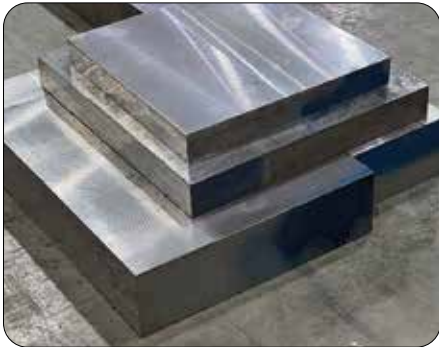


DC53 ★



Medium Chrome Tool Steel



DC53 FEATURES

- Uniform distribution of fine carbides
- Excellent galling and wear resistance
- Exceptional toughness and fatigue resistance
- High temper resistance to support PVD and Nitride surface treatments
- Machining and grinding characteristics superior to most other tool steels
- Rounds from 1/4" diameter up to 20" diameter
- Flats from 1/2" to 12" thick & widths up to 24" wide

DC53 APPLICATIONS

- | | | |
|--------------------|-----------------------|-------------------------|
| • Punches | • Shear Blades | • Cold Heading Dies |
| • Dies | • Shredder Knives | • Mill Rolls & Slitters |
| • Draw & Form Dies | • Thread & Form Rolls | |



Alro Steel
Metals & Plastics

alro.com

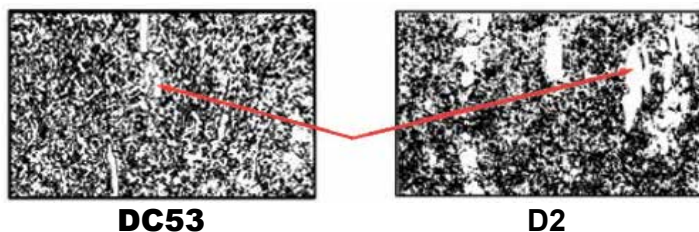


DC53 INTRODUCTION

DC53 is a general purpose cold work tool steel with exceptional Toughness, Wear Resistance, Compressive Strength and Temper Resistance. These properties are obtained through its chemistry as well as its unique manufacturing process of ladle refinement, vacuum degassing and forging methods. **DC53** also has excellent machining characteristics and is well suited as a substrate for PVD surface treatments. **DC53** can also be hot process CVD and TD (Thermal Diffusion) coated, however post heat treat is generally recommended.

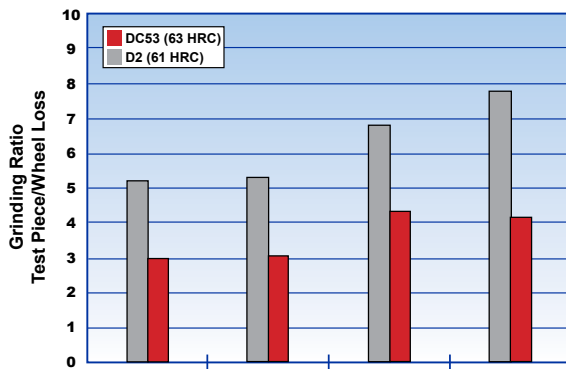
Primary Carbides

Primary Carbides in **DC53** are relatively small with highly uniform distribution as compared to other tool steel grades such as D2. This helps to provide **DC53** with it's superior toughness and fatigue resistances.



Grinding

DC53 can typically be machined 20% to 40% faster than D2 while experiencing as much as 50% less tool wear and breakdown. Faster feeds and speeds reduce machining cost and yield an improved surface finish.

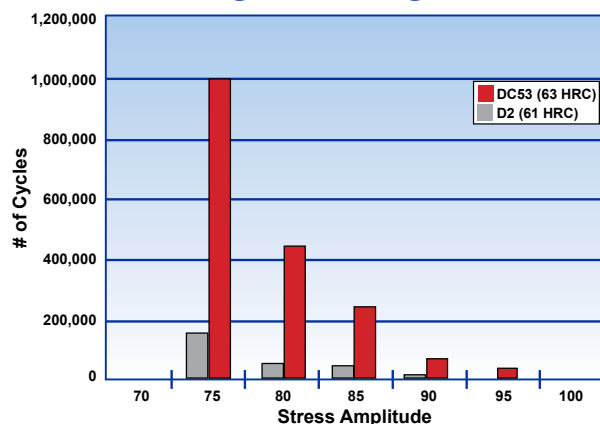


Grinding Frequency (Time)	20	10	35	40
Cut Depth (u/Time)	5	5	10	10
Circum. Velocity (m/min)	6.9	10.4	6.9	10.4
Table Feed (mm/min)	1,300	1,300	2,600	2,600

Chemical Composition %

C	Si	Mn	Cr	Mo	V
.95	1.0	0.4	8.0	2.0	0.3
Annealed Hardness (BHN)				210 - 225	
Specific Gravity (g/cm ³)				7.76	
Density (lb./Inch ³)				.2793	
Young's Modulus (E)				21,700	
Modulus of Rigidity (G)				8,480	
Poisson's Ratio				28	

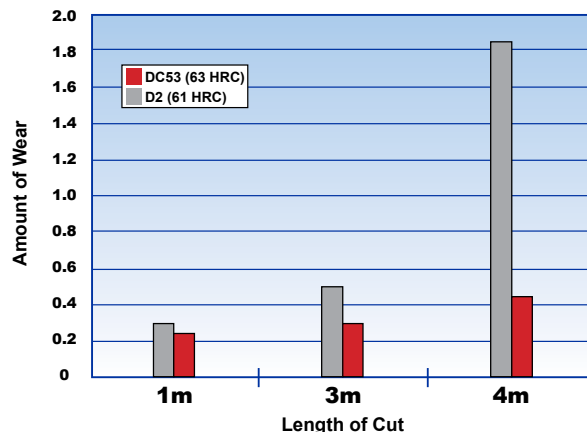
Fatigue Strength



Machining

Cutting Speeds for DC53 in Surface Feet per Minute

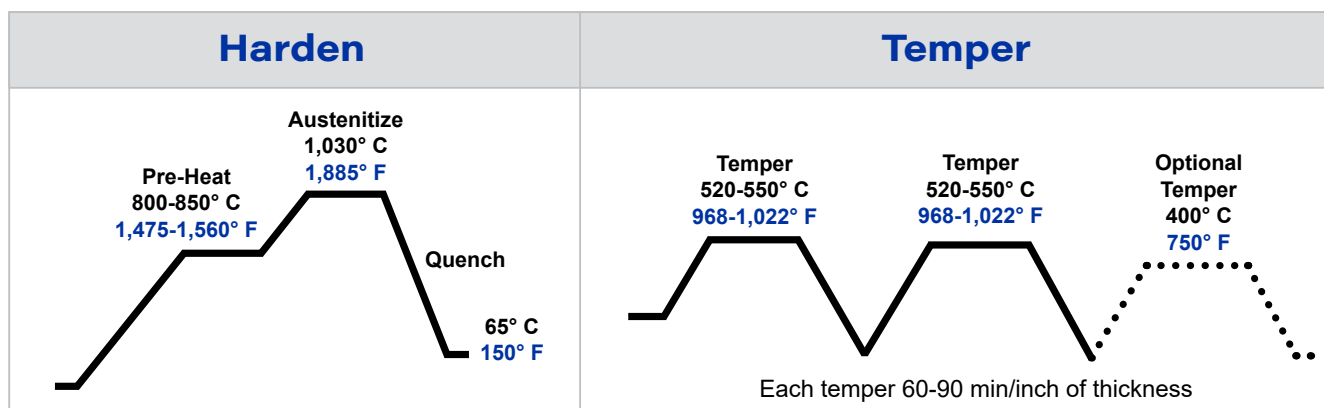
Operation	HSS Tools	Carbide Tools
Turning	70 SFM	235 SFM
Drilling	50 SFM	150 SFM
Milling	55 SFM	195 SFM



HEAT TREATMENT

Austenize	Double High Temperature Draw*	
1,030° C 1,885° F	520° C 968° F	HRC 62/64
	540° C 1,004° F	HRC 60/62
	550° C 1,022° F	HRC 58/60

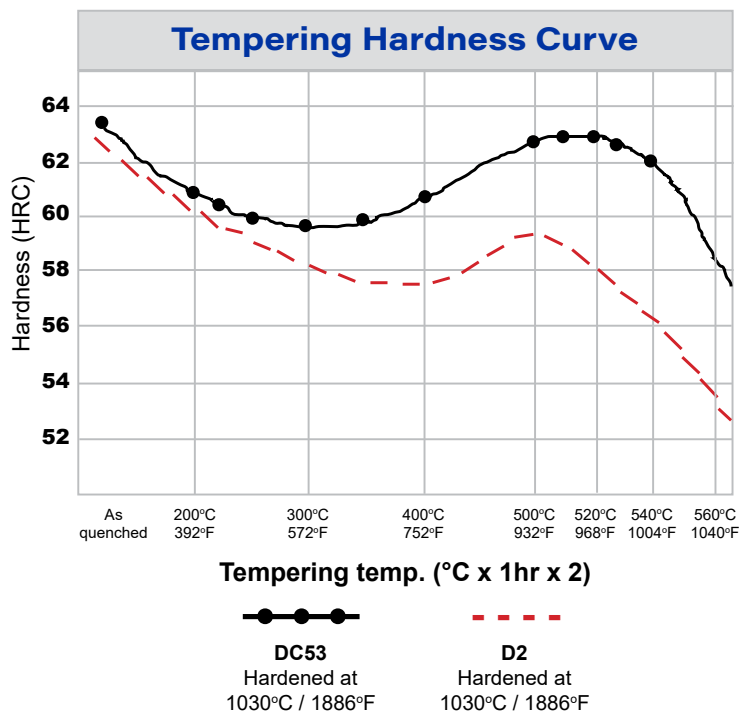
* Material growth .10% to .15% (.0010" to .0015" per inch). An optional third temper recommended for intricate high precision components requiring EDM work or PVD coatings.



Vacuum Austenitize	
Dia./Thickness	Heating Time (min.)
4" (100mm) & Under	20-30 min./inch of thickness
over 4" (100mm)	10-20 min./inch of thickness

2 bar quench pressure recommended

Salt Bath Austenitize	
Dia./Thickness	Immersing Time (min.)
1/4" (6 mm)	5 - 8 minutes
1/2" (12 mm)	8 - 10 minutes
3/4" (18 mm)	10 - 15 minutes
1-1/2" (36 mm)	15 - 20 minutes
2" (48 mm)	20 - 25 minutes
4" (96 mm)	30 - 40 minutes



TOOL STEEL APPLICATIONS

Application				
Blanking dies for Ni based alloy materials used for medium scale production of television components.				
Results				
Working	Material Worked	Conventional Die Steel	DC53	Aprox. Dimensions
Cold Pressing	Ni-based Alloy 0.2mm Thick	D2 (HRC 58/59) Tempered at 510° C	HRC 62/63 Tempered at 520° C	35 mm x 100 mm 250 mm
Evaluation	---	5,000 Hits	25,000 Hits	400% Increase
Conclusions				
Durability: The worked material is tough and the chipping and seizing of die edge were problematic.				
Effect of DC53: High temperature tempering and high hardness are important in preventing seizing and extending the life of die edges.				

Application				
This type of die is commonly used; surface hardness treatment is applied depending upon the material worked and finishing preciseness required.				
Results				
Working	Material Worked	Conventional Die Steel	DC53	Aprox. Dimensions
Trimming	5140 HRC 23 16 mm Dia.	M2 High Speed Steel; HRC 60 CVD-Treated	HRC 62/63 Tempered at 520° C CVD-Treated	48 mm Dia. x 35 mm Long
Evaluation	---	11,000 Hits	42,000 Hits	281% Increase
Conclusions				
Durability: Chipping of the cutting-edge and insufficient base hardness of the die led to termination of life.				
Effect of DC53: In order to increase the effectiveness of surface treatment, higher base hardness of the die should be considered; the high hardness of DC53 proved effective.				

Application				
Blanking and forming of cold-worked bearing races.				
Results				
Working	Material Worked	Conventional Die Steel	DC53	Aprox. Dimensions
Cold Pressing	Cold Rolled Steel 1.2 mm Thick Not Coated	D2 (HRC 58/60) Tempered at 510° C	HRC 62/63 Tempered at 520° C	80 mm Dia x 100 mm Long 250 mm
Evaluation	---	220,000 Hits	380,000 Hits	72% Increase
Conclusions				
Durability: Wear (Galling) of inner die surface and edge chipping affected durability.				
Effect of DC53: High hardness and high toughness of DC53 when tempered at high temperature greatly improved durability.				

Application				
FB punches hook-shaped electric appliance components; its long, thin shape provides severe conditions.				
Results				
Working	Material Worked	Conventional Die Steel	DC53	Aprox. Dimensions
Fine Blanking	HR 1045 HRB 80 1.5 mm Thick	D2 (HRC 56) Tempered at 530° C	HRC 60 Tempered at 550° C	70 mm Dia. x 110 mm Lg.
Evaluation	---	1,600 Hits	3,900 Hits	143% Increase
Conclusions				
Durability: Cracking and fracturing occurred at the tip of the long, thin shape resulting in a shortened life.				
Effect of DC53: Because of DC53's excellent toughness, hardness could be increased, resulting in more than double the life.				

Here is what our customer's are saying:

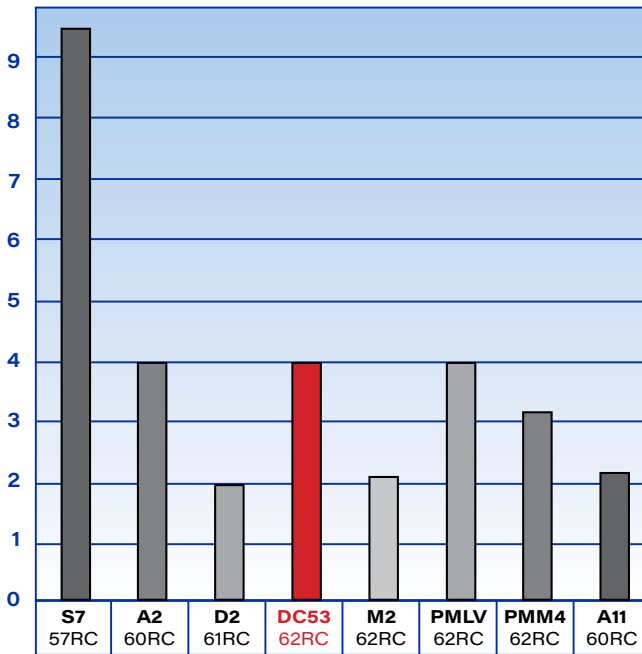
"The key to the project was selecting the right tool steel to get a successful draw. Given the rigors of the stainless steel Class A surface application, a stronger material was required. We chose DC53 and have experienced an increase in tool life by a factor of three compared to traditional draw tooling."

"With DC53 we are able to offer our customer's a better performing steel while decreasing our production costs, definitely a win-win situation."

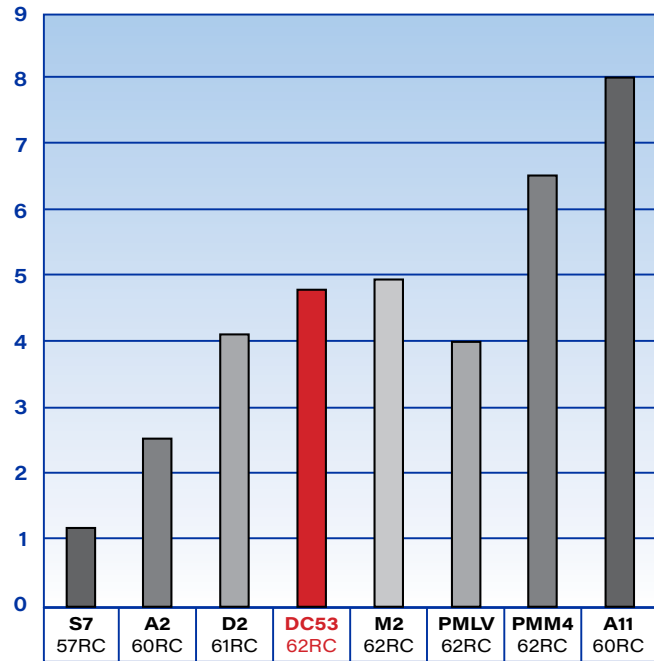
Alro Steel is the authorized distributor of DC53 for  Daido Steel Co. Ltd.

CHARACTERISTICS

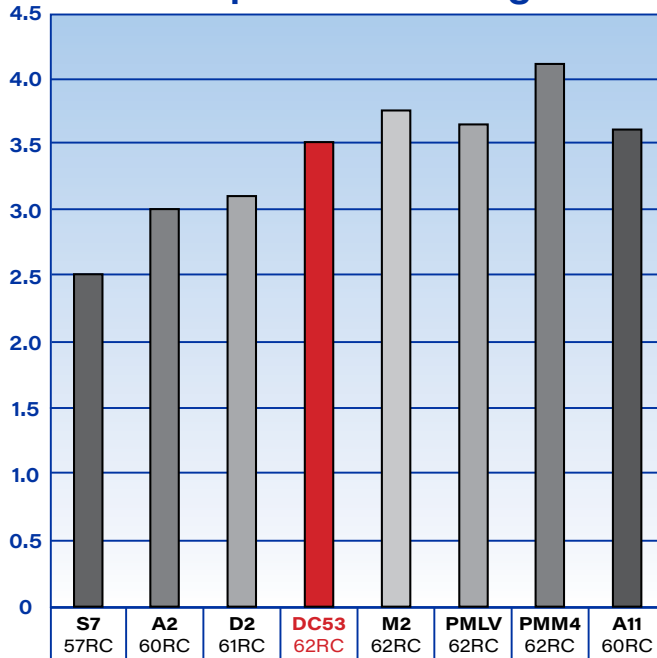
Toughness



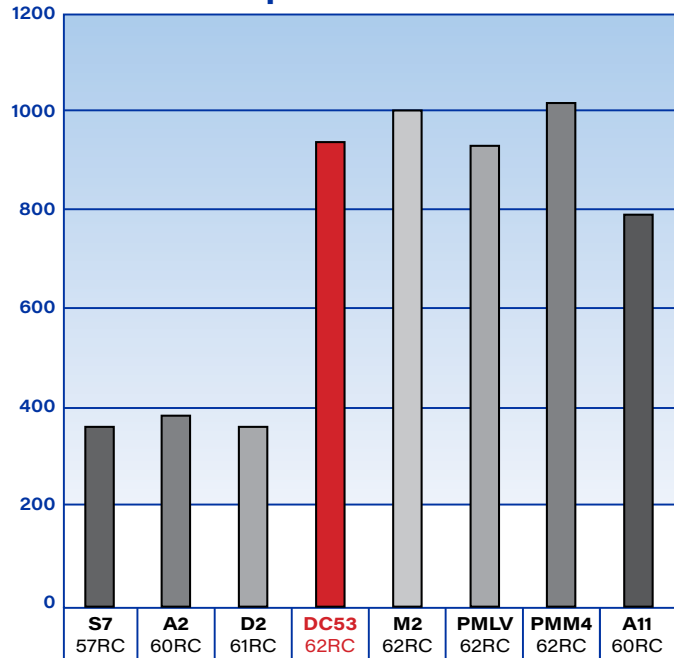
Wear Resistance



Compressive Strength



Temper Resistance



Daido Steel Co. Ltd. and Alro Steel shall not be held responsible for damage caused by misunderstanding or improper use of the technical information contained in this brochure. The contents of this brochure may be subject to change without notice. Please inquire for the latest information. No portion of this brochure may be reproduced without the express permission of Daido Steel Co. Ltd. and Alro Steel, Inc. DC53® is a registered trademark of Daido Steel Co. Ltd.



Alro Steel
Metals & Plastics



Alro Locations



● **Metals** ● **Plastics** ● **Outlet Stores**

Alro Steel was founded in 1948 by brothers Al and Robert Glick in Jackson, Michigan. The company is a distributor of metals and plastics. Alro is focused on offering cut-to-size metals and plastics with next day delivery to over 50,000 customers in North America. Alro operates over 80 locations in 16 states and provides a broad inventory of products under the following companies: Alro Steel, Alro Metals, Alro Metals Outlet, and Alro Plastics. Focused on exceeding our customers' expectations, we build relationships with all our customers, large and small. [To learn more, please visit alro.com.](http://alro.com)

Over 80 Locations in 16 States!

Florida	Michigan	Pennsylvania
Illinois	Missouri	Tennessee
Indiana	New York	Virginia
Iowa	North Carolina	Wisconsin
Kentucky	Ohio	
Maryland	Oklahoma	



Pictured, the Alro Steel facility in Pottsville, Michigan



Metals	Bar	Pipe & Tube	Plate & Sheet	Structural	Grating & Exp. Metal
Alloy	●	●	●		
Aluminum	●	●	●	●	●
Brass	●		●		
Bronze	●	●			
Carbon Steel	●	●	●	●	●
Cast Iron	●	●			
Copper	●	●	●		
Stainless Steel	●	●	●	●	●
Tool Steel	●		●		

e-Business Solutions

- Alro Online Store (MyAlro.com)
- Customized Summary Billing
- Tool Management Solutions
- B2B Transactions

Ask your Alro Representative for details!



Alro Steel

Metals & Plastics

Since 1948

