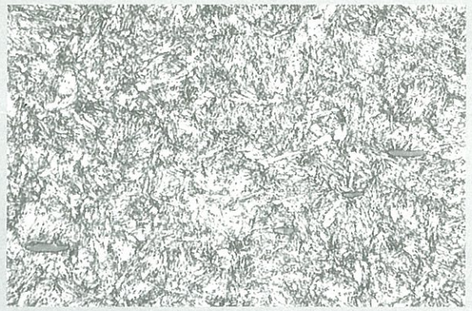
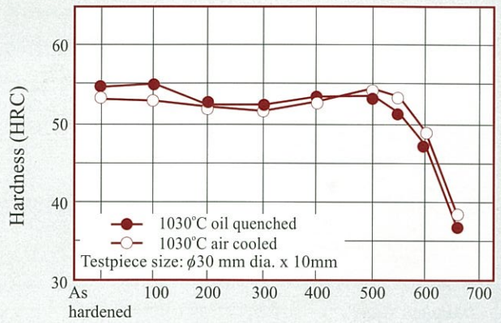
【 Microstructure 】



(x 400)

Hardening: 1030°C, air cooling
Tempering: 630°C x 1hr.
Hardness: HRC 40

【 Tempering-hardness Curve 】



(The material as delivered does not require heat treating.
This data is presented merely for reference.)

Chemical Composition

Daido spec.	Corresponding JIS spec.	Chemical composition (%)						
		C	Si	Mn	Cr	Mo	V	Free-machining elements
DH2F	-----	0.32-0.42	≦1.5	≦1.5	4.50-5.50	1.00-1.50	0.40-1.20	Added

Impurities: P≦0.030%, Cu≦0.25%, Ni≦0.25%

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11/2004

DH2F

Modified SKD61 (H13) Prehardened to 40 HRC level Free-machining Hot-forming Tool Steel

Features

1. Prehardened at 37-41 HRC. Without additional heat treating, DH2F is well suited for complex high-precision dies and parts susceptible to deformation.
2. Can be easily cut and milled because of good machinability.
3. Cuts diemaking costs by reducing man-hours required for fabrication.
4. Surface treating gives DH2F enhanced abrasion and corrosion resistance.

Applications

Diecasting dies for aluminum and zinc Diecast die parts Plunger tips, sprue bushings

Dies for plastics Dies for aluminum extrusions Press dies Dieplate strippers Machine parts

DAIDO STEEL

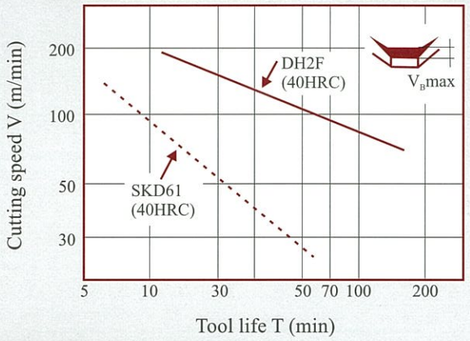
Quality Characteristics

Material size (mm) : 120 x 230

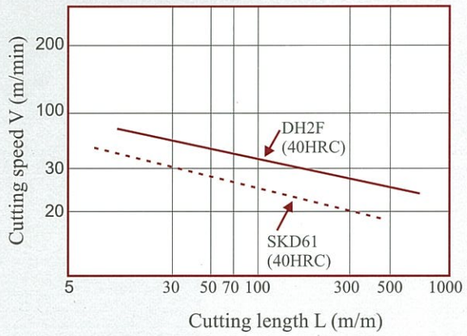
【Machinability】

● Good machinability raises productivity

● An example of tool life of face milling cutter



● An example of tool life of HSS drill bit



● Cutting parameters

Parameters / Tool	Tool material	Tool shape	Cutting fluid	Feed	Cut	Cutting speed (m/min)	Test piece size (mm)	Hardness (HRC)	Tool life and point
Face milling cutter	M20	NP-100R	None	0.075mm/tooth	1.5mm	66-165	80^{W} x 50^{T} x 200^{L}	40	V_{Bmax}=0.3mm
Drill bit	SKH51	10mm dia., tapered-shank drill a = 118°	None	0.1mm/rev	30mm deep hole	20-40	80^{W} x 50^{T} x 200^{L}	40	Tool erosion

【Clip Shape】

● DH2F (Modified SKD61(H13)Prehardened)

● SKD61 (H13)

Cutting parameters:
Tool : SKH51, 10 mm dia., tapered-shank drill α = 118°
Feed : 0.10mm/rev
Hole depth : 30mm
Cutting speed : 25m/min
Test piece hardness : 40HRC
Test piece size (mm) : 100 x 200 x 300

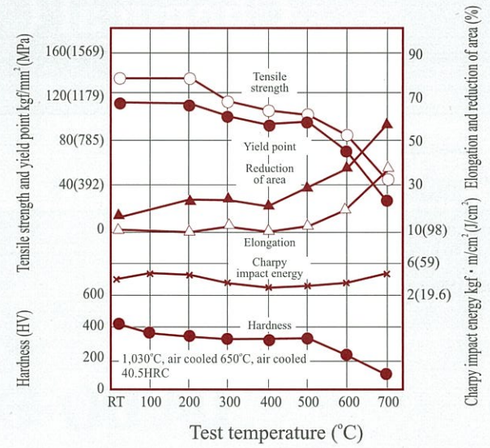
【Abrasion Resistance】

● DH2F has better abrasion resistance than that of SKD61

Abrasion speed (m/sec)	Abrasion loss ($mm^3kgf \times 10^{-7}$)	
	DH2F	SKD61
0.20	3.76	3.50
0.51	5.24	5.56
0.94	3.50	5.24
1.63	3.03	5.56
1.97	4.04	5.24
2.38	4.61	5.24

Test machine : Ohgoshi method abrasion test apparatus
Abrasion distance : 200m
Final load : 3.3kg
Mating material (disk) : SKD11, HRC57
Abrasion speed : 0.2 to 2.4m/sec
Test piece hardness : HRC42

【Mechanical Properties】



Test piece size
Tension test : 8 mm dia. x 90mm
Charpy impact test : JIS No.3 test piece (R1,2 mm hole depth) obtained from the material in the rolling direction

【Erosion Resistance】

Spec.	Weight before test (gr)	Weight after test (gr)	Erosion loss	
			(gr)	(%)
DH2F	27.33	23.18	4.15	15.2
SKD61	27.12	23.39	3.73	13.9

Erosion testing: An annealed 15mm dia. x 20mm sample is weighed before and after soaking in an aluminum bath at 700°C for 30 hours.

【Coefficient of Thermal Expansion】

● Average Coefficient of Thermal Expansion for DH2F and SKD61

(x 10^{-6}/°C)

Spec.	20~100°C	20~200°C	20~300°C	20~400°C	20~500°C	20~600°C	20~700°C
DH2F	8.9	10.8	11.9	12.6	13.1	13.7	13.9
SKD61	8.6	10.1	11.4	12.2	12.8	13.3	13.6