Daido's Hot Work Die Steel

DH31-EX

High tough and heat checking resistance Premium Hot Work Die Steel

Features

- High toughness due to fine grains by double melting
- High toughness even in large dies due to higher hardenability
- High elevated temperature strength and superior heat checking resistance

Applications and proper hardness

Applications	Hardness (HRC)
Al,Zn,Mg die casting molds	41～48HRC
Die casting parts (Plunger sleeve, chip etc.)	45～50HRC
Hot extrusion dies	43～50HRC
Hot shear blades	35～45HRC
Hot forging dies	42～50HRC

Chemistries

Patent pending

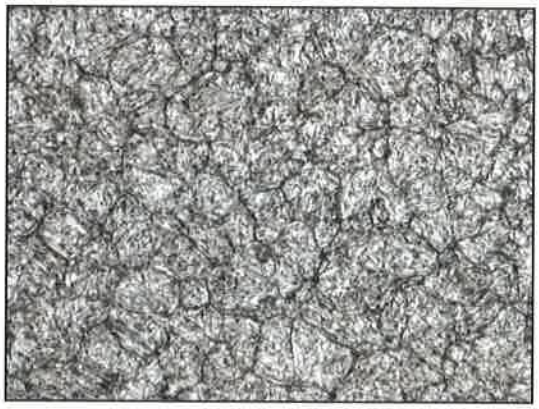
Heat treatment

Forging Temp. : C	Treating temperature : C			Hardness		Transformation point : C	
	Annealing	Quenching	Tempering	Annealed	Quenched & tempered	Ac	Ms
1200－900	820－870 Slow cooling	1000-1050 Air cooling	550～650 Air cooling	≦235HB	≦53HRC	805～885	300 Austenite temp : 1030 C

Microstructure （Quenched and tempered）

Specimen: 200H x 600W x 300L(Center)
Vacuum quenched and tempered

25 μ m



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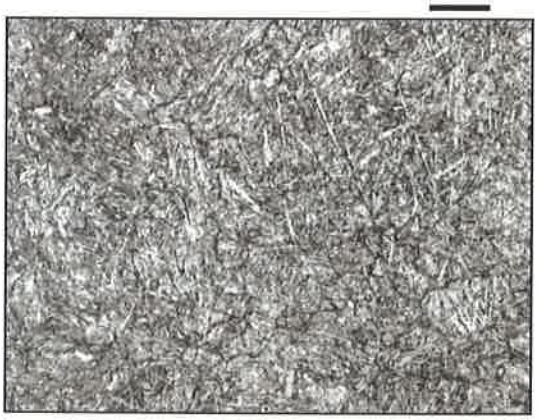
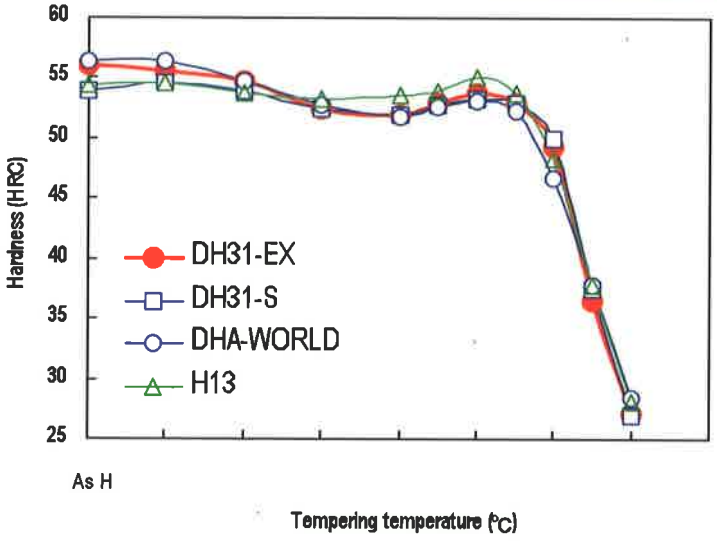


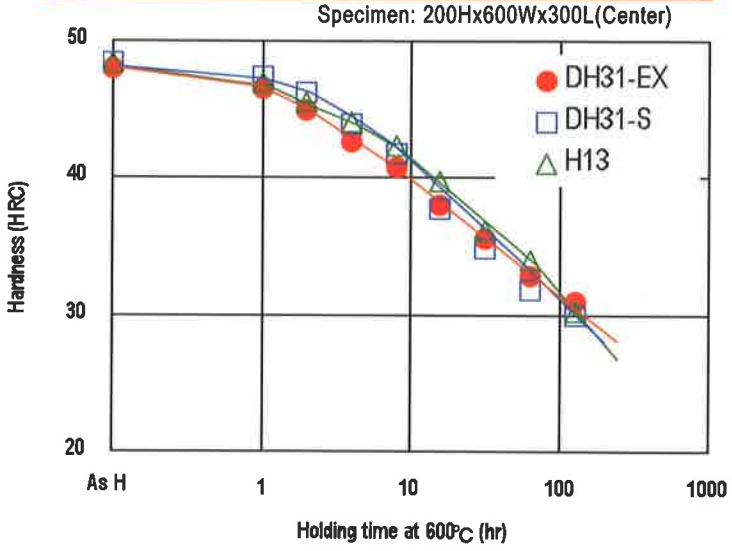
H13

Tempering hardness



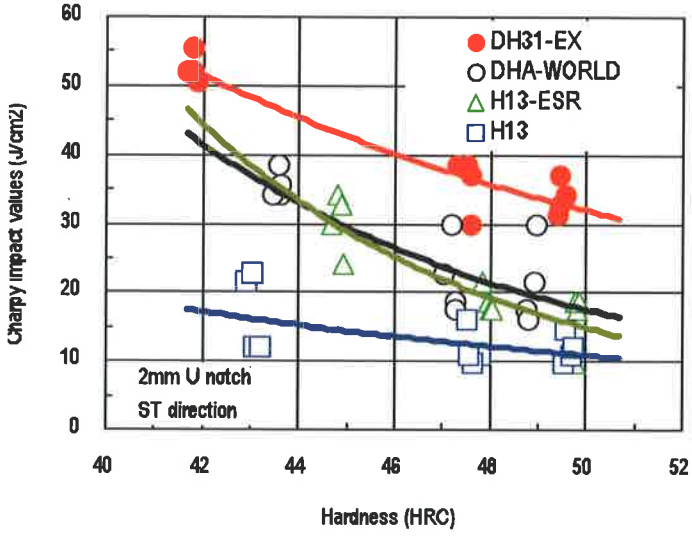
Softening resistance

Specimen: 200Hx600Wx300L(Center)

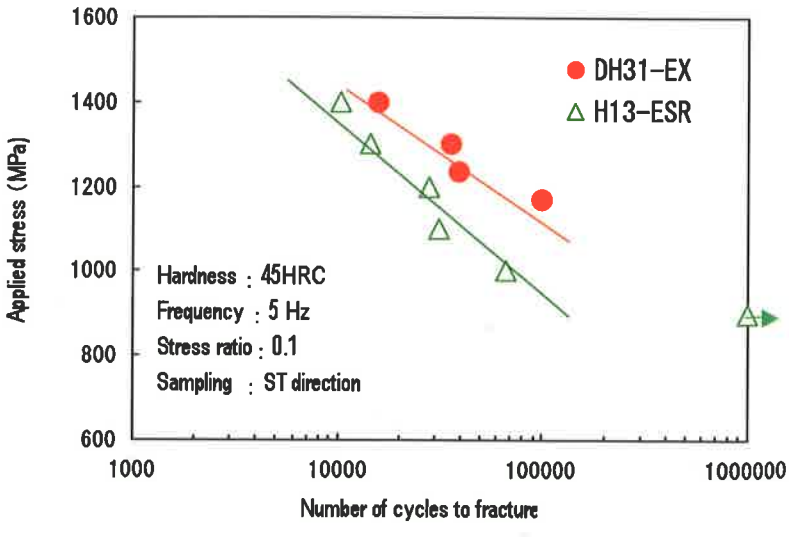


Toughness

Specimen: 200Hx600Wx300L(Center)



Fatigue properties



Properties

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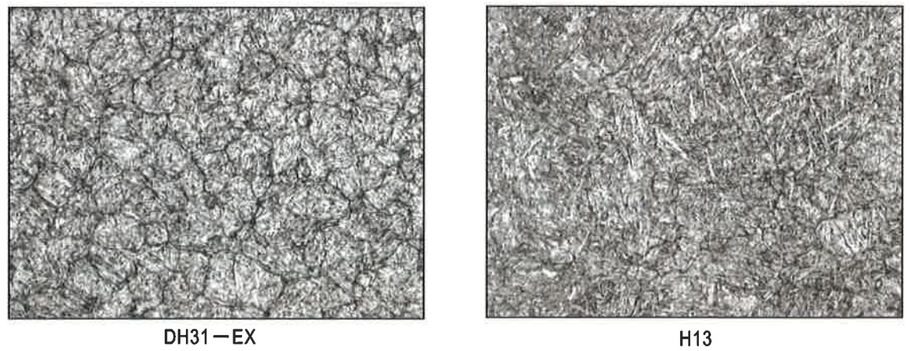
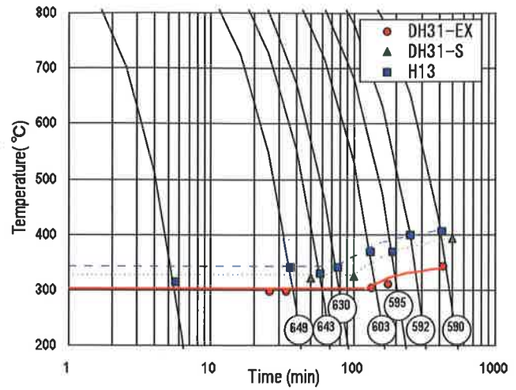
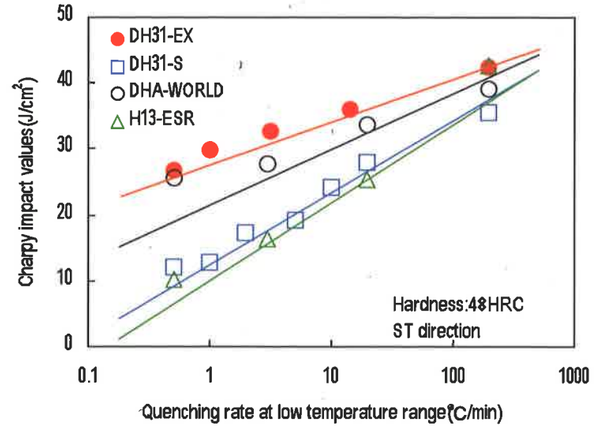


DH31－EX　　H13

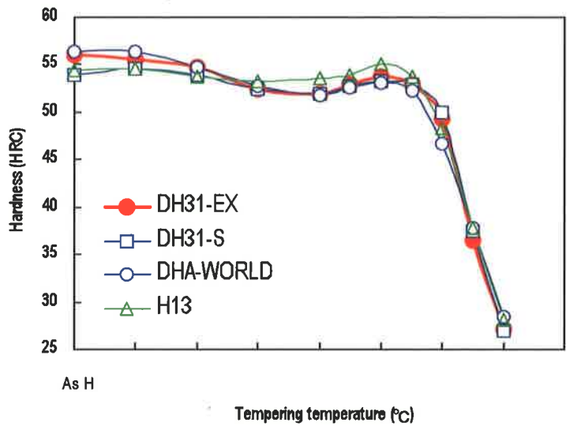
CCT Curves



Quenching rate vs. Toughness

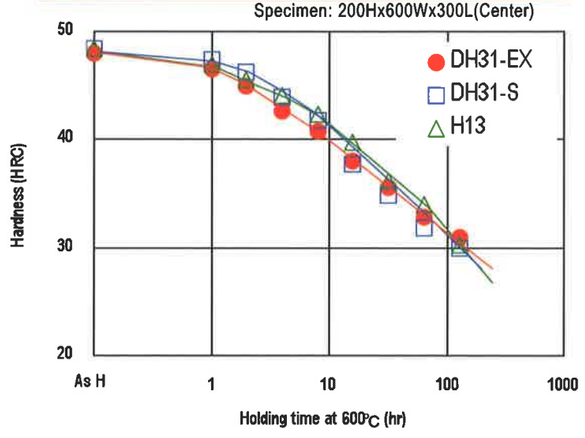


Tempering hardness

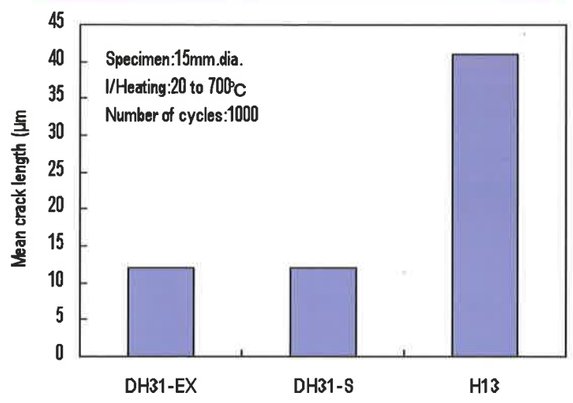


Softening resistance

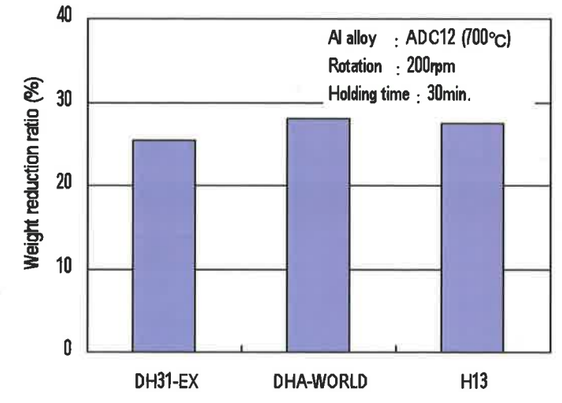
Specimen: 200Hx600Wx300L(Center)



Heat checking resistance

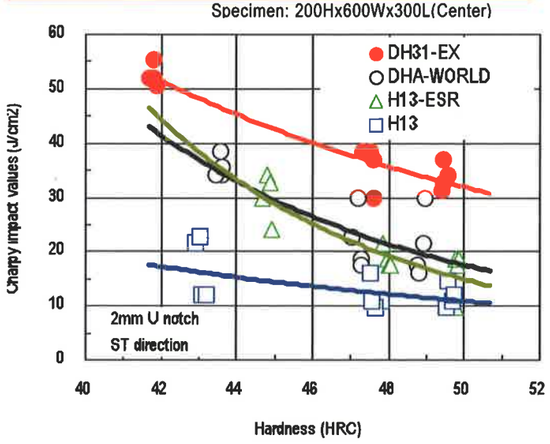


Al erosion resistance

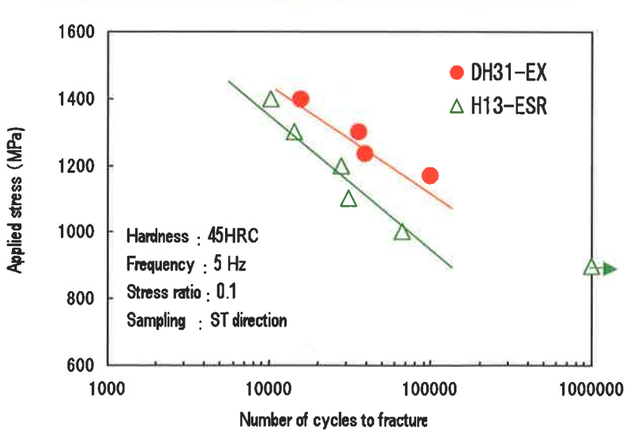


Toughness

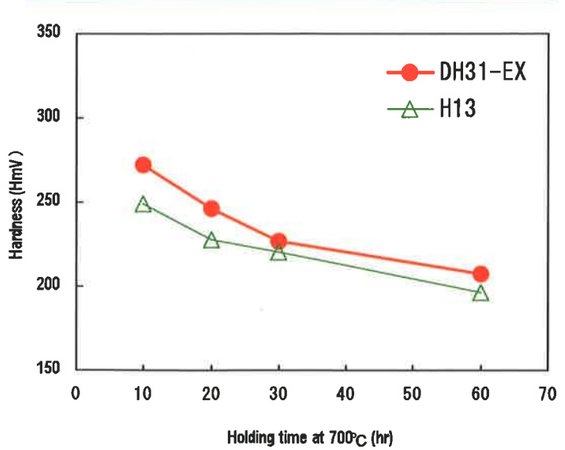
Specimen: 200Hx600Wx300L(Center)



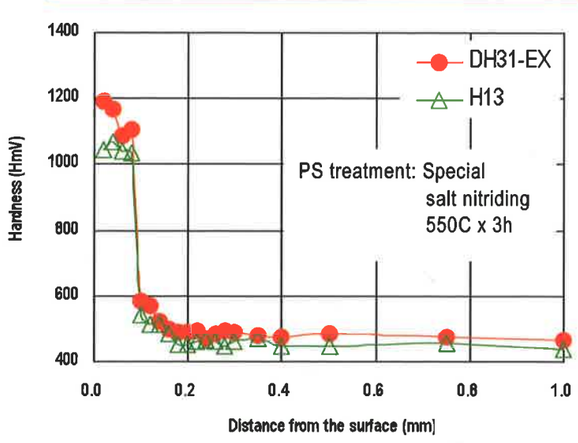
Fatigue properties



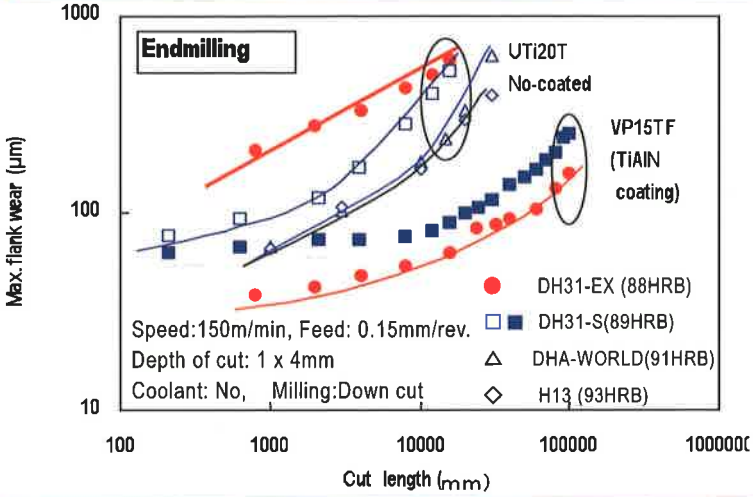
Hot hardness

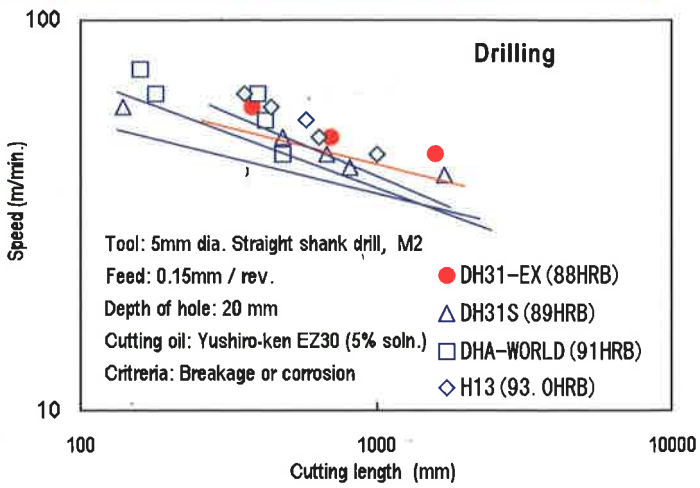


Nitriding characteristics



Machinability





Thermal expansion rate

Temperature	20~100℃	20~200℃	20~300℃	20~400℃	20~500℃	20~600℃	20~700℃
$\times 10^{-6}$/K	11.6	11.8	12.0	12.2	12.5	12.8	12.9

Thermal conductivity

Temperature	100℃	200℃	300℃	400℃	500℃	600℃	700℃
W/m·K	26.7	27.9	29.0	29.4	29.7	30.0	29.5

Specifc heat

Temperature	100℃	200℃	300℃	400℃	500℃	600℃	700℃
J/kg·K [cal/g·℃]	487 [0. 116]	527 [0. 126]	572 [0. 137]	626 [0. 150]	703 [0. 168]	802 [0. 192]	985 [0. 235]

Density

温度	20℃
kg/m^3 [g/cm^3]	7800. 0 [7. 80]