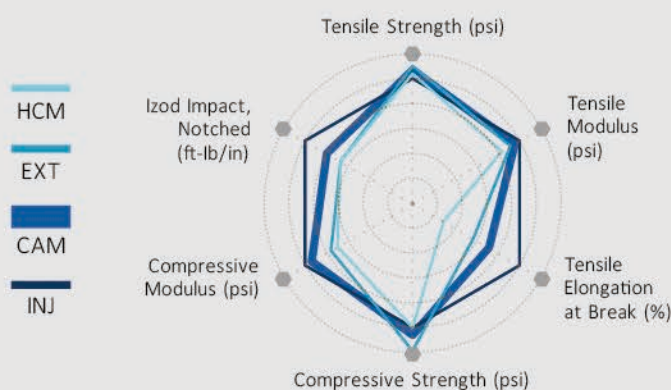


# CENTRIFUGALLY ASSISTED MOLDING

Polymics Ltd. has developed an innovative process and the equipment to manufacture CAM tubes®, currently available in unfilled PEEK. This unique technology allows for longer lengths than injection molding (20"+) and thinner walls (down to .050") than other melt processes. The addition of this 4th technology (with extrusion, compression molding and injection molding already in production) gives Polymics an unmatched breath of stock shape manufacturing for PEEK tubes.

## TYPICAL PROPERTY VARIATIONS BY PROCESS



Based on unfilled PEEK, processed by listed process mentioned in machine direction.

## POLYMICS' STANDARD CAM POLYMERS

PEEK	Unfilled, Glass Reinforced & Other Grades (Under Development)
OTHER POLYMERS	Ultem PEI, Pyramid PPS, PAES
COMPOSITE	CF Reinforced PEEK Composites

Pyramid is a registered trademark of Polymics, Ltd. Celazole is a registered trademark of PBI Performance Products, Inc. Valox and Ultem are registered trademarks of Sabic Innovative Plastics.

## POTENTIAL APPLICATIONS SUMMARY

RIGID CASTINGS	Seal & Ring in Energy Industries Bearing & Bushing Stocks Pipe Section Belting Markets
FLEXIBLE CASTINGS	Equipment: Image Transfer, Banking, Printing, Electronic etc. Food Handling General Power Transmission Pulleys & Splines
OTHER NEW COMPOSITE FORM	

## ADVANTAGES OF POLYMICS CAM

**EXCELLENT MECHANICAL PROPERTIES**  
similar to injection molding

**LONGER LENGTH**  
than IM = better yield

**SMALLER MOQ'S**  
ideal for short runs and prototyping

**THINNER WALLS**  
less machined stress

**LARGER OD'S**  
reduced large part cost

**MORE OPTIONS FOR WALL THICKNESS**  
less waste

**LOWER STRESS**  
inherently but also from less machining

## CENTRIFUGALLY ASSISTED MOLDING



## POLYMICS' STANDARD SIZES / SHAPES

TUBE	Outer Diameters (OD) of 2.0" to 11" in Increments of 0.25" Standard Wall Thicknesses of 0.125," 0.250," 0.375," and 0.500" (Custom Thickness Available) In Outer Diameters (OD) of 3.25" and 5.75," a Wall Thickness of 0.625" Is Also Offered Lengths of 6.0" to 18"
ENDLESS BELTS	Thin Wall Tubes Available as Special Orders



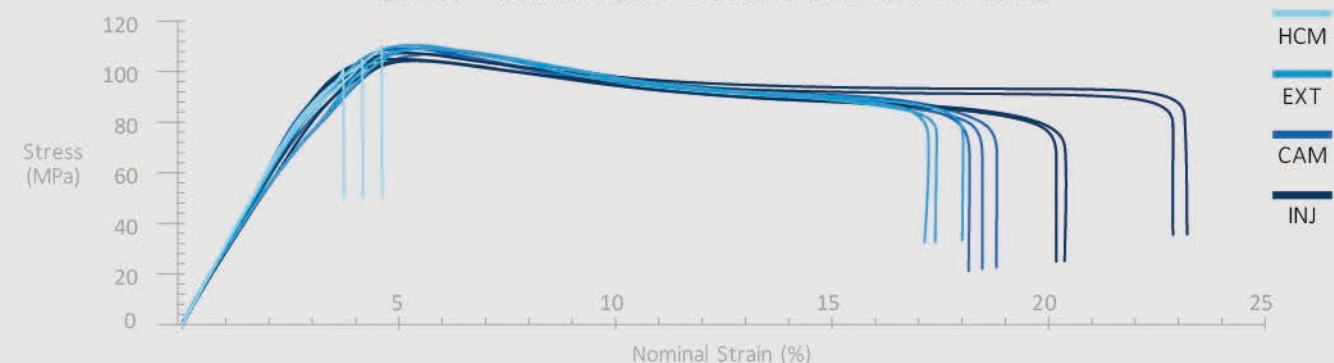
Size and shape capabilities of individual materials may vary. Contact Polymics, Ltd. for details. Custom materials/sizes also available.

## TENSILE PROPERTIES COMPARISON

MOLDING PROCESS	INJ	CAM	EXT	HCM
SUMMARY				
TENSILE STRENGTH AT YIELD (MPa)	105.6	108.2	110.8	105.3
TENSILE STRAIN AT BREAK	20.90%	18.50%	18.05%	4.17%
TENSILE MODULUS AT 1% (MPa)	3012	2885	2970	3128
SUMMARY - RELATIVE PROPERTY				
TENSILE STRENGTH AT YIELD	1.00	1.02	1.05	1.00
TENSILE STRAIN AT BREAK	1.00	0.89	0.86	0.20
TENSILE MODULUS AT 1%	1.00	0.96	0.99	1.04

Uniformity at different location: CAM - Extrusion - Compression - Injection.

## STRESS – NOMINAL STRAIN CURVES OF NEAT PEEK TUBES



## SUMMARY

CAM tubes® provides a low stress feed stock for seal, valve and ring applications with a balanced property that fills in the gap between injection molded and extruded tubes. While our current standard offering is limited to unfilled PEEK, it can be easily adopted in other unfilled polymer systems. Polymics is continuing the development with filled and wear enhanced PEEK grades as well. Look for additions to this product line in 2017 and beyond as Polymics continues with "PEEK and beyond" platform strategy.