater in Brinell Hardness Scale. (Figure 3)

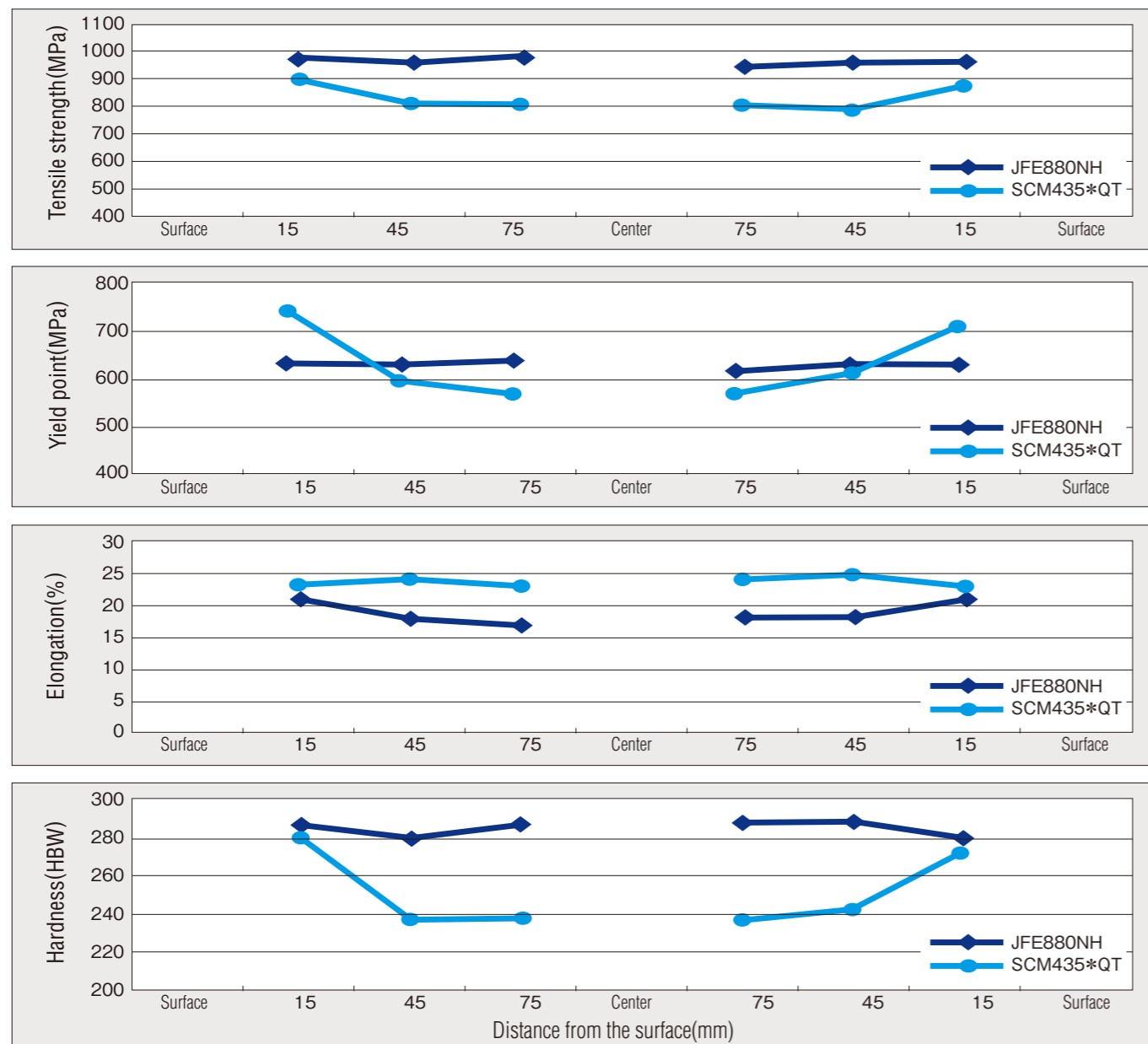


Figure 2. The material properties throughout the section of the micro-alloyed steel JFE880NH (ϕ 190mm)

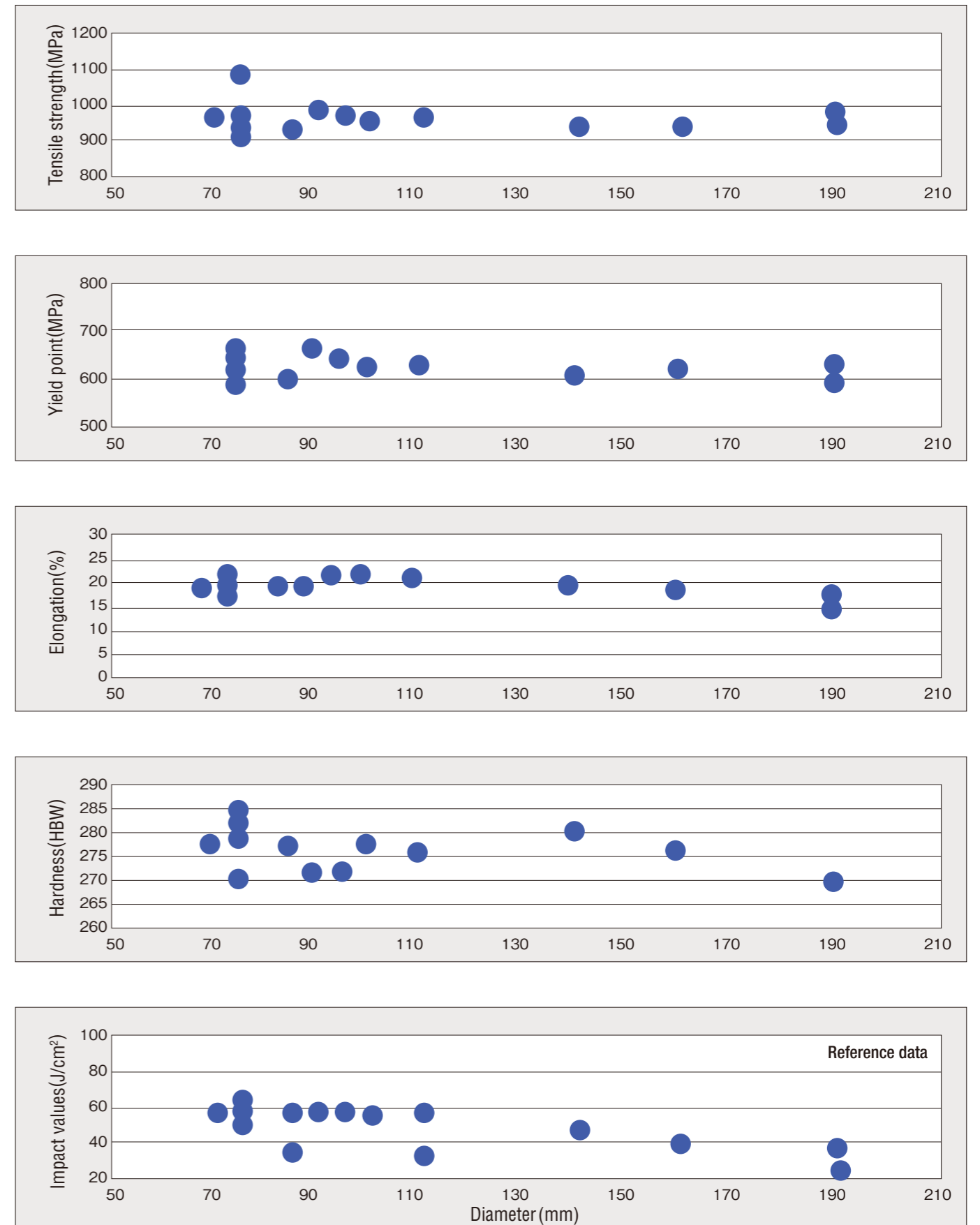


Figure 3. The material properties of the micro-alloyed steel JFE880NH by diameter (point at 1/4 the diameter)

JFE880NH (900MPa Grade)

3. Properties of the steel

● The hardness distribution in the radial direction of JFE880NH after applying induction hardening is shown in Figure 4. The hardness of the hardened layer is roughly 600HV.

● The results of the rotational bending fatigue testing with screw are shown in Figure 5. As it has been suggested, there is a strong correlation between the fatigue strength and tensile strength. The tensile strength of JFE880NH is equal or more with the areas beneath the surface layer of SCM, in which thermal refinement is complete; also in the testing using the test piece with screw, the fatigue strength of JFE880NH is about the same or greater. With respect to the areas other than the completely thermally refined areas of SCM, in the areas near the core, in which the thermal refinement is not complete, tensile strength of JFE880NH is stronger than that of SCM at all the positions and all the standards, and fatigue strength of JFE880NH, also, is stronger.

● The workability of JFE880NH is shown in Figure 6. Life duration was determined by tool wear, at $VB=0.2$ mm using a super hard tool with no lubrication. The results show that JFE880NH is superior to quenched-and-tempered SCM440, even though tool life of JFE880NH is not as long as that of as-rolled SCM440.

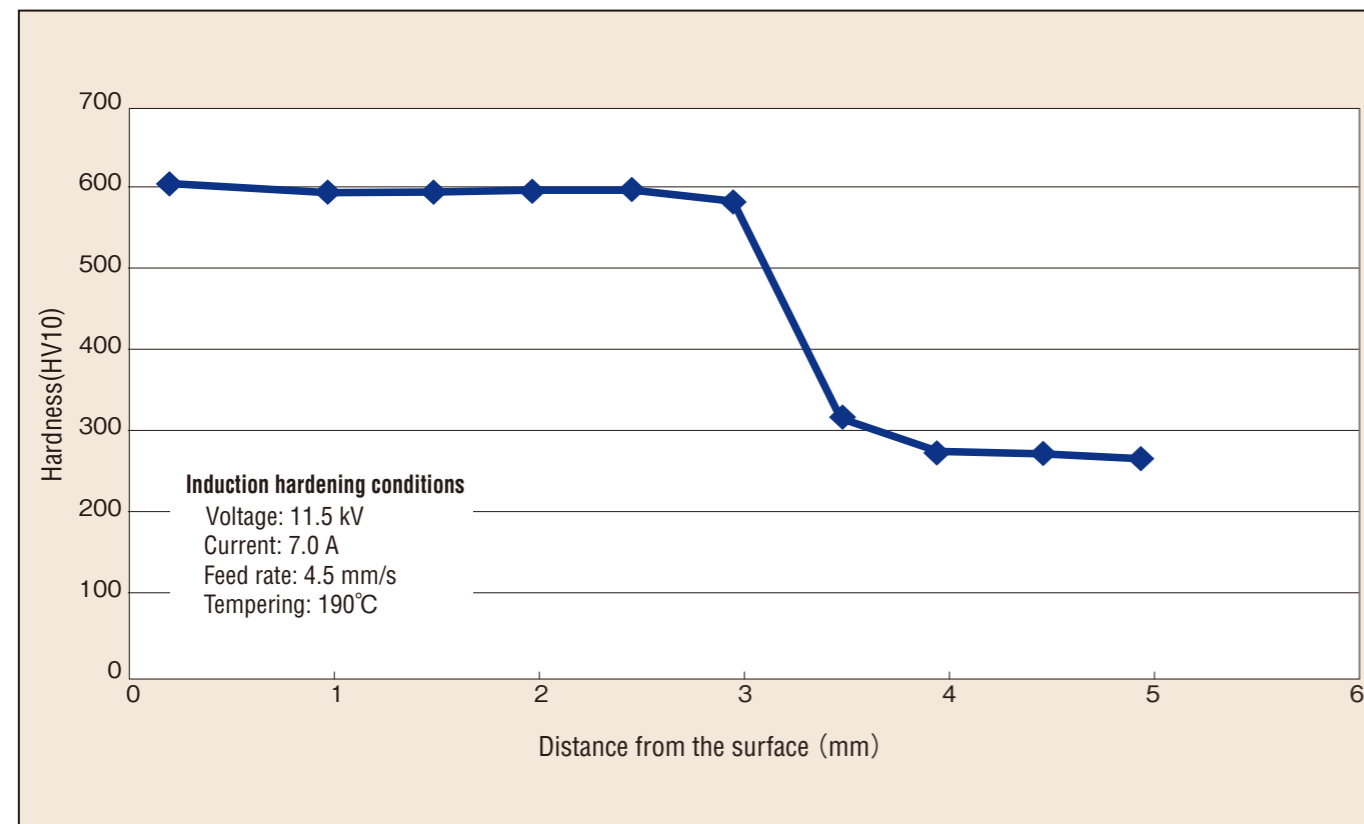


Figure 4. Depth of the hardened layer after applying induction hardening

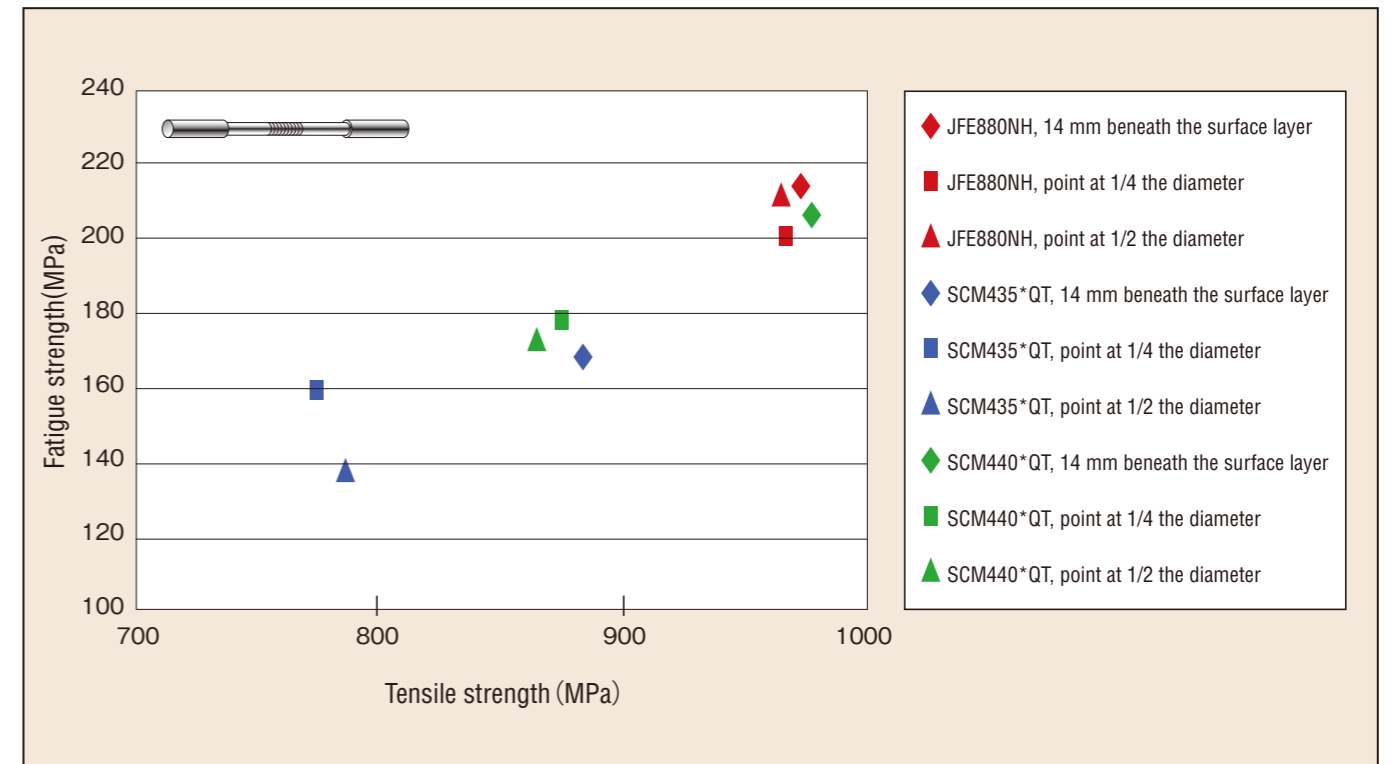


Figure 5. Results of rotational bending fatigue test with screw

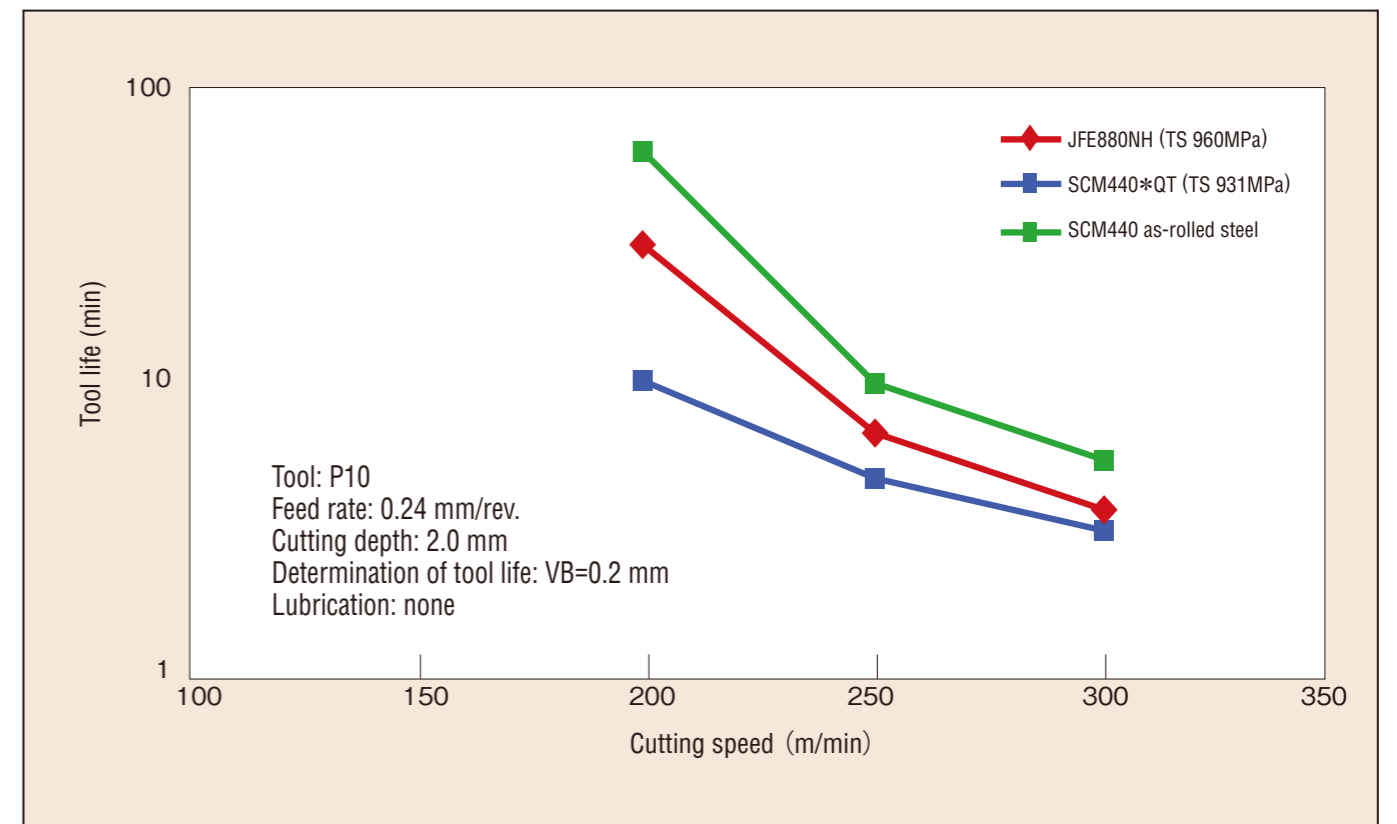


Figure 6. JFE880NH workability

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