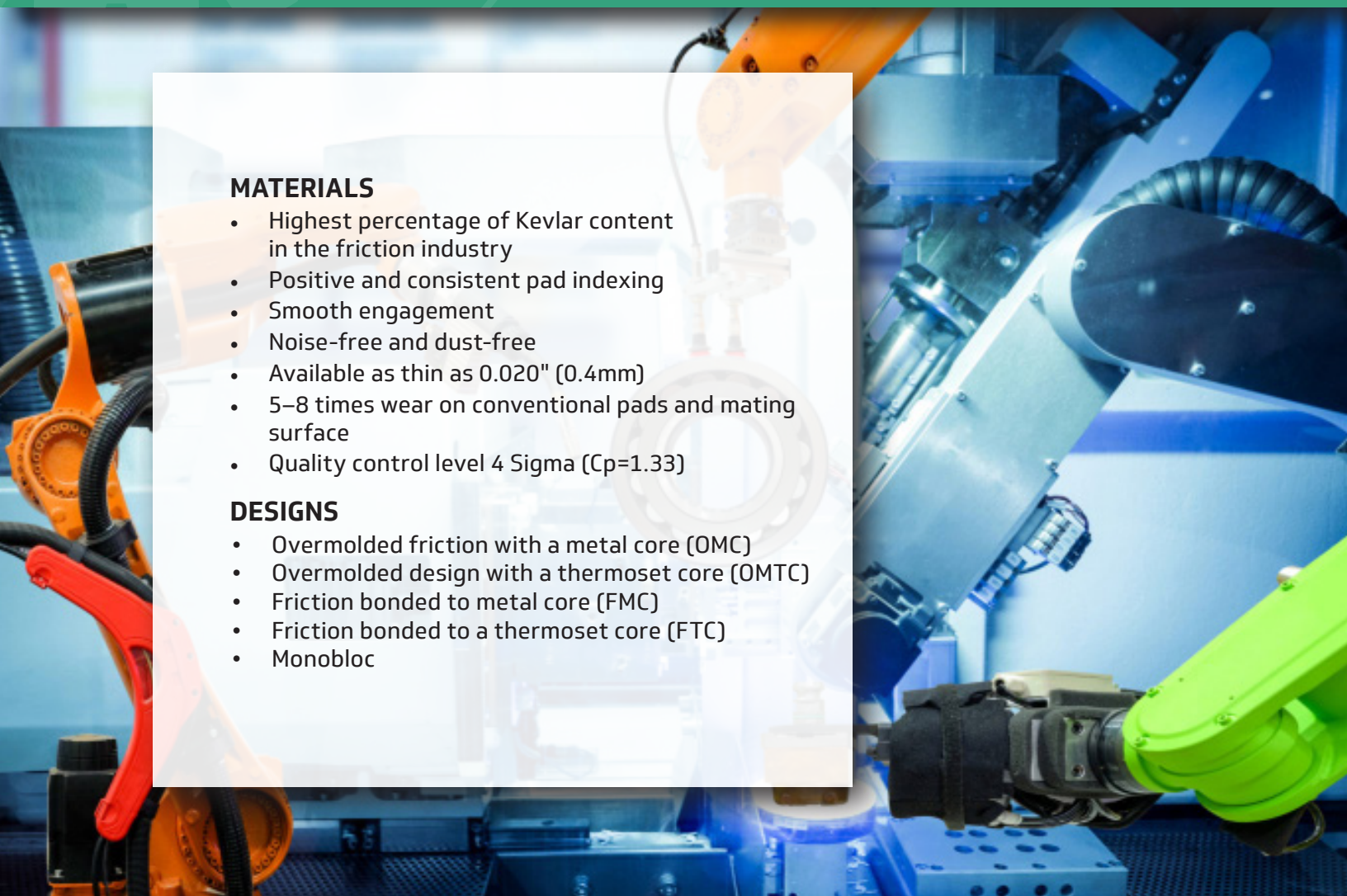
ProTec
FRICTION GROUP

# Advanced Brake Materials & Designs for Robotics

## Precision, Performance & Prolonged Life

**ProTec has extensive experience developing and delivering high-tech friction parts for robotic brakes and clutches for medical, industrial, aerospace, and consumer applications.**

Custom ProTec friction materials are formulated for use with the special designs currently in use by the robotics industry. ProTec's ability to supply includes bulk friction material, friction products made to print or composite components with unique characteristics.

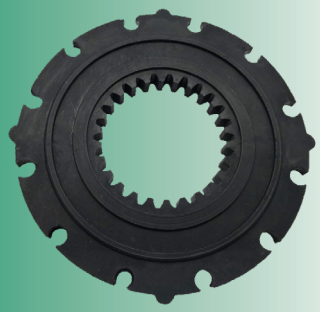


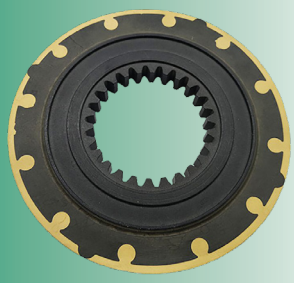
### MATERIALS

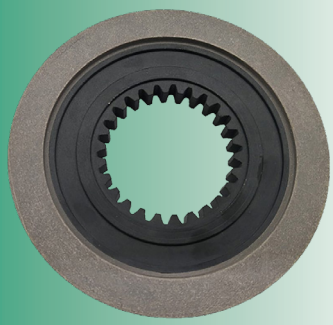
- Highest percentage of Kevlar content in the friction industry
- Positive and consistent pad indexing
- Smooth engagement
- Noise-free and dust-free
- Available as thin as 0.020" (0.4mm)
- 5–8 times wear on conventional pads and mating surface
- Quality control level 4 Sigma (Cp=1.33)

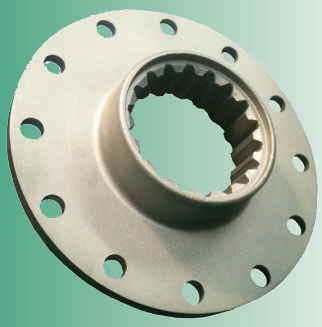
### DESIGNS

- Overmolded friction with a metal core (OMC)
- Overmolded design with a thermoset core (OMTC)
- Friction bonded to metal core (FMC)
- Friction bonded to a thermoset core (FTC)
- Monobloc









## DESIGNS

**Overmolded friction locked to a metal core** is manufactured by inserting the metal core into a cavity and injecting the friction material at high pressure. The material is mechanically locked to the core while being precision molded to size.

**Overmolded design locked to a thermoset core** is the ultimate precision product. High friction intermediate plate offer the highest OD to torque ratio. In addition its high value technology, the most affordable pricing can be obtained, especially on high volume parts.

**Friction bonded to metal core** is typically made with a machined aluminum or steel disc containing a drive lug configuration with ID/OD friction rings or pucks bonded to either side.

**Friction bonded to a thermoset core** can use the same friction materials as the metal core assembly mentioned above, although the assembly derives an important extra benefit. TF4650BXE cuts wear on the drive lug vs. metal cores and lasts longer on the drive lug fit. Additionally, it reduces vibration tendencies, cutting weight (inertia), and slides easier on the lug giving quick, clean releases/ engagements of the brake assembly.

**Monobloc Designs** are made entirely of a simple friction material.

## MATERIALS

• **TF202AF** is formulated to be injectable while providing the needs of robotic braking with smooth operation, long life and quiet engagements. It is a precision molded ring with stable friction performance.

• **TF4650BXE** is a resin material molded over a metal core. Nonmetallics provide excellent conditioning of the mating members in addition to smooth and quiet characteristics. TF4560BXE is a high-strength, high-friction material used both as a coreplate, as well as an intermediate separator plate (in multiplate units) and/or as a monobloc single friction disc.

• **TF1600MC** is 80% Kevlar with high friction and outstanding durability of itself and of its mating member. It is also known for smooth, quiet operation, with no wear debris/dust, and is available in thicknesses as thin as 0.5mm (0.020”).

• **TF1820** brings consistent heavy duty friction performance characteristics to a bonded assembly as it does in the monobloc form and is available in thicknesses as thin as 3mm. As a pressure molded organic material with exceptional strength, TF1820 offers good wear/engagement, low swell characteristics, as well as, quiet operation.

ISO® 14001 ISO® 9001

Our R&D and production engineers have tailored application-specific materials and design options for electronic precision contol devices.

ProTec FRICTION GROUP

45 Kensico Drive
Mount Kisco, New York 10549 USA
answers@protecfriction.com
www.protecfriction.com
+1-914-244-3600