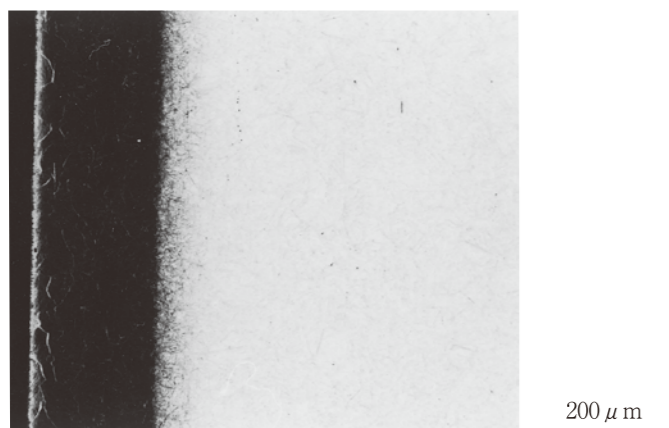


Nitriding characteristics

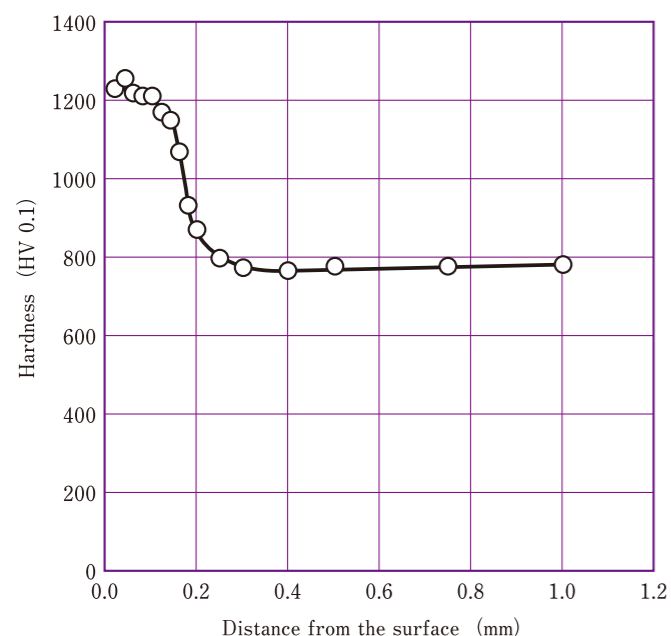
An example of micro structure nitrided by PS process

● PS process

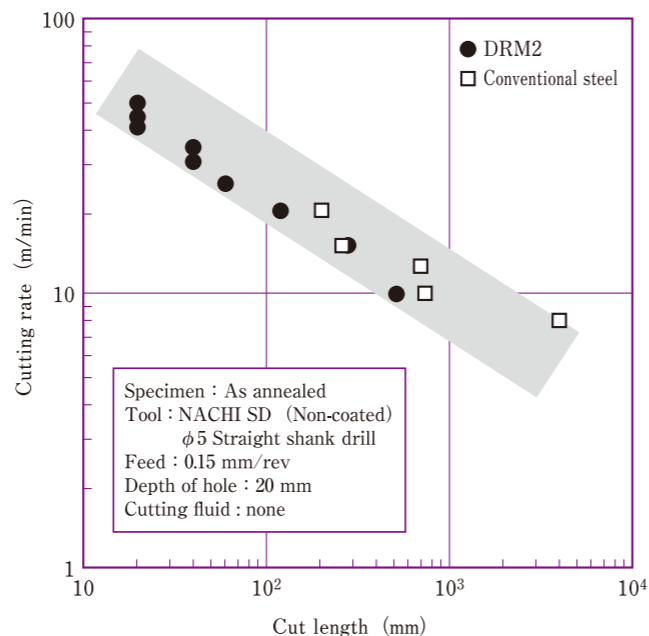
Daido Die & Mold Steel Solutions originally developed process featured by high scuffing and erosion resistance



● Hardness distribution



Drilling machinability



Physical properties

◆ Thermal expansion rate

Temp.	20~100°C	20~200°C	20~300°C	20~400°C	20~500°C	20~600°C
×10 ⁻⁶ /K	10.7	11.3	11.6	12.0	12.5	12.9

◆ Thermal conductivity

Temp.	25°C	100°C	200°C	300°C	400°C	500°C	600°C
W/m·K	24.4	26.5	27.2	28.0	28.1	28.4	28.4

*Accuracy of repeated measurements is about ±10%.

◆ Specific heat

Temp.	25°C	100°C	200°C	300°C	400°C	500°C	600°C
J/kg·K	477	520	539	575	613	672	754

◆ Young's modulus / Rigidity modulus / Poisson's ratio (25°C)

Young's modulus	Rigidity modulus	Poisson's ratio
211GPa	81GPa	0.30

Quenching: 1100°C×1h, Oil cooling
Tempering: 560°C×1h - Air cooling, Twice
Hardness: 61HRC

Dream Series Daido's DRM2™

Warm and Cold Forging Die Steel

High hard and tough matrix type high speed tool steel

Features

Matrix type high speed tool steel available for warm and cold forging tools where critical performance is required.

DRM2 prolongs service life due to its higher hardness and toughness than those of conventional grades.

- ①Applicable with the maximum hardness 62HRC
- ②Fine microstructure contributes to high toughness and fatigue strength
- ③Greater hardenability results in high performance even in large dies and gas quenching in vacuum furnace.
- ④Double melting realizes clean and homogeneous steel with less non-metallic inclusions

Applications

- Warm forging dies and punches
- Cold forging dies and punches

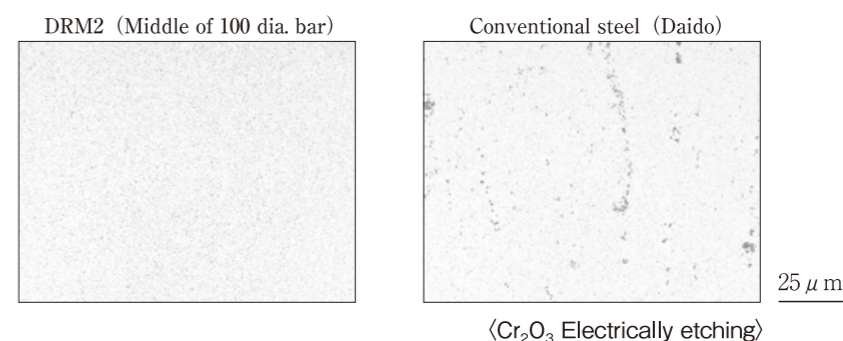
Heat treatment

Re-forging Temperature	Heat treatment (°C)			Hardness	
	Annealing	Quenching	Tempering	Annealed	Quenched & Tempered
Requested to inquire	800~880 Slow cooling	1050~1120 OQ, GC, Salt bath	550~620 AC, ≥twice	≤235HB	58~62HRC

OQ : Oil quenching, GC : Gas quenching in vacuum furnace, AC : Air cooling

Microstructure (As annealed)

- Fine and uniform microstructure with less coarse carbides



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■ Document Disclaimer

The product characteristics included in this brochure are the representative values based on the result of our measurements, and do not guarantee the performance in use of the products.

Please inquire the latest information to our department in charge as the information of this brochure is updated without previous notice as needed.

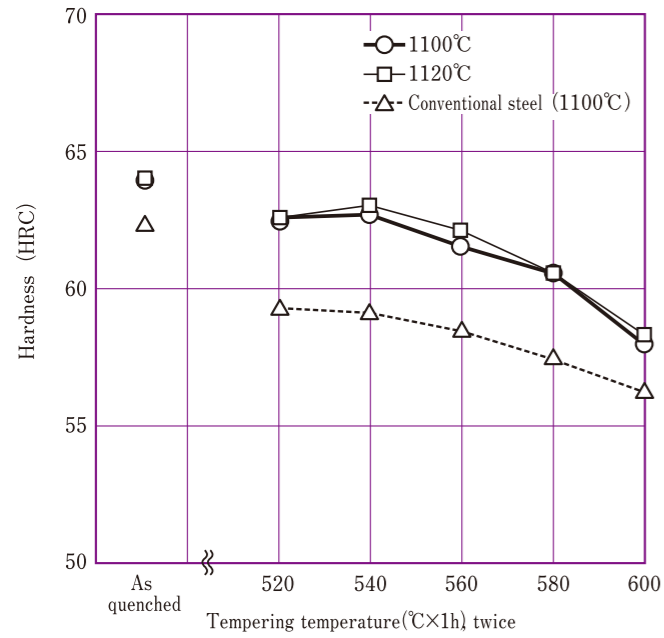
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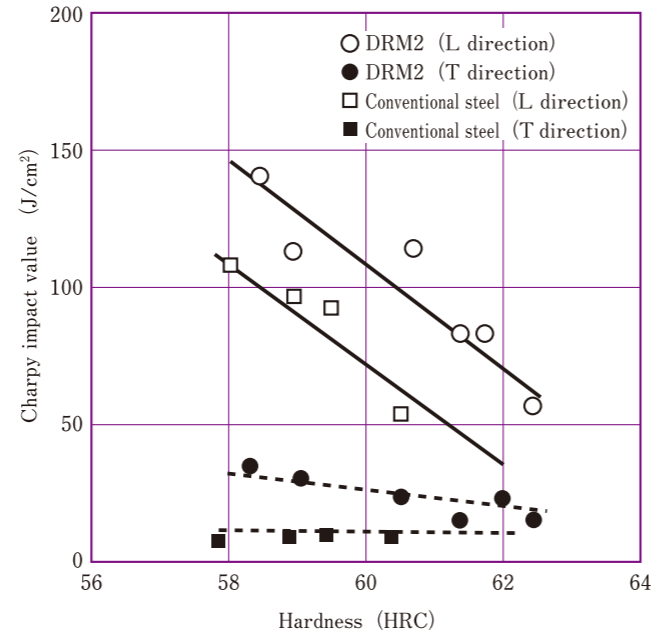
Properties

Tempered hardness



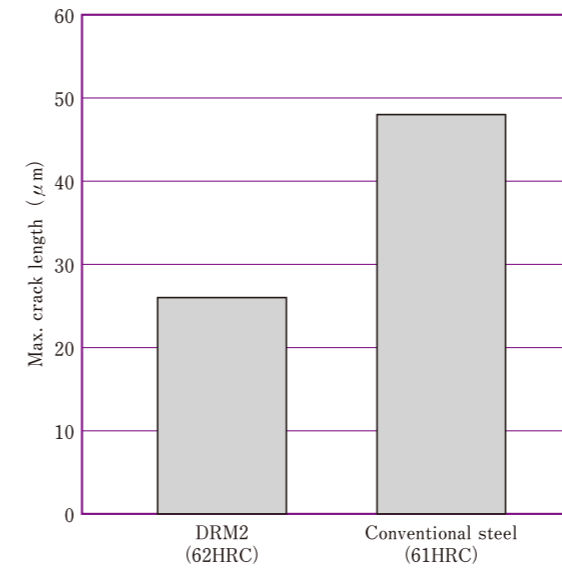
- Specimen : 15mm square
- Hardening : Oil quenching
- Tempering : Air cooling

Toughness



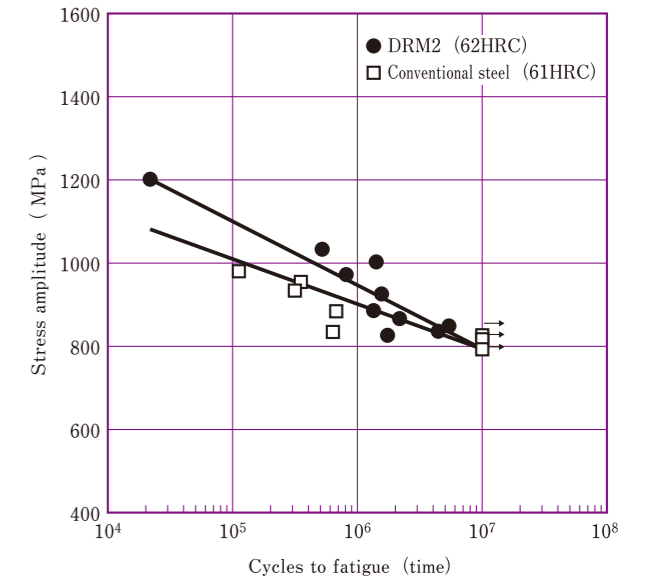
- Sampling : 100mm dia. Bar center
- Specimen : 10R notched
- Heat treatment : DRM2..... H : 1120°C OQ
T : 540~600°C AC, twice
- Conventional Steel...H : 1120°C OQ
T : 540~600°C AC, twice

Heat checking resistance



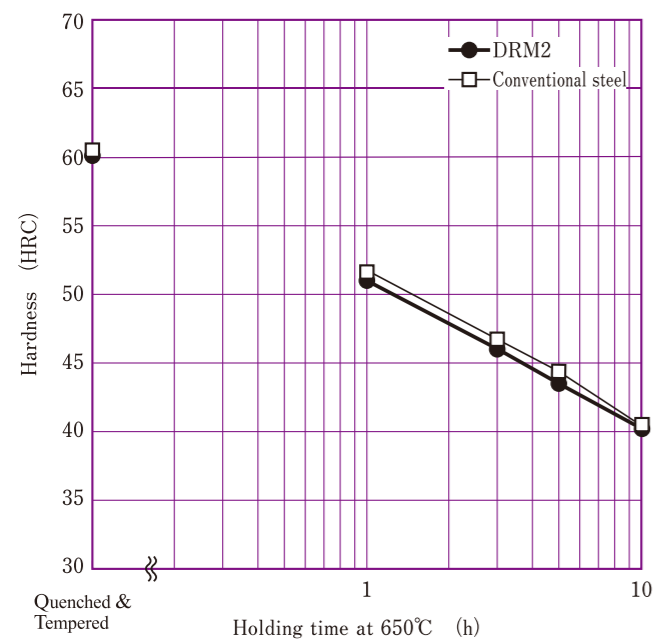
- Specimen : 15 mm dia. 10 mm thick
- Heat treatment : DRM2..... H : 1120°C OQ
T : 560°C AC, twice
- Conventional Steel...H : 1140°C OQ
T : 560°C AC, twice
- Test method : Induction heating 20→700°C (1000 times)

Fatigue strength



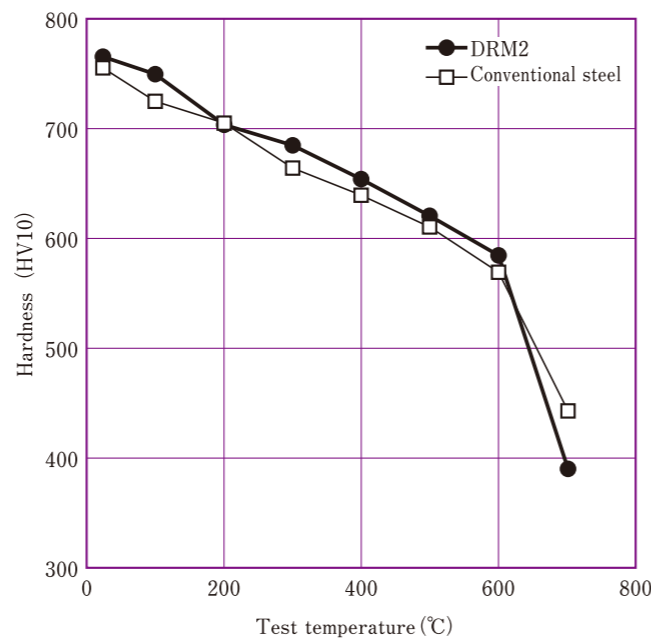
- Sampling : 100 mm dia. Bar center
- Heat treatment : DRM2..... H : 1120°C OQ
T : 560°C AC, twice
- Conventional Steel...H : 1140°C OQ
T : 560°C AC, twice
- Test method : Rotating bending fatigue test (20°C)

Softening resistance



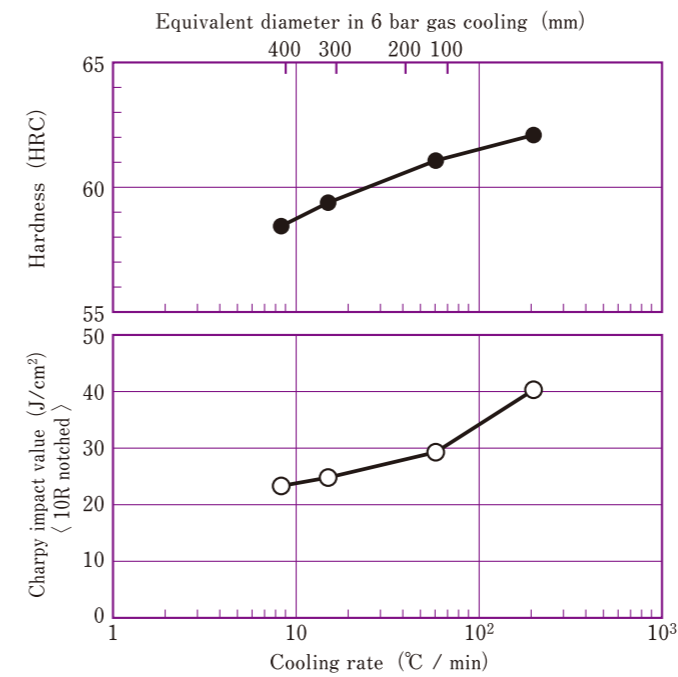
- Heat treatment : DRM2..... H : 1120°C OQ
T : 580°C AC, twice
- Conventional Steel...H : 1120°C OQ
T : 610°C AC, twice

Hot hardness



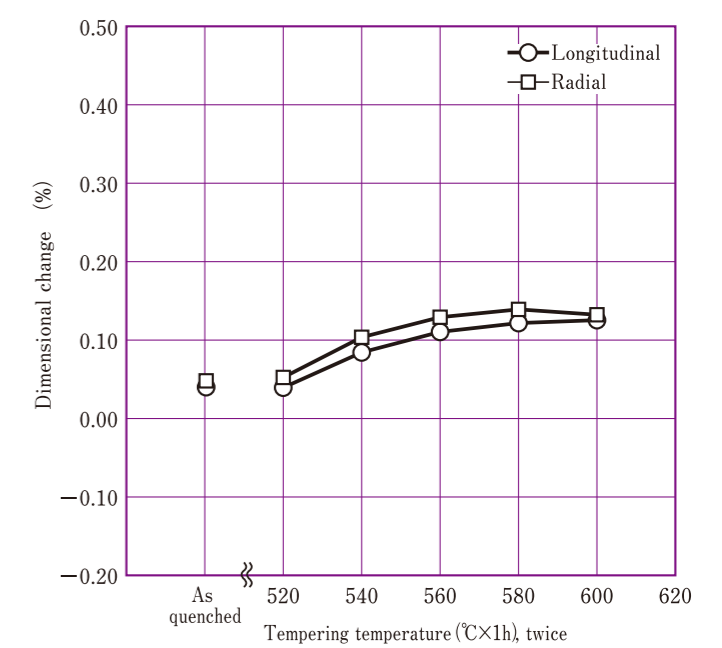
- Heat treatment : DRM2..... H : 1120°C OQ
T : 560°C AC, twice
- Conventional Steel...H : 1120°C OQ
T : 560°C AC, twice

Hardenability



- Sampling : 100mm dia. Bar center
- Heat treatment : H : 1120°C (200°C / min → equal to OQ)
T : 560°C AC, twice

Dimensional change



- Specimen : 36mm dia. × 60 mm
- Hardening : 1120°C salt bath quenching