

DURA-BAR INTRODUCES SOLUTION STRENGTHENED DUCTILE IRON

NEW ALLOY HAS IMPROVED STRENGTH AND DUCTILITY

BY BRENT HAIGHT



With improved strength and ductility, SSDI is an alternative to 1045 steel, which is used in a wide variety of oil and gas and fluid power applications.

Charter Dura-Bar has introduced a new ductile iron grade to its portfolio of continuous cast iron bar stock, Solution Strengthened Ductile Iron (SSDI). One of the key features of SSDI is its enhanced machinability due to the addition of silicon. According to Jason Parr, product manager at Dura-Bar, machining trials have yielded productivity increases of approximately 30% with no negative impact in tool wear.

“Solution Strengthened Ductile Iron is a metallurgical term that has been adopted by the producers of ductile iron and is gaining increased interest from numerous customers for a variety of applications,” said Parr. “The Dura-Bar SSDI has a minimum tensile strength of 75,000 psi (5171 bar), a minimum yield strength of 55,000 psi (3792 bar), and a minimum elongation of 15%. SSDI also boasts a tightened Brinell Hard-

Mechanical Properties	SSDI (minimum)	1045 Steel (typical)
Tensile strength (psi/bar)	75,000/5171	81,900/5646
Yield strength (psi/bar)	55,000/3792	45,000/3102
Elongation (%)	15	16
Average Brinell Hardness	198	163
Ultimate shear strength (psi/bar)	67,500/4653	61,400/4233
Fatigue strength (psi/bar)	42,000/2895	41,000/2826

ness (BHN) for consistency throughout the material compared to other similar ductile iron alloys. Initial tests show the wear rate of SSDI is approximately 30% lower than that of 1045 carbon steel.”

“SSDI can be heat-treated, thus increasing the overall Brinell Hardness”

Headquartered in Woodstock, Illinois, USA, Charter Dura-Bar manufactures Dura-Bar continuous cast iron bar stock, an alternative to steel, aluminum, and castings. Dura-Bar iron stock is available in a wide variety of sizes and shapes in all standard ASTM A48 and ASTM A536 gray and ductile iron grades.

SSDI is initially available in 1- to 9-in. (25.4 x 228.6-mm) rounds, 3.25 x 3.75-in. (82.55 x 2096.77-mm) squares, and 6.25 x 7.25-in. (158.75 x 184.15-mm) rectangles.

“SSDI slots between two of Dura-Bar’s existing grades of ductile iron, 65-45-12 and 80-55-06,” said Parr. “It exhibits improved machinability and is comparable to Dura-Bar 65-45-12 but with elevated tensile and yield strengths. The development of SSDI has been driven primarily through customer demand. Customers wanted a consistent hardness range for improved machinability without a loss in strength.”

According to Parr, SSDI has a ferritic matrix with small amounts of pearlite (less than the Dura-Bar 65-45-12

stock). The microstructure is “forced” to be ferritic by the heavy addition of silicon (aka solution strengthening). “With the addition of silicon, one of the greatest benefits is enhanced machinability and less tool wear, thus increased savings,” said Parr. “Without the added silicon, the strength will be similar to the Dura-Bar 65-45-12, which has a ferritic matrix structure with small amounts of pearlite. It has a matrix structure and properties similar to several low-carbon grades. Due to its composition, preliminary results show that SSDI can be heat-treated, thus increasing the overall Brinell Hardness (BHN) range to 255-331.”

SSDI can be used in several industries including fluid power as well as oil and gas. Applications in fluid power include, but are not limited to, rotors used in air compressors, hydraulic manifolds, and cylinders, as well as plug valve inserts and crossheads in the oil and gas industry.

“With improved strength and ductility, SSDI is an excellent alternative to 1045 steel, which is used in a wide variety of fluid power and oil and gas applications,” said Parr. 