Reduce Your Machining Costs with New Dura-Bar Plus

Dura-Bar products have always been considered the most machinable cast iron due to strict control of the process variables that govern continuous casting. Recently, extensive tool life tests by independent machine shops and the University of Alabama, Birmingham have been used to establish even tighter control limits on the continuous casting process. The result is new and improved Dura-Bar Plus.

Dura-Bar Plus is engineered iron designed to meet out customer's most critical requirements. It is manufactured to strict process controls that give you world-class quality and uncompromising consistency.

By using Dura-Bar Plus, you will be able to increase your profit margins by machining more parts per hour, thereby decreasing cycle time and increasing profitability. With Dura-Bar Plus, you also will be able to:

- Optimize your machining speeds and feeds;
- Lower your tooling costs;
- Decrease downtime for tooling changes; and
- Reduce scrap

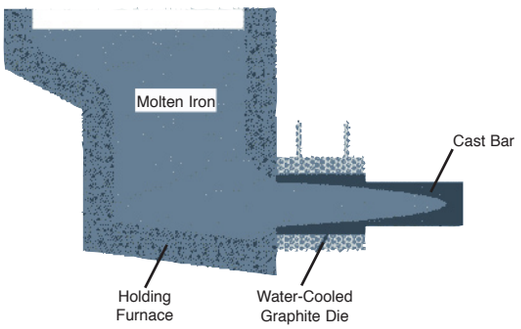
In addition, the wide range of sizes and immediate availability of Dura-Bar products eliminate the need for expensive patterns and costly inventories. Together, it all adds up to a lower cost per part.

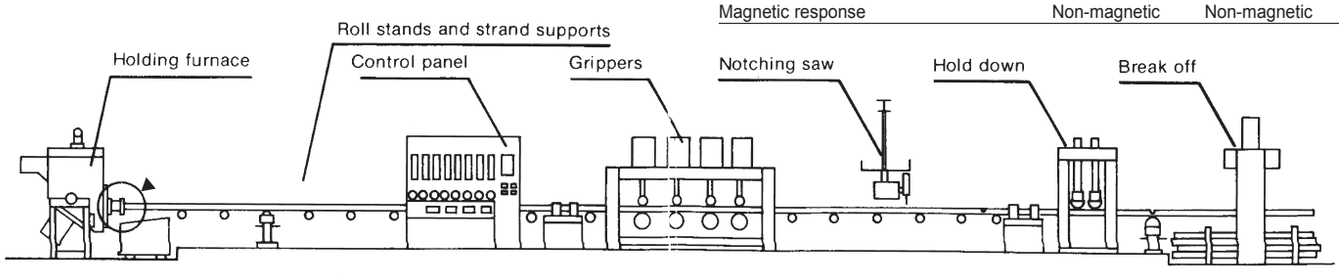
Dura-Bar Plus is only available in G2 gray iron and in 65-45-12, 80-55-06, and 100,-70-02 ductile irons.

A Commitment to Quality

Dura-Bar is a QS-9000 Registered company committed to quality. We maintain our position as industry leader by producing the most consistently reliable, highest quality bars and tubes. As such, our new Dura-Bar Plus products are sold with a Zero-Defect Guarantee against foundry defects. (For more information about the Zero-Defect guarantee, go to the Dura-Bar web site at www.dura-bar.com.)

The Continuous Casting Process





DURA-BAR®

Gray Iron

The close grain, dense iron permits precision machining at optimum speeds. Uniform hardness helps produce a consistent end product.

Mechanical Properties (Typical)

Type	G1A*	G1	G2 Plus
Tensile strength psi**	30,000	35,000	40,000
Compressive strength psi	120,000	120,000	120,000
Transverse strength psi	35,000	60,000	65,000
Deflection (inches)	n/a	0.20-0.34	0.25-0.34
Graphite	Type D	Type A size 4 or smaller Type A size 6 or smaller	
Modulus of elasticity (million psi)	n/a	17	18
Heat-treat response (quench hardness) matrix***	n/a	Rc 55 min	Rc 55 min
Hardness (BHN) midradius	143-229	143-235	207-241
Microstructure	High Ferritic	Partially Pearlitic	Highly Pearlitic

Ductile Iron

Ductile Iron combines high strength, ductility, toughness, and hardenability with the processing advantages of cast iron.

Mechanical Properties (Typical)

Type	65-45-12 Plus	80-55-06 Plus	100-70-02 Plus
Tensile strength psi	65,000	80,000	100,000
Yield strength psi	45,000	55,000	70,000
Elongation %*	12	6	2
Hardness (BHN) midradius	131-180	187-241	241-302
Modulus of elasticity (million psi)	23-26	23-26	23-26
Heat-treat response	Rc 55 min	Rc 55 min	Rc 55 min
Hardness (BHN) midradius	143-229	143-235	207-241
Microstructure	ferritic (min. 75% ferrite)	partially pearlitic (approx 50% pearlite)	pearlitic (min. 75% pearlite)

* In bars under 2.0" diameter, elongation will be slightly less.

Ni-Resist

This austenitic material resists corrosion, erosion, oxidation, and operational wear. It has low temperature stability and is heat resistant.

Mechanical Properties (Typical)

Type	1	2
Tensile strength psi	25,000	25,000
Compressive strength psi	100,000	100,000
Hardness (BHN) midradius	131-183	118-174
Modulus of elasticity (psi x 10^6 at 25% of tensile)	12.0-14.0	15.0-16.2
Thermal expansion (70˚-400˚F millionths per ˚F)	10.7	10.4
Magnetic response	Non-magnetic	Non-magnetic

Austempered Ductile Iron

Ductile iron can be heat-treated to enhance wear resistance and mechanical properties. The standard methods of heat-treating include quench and temper, induction, and flame hardening. In each of these methods the matrix is transformed to martensite, which will be stronger and more wear resistant than either pearlite or ferrite.

Another method of heat-treating involves heating the part to obtain austenite and then quenching it above the martensite start temperature but below the pearlite transformation temperature, and holding the part at this temperature for a time that is sufficient to produce an ausferrite matrix. This process is called austempering, and parts that have been heat-treated in this manner are commonly referred to as austempered ductile iron, or ADI. Austempered ductile iron parts have high impact properties, excellent wear resistance, and higher tensile strengths than parts that have been quench and tempered.

Any grade of ductile iron can be austempered but it is sometimes necessary to add nickel and copper to produce the desired microstructure in parts that have heavy sections (greater than 2").

The table below contains the expected minimum properties of ADI.

Standard ADI Grades

Grade	Tensile Strength (MPa)	(KSI)	Yield Strength (MPa)	(KSI)	Elongation %	Impact Energy* (J)	(ft-lbs)	Typical Hardness BHN/(B.I.D.)
1	850	124	550	80	10	100	74	269 - 321 (3.4 - 3.7)
2	1,050	153	750	109	7	80	59	302 - 363 (3.2 - 3.5)
3	1,200	175	900	131	4	60	45	341 - 444 (2.9 - 3.3
4	1,400	204	1,100	160	1	---		388 - 477 (2.8 - 2.9)
5	1,600	233	1,300	189	---	---		444 - 555 (2.6 - 2.9)

* Tested at 22˚C +/- 7˚C

Dura-Bar Sizes and Shapes

Dura-Bar products are produced in a wide range of sizes, shapes, and lengths.

Rounds		Tubes	
Nominal Diameter *	Increments Available	Inside Diameter	Outside Diameter
0.625" - 4.000"	0.125"	1.500" - 7.000"	2.250 - 16.000"
4.250 - 11.000"	0.250"		
11.500 - 15.000"	0.500"		
16.000 - 20.000"	1.000"		

*As-cast Dura-Bar will finish at the size specified with minimum stock removal. Centerless ground bars are available up to 6.000" diameter.

Rectangles and Squares

Rectangular sizes up to 18.500" thick and 22.000" wide are available. Standard square sizes range from 1.250" to 12.250".

Special Profiles

Half-rounds, quarter-rounds, and other shapes are quoted on request.

Immediate Shipment

Dura-Bar is more than just a product -- it's a service. We will cut bars and tubes to any specifications or lengths and ship them immediately. We maintain a large inventory of bars and tubes in a wide range of sizes and shapes, eliminating the need for you to hold a costly inventory of parts or castings. Call Industrial Tube & Steel for more information on how Dura-Bar products will increase your machining productivity.

Typical Applications for Dura-Bar

• Bearings • Bushings • Cams • Conveyor Guide Rollers •

• Couplings Cylinders • Dies • Gears • Pistons • Pulleys • Rams •

• Rotors • Seal Rings • Shafts • Sprockets • Valve Bodies Valve Guides •

• Gibs • Ways • Collets • Sleeves • Rolls •