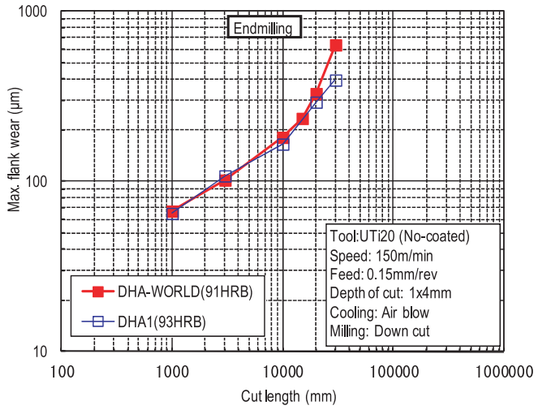
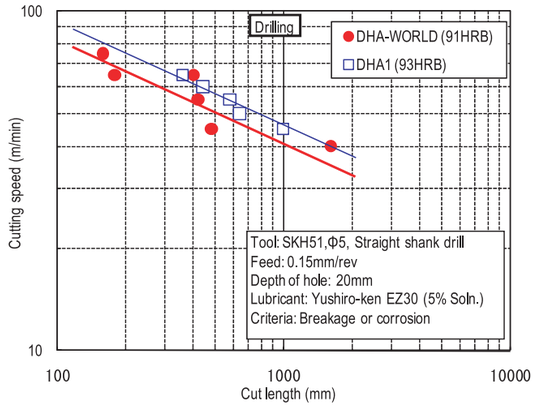
Machinability





Main applications

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

Physical properties

Thermal expansion rate

Temp.	20 - 100℃	20 - 200℃	20 - 300℃	20 - 400℃	20 - 500℃	20 - 600℃	20 - 700℃
x10^{-6}/K	11.3	11.7	12.1	12.5	12.8	13.1	13.2

Thermal conductivity

Temp.	100℃	200℃	300℃	400℃	500℃	600℃
W/m・K	28.4	29.1	30.0	30.3	30.1	29.5

Specific heat

Temp.	100℃	200℃	300℃	400℃	500℃	600℃	700℃
J/kg・K [cal/g・℃]	473 [0.113]	509 [0.122]	558 [0.133]	604 [0.144]	667 [0.159]	760 [0.182]	934 [0.223]

※Heat treatment of specimens

Quenching : 1030℃, AC, Tempering : 610℃, AC, Twice

DAIDO STEEL

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www.daido.co.jp/

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SC1303 15.03.1,0 (DLS)

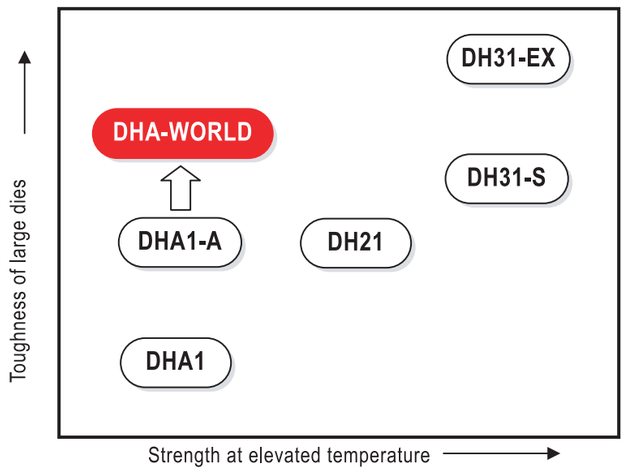
Daido's Hot Work Die Steel Series

DHA-WORLD

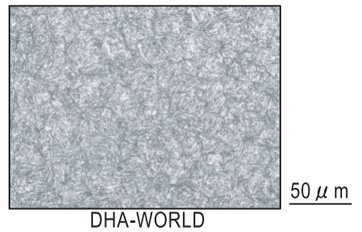
High hardenability and high tough Hot Work Die steel available for large Die Casting Dies as improved SKD61

Features

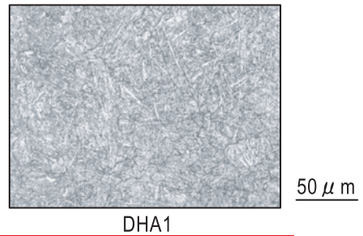
1. High hardenability : High toughness even in large sized dies due to optimum alloy designing
2. Single melt steel : Almost the same quality as double melt steels due to state of the art production technologies



Specimen:200mm H×600mm W×300mm L(Center)
Quenching:1030℃, gas quenching with 6bar



DHA-WORLD



DHA1

Chemical composition

▪ Patent pending

Heat treatment

Forging Temperature (℃)	Heat treatment (℃)			Hardness		Transformation Temp. (℃)	
	Annealing	Quenching	Tempering	Annealing	Quenching Tempering	Ac	Ms
900～1200	820～870 Slow cooling	1000～1050 Air cooling	550～650 Air cooling	≦229HB	35～53HRC	815～875	300(Austenitized at 1030℃)

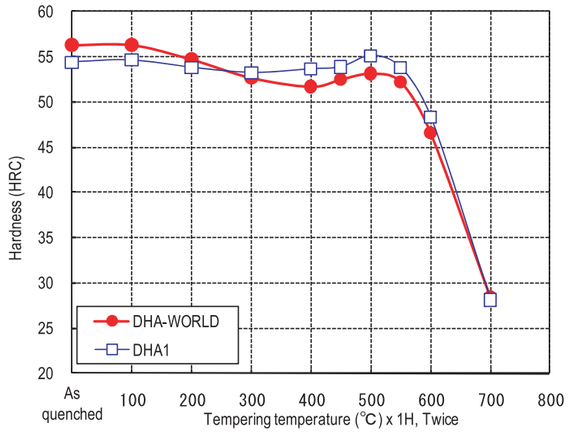
DAIDO STEEL

Properties

Material size : 200mm H × 800mm W

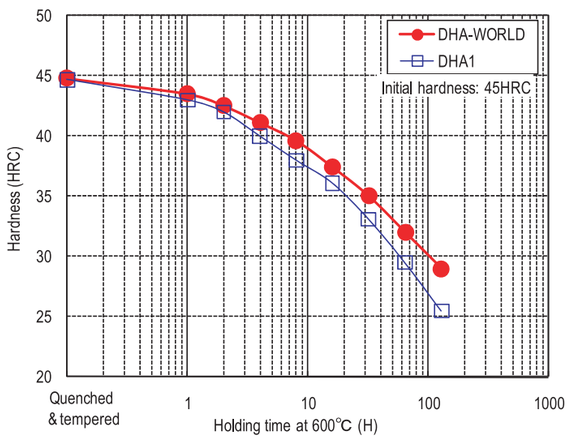
Tempering hardness

Specimen :10mm x 15mm x 20mm
Quenching:1030℃ x 15min, AC



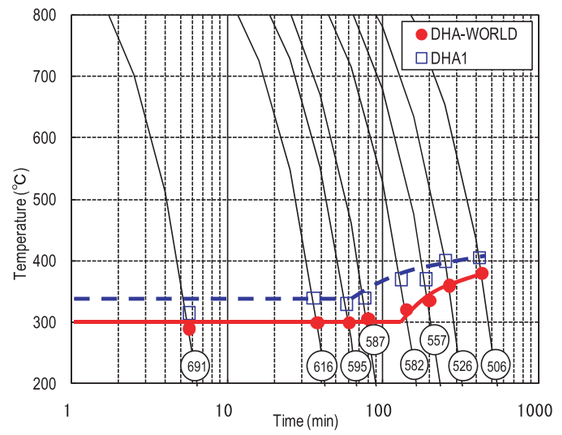
Softening resistance

Specimen :200mm H x 600mm W x 300mm L(Center)
Quenching :1030℃, Gas cooling (6-9bar)

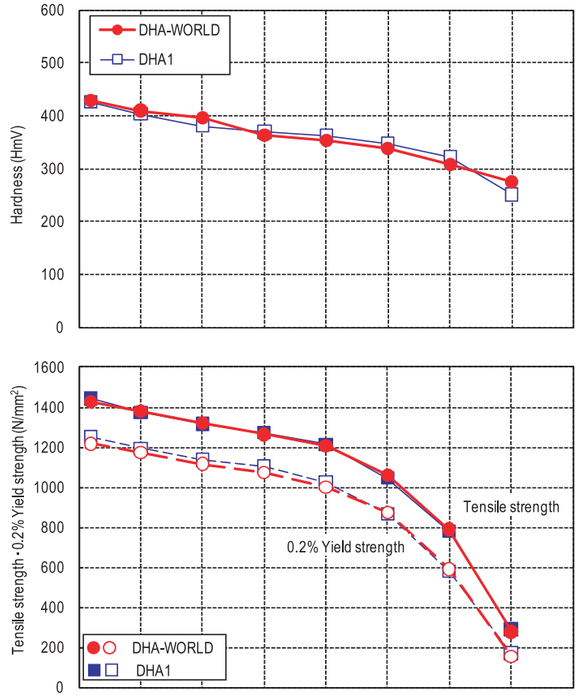


CCT curves

(Austenitizing temp. 1030℃ x 15min)

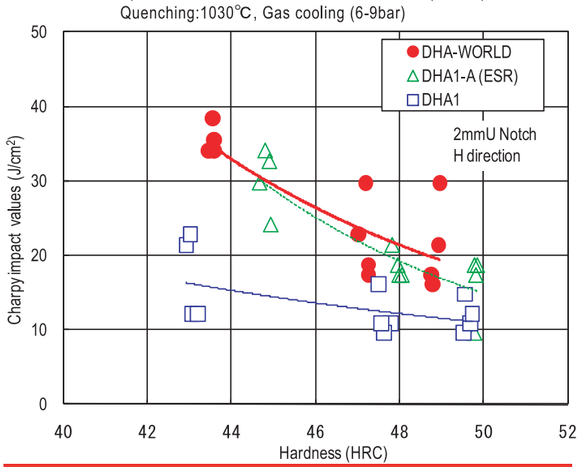


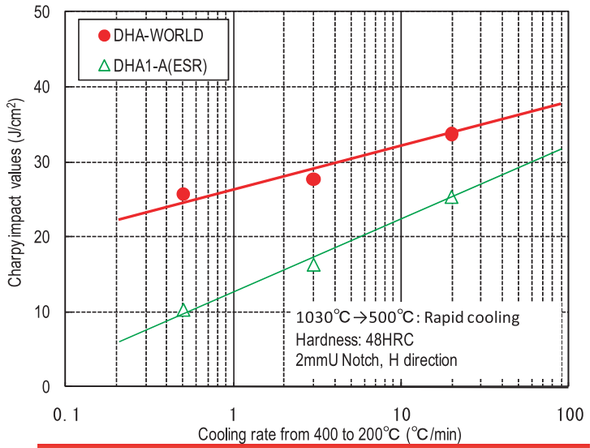
Mechanical properties



Toughness

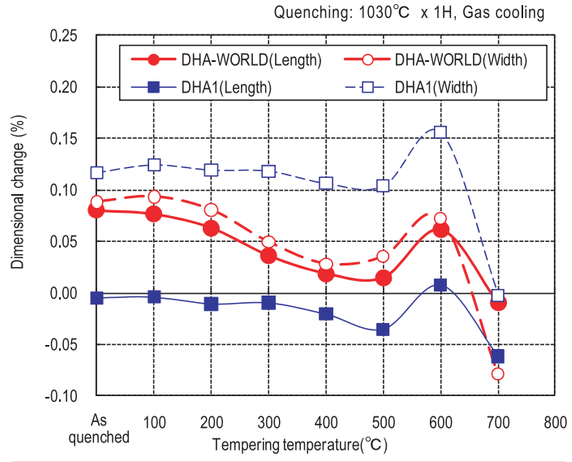
Specimen:200mm H x 600mm W x 300mm L(Center)
Quenching:1030℃, Gas cooling (6-9bar)





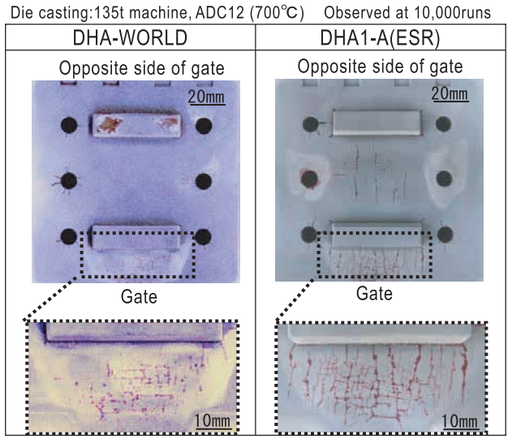
Dimensional change

Specimen: ϕ 30 x 45mm
Quenching: 1030℃ x 1H, Gas cooling



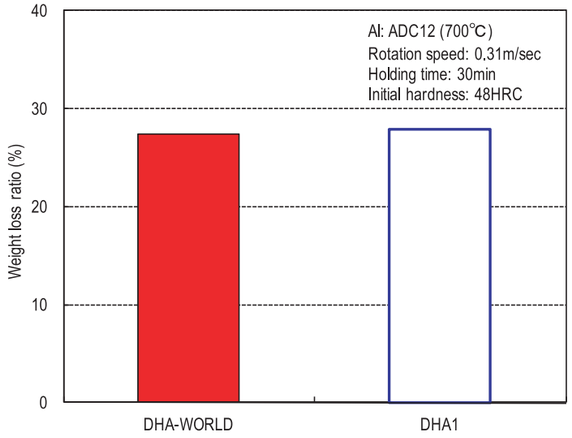
Heat checking resistance

Mold size:62mm x 200mm x 205mm (42HRC)
Quenching:1030℃, Gas cooling (6bar)
Die casting:135t machine, ADC12 (700℃) Observed at 10,000runs



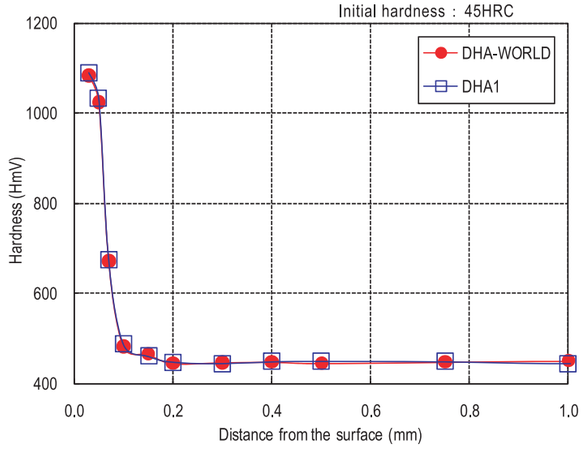
Al erosion resistance

Specimen: ϕ 10 x 30mm
Quenching:1030℃, Gas cooling



Nitriding characteristics

Nitriding : PS treatment
Initial hardness : 45HRC



Quenching : 1030℃,AC, Initial hardness : 45HRC
Dimension : Tensile specimen : ϕ 8 × 90mm
Charpy specimen : 10mm × 55mm