

KAWASAKI STEEL TECHNICAL REPORT

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and Process Control

Impact Energy Absorbing Capabilities and Shape Fixabilities of High Strength Steel Sheets for Automotive Bodies

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Synopsis :

In order to simultaneously satisfy the conflicting requirements of weight reduction and improved crashworthiness for automotive bodies, the application of high strength steel sheets is effective. For the purpose of making it possible to select material characteristics of high strength steel sheets which produce formed parts with stable shapes or to select shapes for formed parts which have suitable material characteristics for high strength steel sheets, we studied the advance evaluation of impact energy absorbing capabilities as body parts and of shape fixabilities at press forming by means of FEM simulation. As a result, we have made it clear that it is possible to evaluate the impact energy absorbing capabilities as automotive body parts taking the dynamic deformation characteristic of steel sheets into consideration. Furthermore, we have

Impact Energy Absorbing Capabilities and

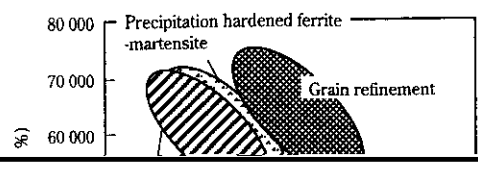
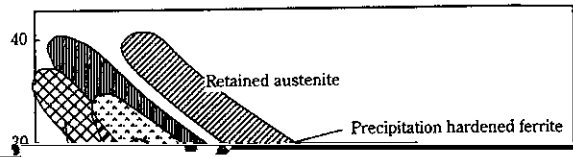
Formability of High Strength Steel Sheets

Synopsis:

In order to simultaneously satisfy the conflicting requirements of weight reduction and improved crash-

Table 1 The Japan Iron and Steel Federation standard and hardening mechanism of typical high tensile strength steel sheets produced by Kawasaki Steel

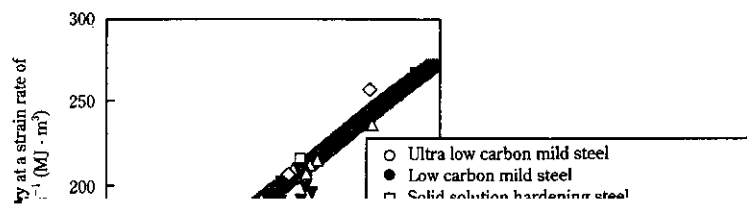
440	Hot rolled	JSH440W, J	SAPH440	C, Mn alloyed solid solution hardening
		JSH440B	SAPH440LC	C, Mn alloyed solid solution hardening
		JSH440R	KFR440E	C, Mn alloyed solid solution hardening
		—	SAPH440BH	C, Mn alloyed solid solution hardening and strain aging
	Cold rolled	JSC440W	APFC440	C, Si, Mn, P alloyed solid solution hardening
		JSC440P	CHR440	C, Si, Mn, P alloyed solid solution hardening
		—	CHLY440	Martensitic transformation hardening (dual phase)
	Hot-dip galvanized	JAH440W, J	RASA440	C, Mn alloyed solid solution hardening
		JAH440R	RAAPFH440	C, Mn alloyed solid solution hardening
	Cold-dip galvanized	JAC440W	RASAP440	C, Mn alloyed solid solution hardening
JAC440P		RACHRX440	C, Mn, P alloyed solid solution hardening	
—		RACHLY440	Martensitic transformation hardening (dual phase)	
540	Hot rolled	JSH540W	RHA540	C, Mn alloyed solid solution hardening
		JSH540B	RHA540SK	Ti-added precipitation hardened ferrite and martensitic transformation hardening
		ISH540R	RHA540F	Ti, Nb-added precipitation hardening



in local elongation and uniform elongation be of a uniformly hardened structure macroscopically and of a nonuniformly hardened structure microscopically, and

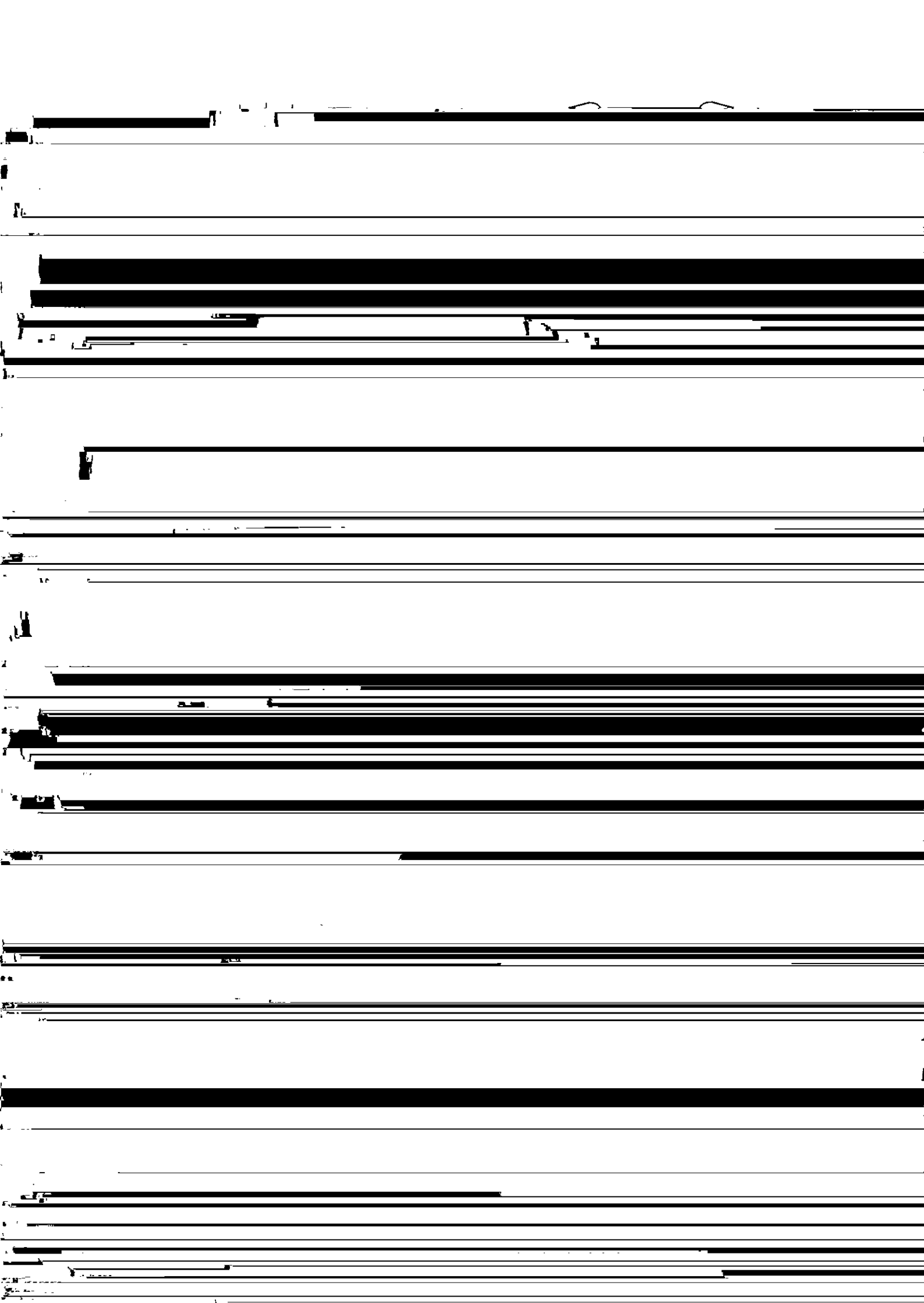
900 (1) Strain rate = $2 \times 10^{-2} \text{ s}^{-1}$

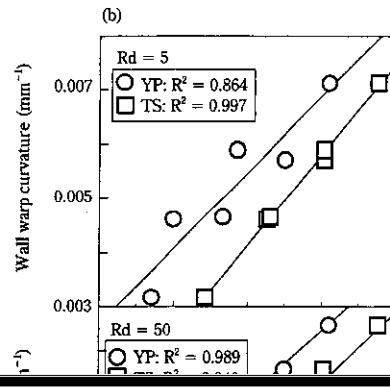
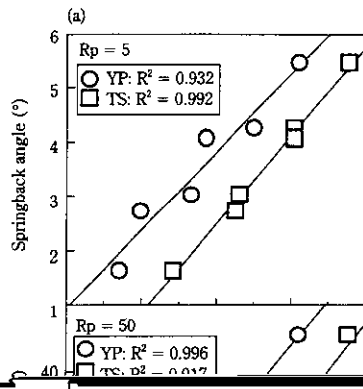
900 (2) Strain rate = $2 \times 10^3 \text{ s}^{-1}$
c

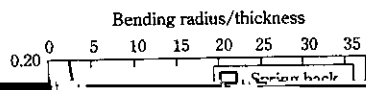


Mild steel 590 MPa grade

Mild steel 590 MPa grade







capabilities as body parts and that of shape fixabilities at the time of press forming, it becomes possible to investigate the material characteristics of steel sheets suitable