



## KDA1S

The KDA1S is a new type of steel for die-casting that has the same basic functions of the KDA1 and features superior durability and cost-reduction performance.

### Features of KDA1S

#### 1. Superior heat-check resistance

• Hard to crack in comparison with the SKD61, and has a finer structure. • Has superior heat-check resistance equivalent to the KDA1 and offers a longer service life.

2. Superior machinability after hardening and annealing. • 30% or more higher machinability than the SKD61. • Approximately 5 times as high as the KDA1.

3. Superior tenacity • 80% or more higher tenacity than the SKD61 (in the T direction). • Good tenacity equivalent to the KDA1.

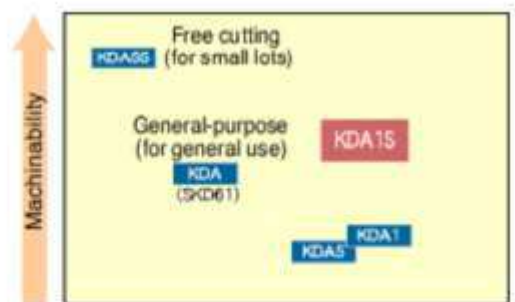
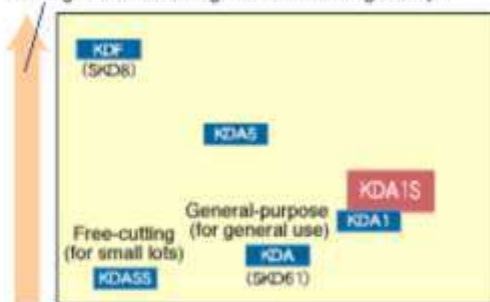
4. Superior heat-softening resistance. • Twice as high heat-softening resistance as the SKD61 maintains high hardness for a long time.

### Applications

- Die-casting molds
- Hot-forging dies

### Position of KDA1S

Strength and softening resistance at high temp.



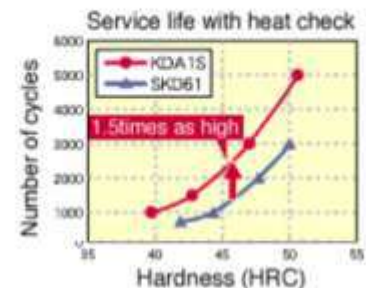
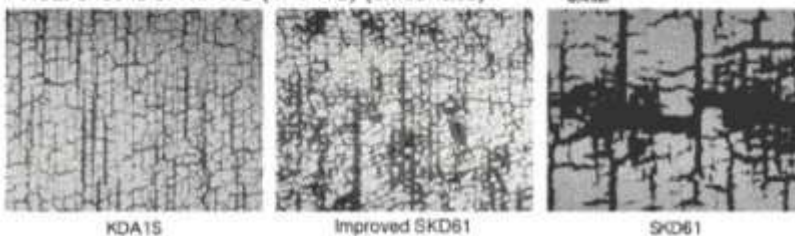
### Heat-check resistance

The KDA1S features finer cracks than the SKD61 and has a heat-check resistance equivalent to the improved SKD61.

#### Test conditions

- RF heating:

Heat checks of KDA1S (47 HRC) (on surface)





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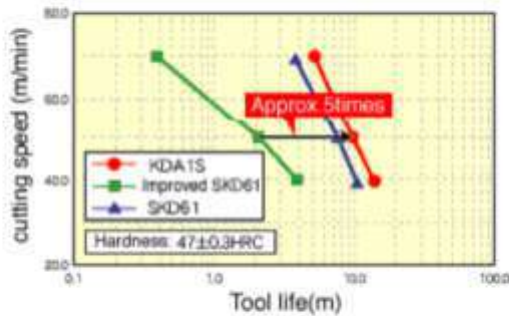
## Machinability

Superior machinability after hardening and annealing to the SKD61

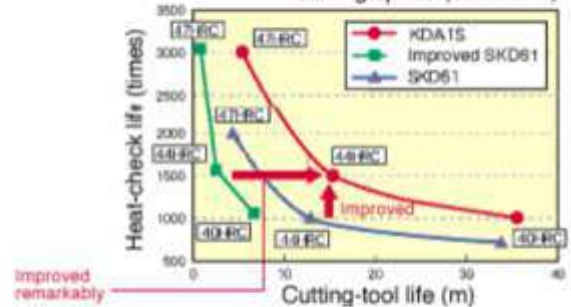
Test conditions

- Machine: OKK MCV-460
- Tool: End mill VA-2SS  $\phi 6.0\text{mm}$
- Cutting: 9mm
- Cutting width: 0.8mm
- Cutting direction: down
- Lubrication: Dry Until tool melts

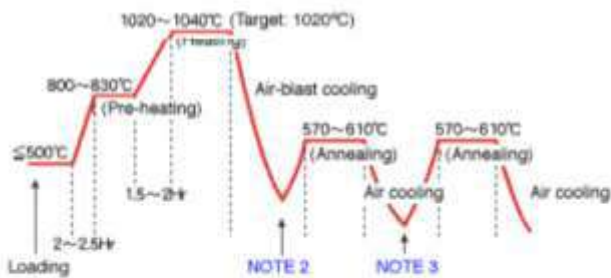
Relationship between cutting speed and tool life



Cutting speed (80 m/min.)

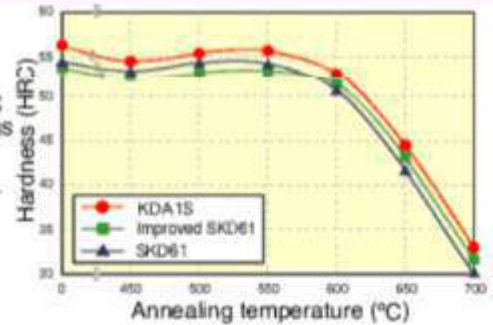


## Thermal processing characteristics



Test conditions

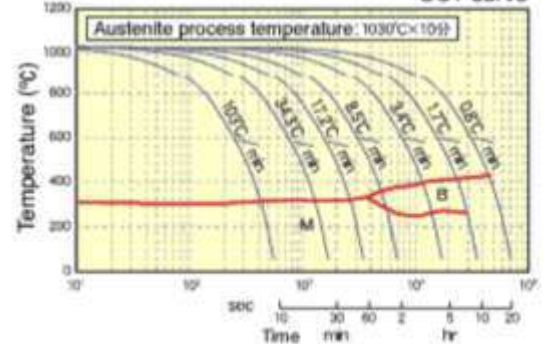
- Test-piece dimensions
- Hardening: 1030°C (Cooling with N2 gas (Vacuum furnace))
- Annealing: Keeping for 1 hour (performed once)



**NOTE 1:** Cool the anneal-heated products forcibly with N2 gas or air until the die temperature decreases to between 100°C-150°C. Load the products into the annealing furnace at the furnace temperature below 300°C. (Observe this procedure for the first annealing.)

**NOTE 2:** Be sure to execute annealing two or more times. Execute additional annealing if the hardness is too high after the second annealing.

CCT curve





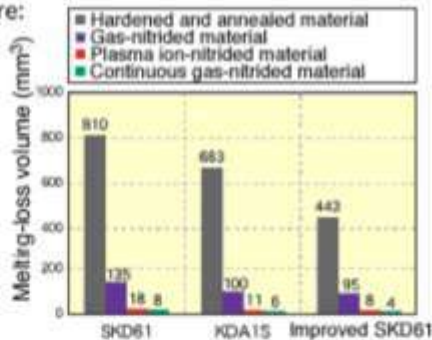
## KDA1S

### Melting-loss resistance

The KDA1S features superior melting-loss resistance to the SKD61, which is remarkably improved by surface treatment.

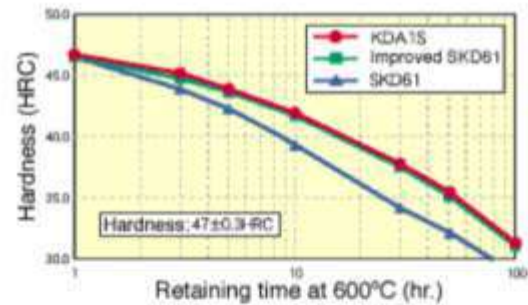
Test conditions

- Test piece:  $47 \pm 0.9$  HRC
- Al alloy: ADC12
- Melting temperature: 700°C
- Revolution: 500rpm
- Test time: 20min



### Heat-softening resistance

The KDA1S features superior heat-softening resistance to the SKD61.



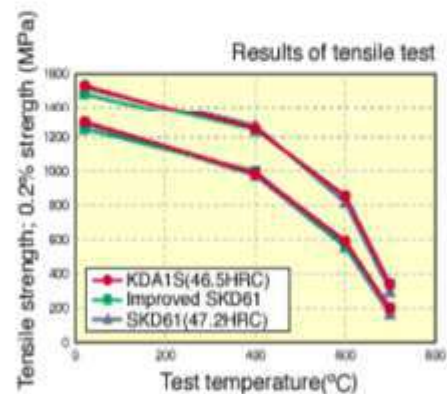
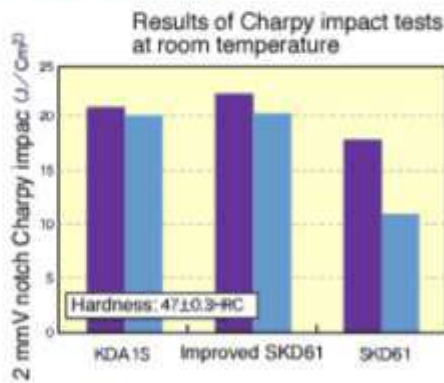
### Strength and tenacity

The KDA1S features superior tenacity to the SKD61.

Results of Charpy impact tests at room temperature

Test conditions

- Material dimensions: 120 x 250 x L, center



### Physical properties

The KDA1S features superior tenacity to the SKD61. Results of Charpy impact tests at room temperature.

■ Thermal expansion factor ( $\times 10^{-6} / ^\circ\text{C}$ )

Temperature / °C	KDA1S	Improved SKD61	SKD61
100	8.84	9.01	8.67
200	10.31	10.35	11.11
300	11.15	11.12	11.92
400	11.88	11.78	12.54
500	12.44	12.35	13.10
600	12.90	12.85	13.61
700	13.17	13.11	13.91

■ Thermal conductivity (cal/cmsec.°C)

Temperature / °C	KDA1S	Improved SKD61	SKD61
30	0.062	0.069	0.059
200	0.077	0.078	0.069
400	0.075	0.079	0.068
450	0.076	0.078	0.068
600	0.075	0.076	0.068
700	0.073	(0.075)	(0.067)
800	(0.071)	0.074	0.066

# OUR PRESENCE



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