



## Higher Performance Alloys Improve Results for Connecting Rods and Bearings

Bowman International (Bowman) and Materion Corporation (Materion) have teamed up to offer two innovative alloy solutions that meet the demands for lighter, more efficient parts for high performance racing and automotive applications – SupremeEX<sup>®</sup> connecting rods and BowMet<sup>®</sup> bearings made of ToughMet<sup>®</sup> alloy.

### SupremEX Connecting Rods

Materion has developed a unique, lightweight connecting rod that is made from **SupremEX<sup>®</sup>**, an aluminum composite.

**These new connecting rods are 65 percent lighter than steel, have lower friction, and resist wear better than other materials.**

### Switch to SupremEX

SupremEX is an optimal solution for replacing steel or titanium while providing higher material performance than industry standard aluminum alloys.

Typically, connecting rods are manufactured from cast or forged steel alloys or titanium. Aluminum has been used in some instances, but its low modulus, low fatigue strength and high coefficient of thermal expansion limit the applications where it can be used successfully.

The high performance and commercial automotive market has been searching for lightweight connecting rods to meet growing demands for more power and efficiency. SupremeEx connecting rods meet those needs.



### What is SupremEX?

SupremEX is a family of high performance metal matrix composites (MMC) made up of aluminum alloys and nano-to micron-sized ceramic reinforcements. The ratio of the metal and reinforcement can be varied to alter physical and mechanical properties, along with manufacturability.

MMC products are manufactured by high energy mixing, to create a very fine-grained, homogenous powder which can be consolidated through several methods.

Con rods can be supplied machined and fitted with the gudgeon pin and big end bearings in metric or imperial sizes.

### BowMet Bearings

Bowman and Materion have developed BowMet bearings, a product line made of Materion's high performance ToughMet 3 alloy.

**ToughMet 3 carries more load and lasts longer than other materials typically used for connecting rod bearings, with no appreciable increase in friction.**

### Switch to BowMet

Previously, thin-walled bearings made of ToughMet had to be custom ordered and machined from solid bar or thick walled tube. In that process, up to 75 percent of the material could be wasted, making ToughMet less cost-effective in applications traditionally served by wrapped bearings.

Together, Bowman and Materion developed a method to wrap thin sheets of ToughMet into BowMet bearings, minimizing scrap losses and reducing production costs.

Bowman offers BowMet in a range of standard catalog sizes, providing added simplicity, especially for smaller quantity orders. Both metric and imperial sizes are available.



Metric Bearing Data		Imperial Bearing Data	
Static load	820 N/mm <sup>2</sup>	Static load	120,000 Lbs/inch <sup>2</sup>
Dynamic load	340 N/mm <sup>2</sup>	Dynamic load	50,000 Lbs/inch <sup>2</sup>
*Max sliding speed	3 m/s dry 10 m/s oiled	*Max sliding speed	10 ft/s dry 33 ft/s oiled
Operating temp	-250°C to + 300°C	Operating temp	-420°F to +570°F
Thermal conductivity	38 W/MK	Thermal conductivity	22 BTU/Ft HR°
Coefficient of friction	0.25 dry 0.04 oiled	Coefficient of friction	0.25 dry 0.04 oiled
Recommended shaft finish	Ra≤ 0.4um (N5)	Recommended shaft finish	16 μinch
Recommended shaft hardness	HRC60	Recommended shaft hardness	HRC60
PV value	9.6 MPa-m/s	PV value	275,000 Psi-ft/min
Hardness	HRC30	Hardness	HRC30

\*Higher speeds can be achieved with hydrodynamic lubrication Errors and Omissions Excepted

### Combine SupremEX and BowMet

Users have been able to decrease connecting rod weight by combining SupremEX con-rods with BowMet bearings. The added strength of SupremEX allows for a reduced rod cross section. The smaller cross section does result in a higher bearing pressure, but this is easily accommodated by BowMet bearings.

The combination gives users the lightweight characteristics of the aluminum composite with a low friction and highly wear resistant bearing for robust, improved operation.

For information about **ToughMet:**

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