

Energy Industry Review

Who we are...

- **The Plastics Family** is a global plastics distribution organization with revenues in excess of \$5 Billion, the largest plastics shape distribution organization globally
- **North American Plastics** is comprised of 15 different companies, all plastics related, with 127 locations primarily focused on N. America, and with revenues in excess of \$1.2 Billion
- **Port Plastics** is our US based distribution company that focuses on supporting mechanical industries, **Semiconductor, Aerospace, Chemical Processing**... We have 11 locations, including Los Angeles, Portland, Phoenix & San Jose which primarily support the Semiconductor industry. We have 4 locations ; including Los Angeles, Dallas, Denver, and Houston which support the Energy industry.
- Our value to the mechanical machine shops is unique:
 - We are a neutral source of expertise with respect to what is available in terms of chemistry, technology, capability cost and capacity
 - We understand the Energy market -- materials, requirements, trends, supply chain...
 - We understand & are proactive in understanding the unique supply chain issues associated with 2021-2022



Our Goal – To do “our” part to help steer the ship thru the icebergs



From my vantage point – 2022 is the potentially the perfect storm
Up to 60% growth matched to an industry that is historically tight in supply

What's Going on in the Resin Shape Market

1. Global resin shortages started with the Texas freeze in February 2021 which resulted in the shut down of many plastic resin & feed stock suppliers for an extended time frame
2. The shut down happened at a time that the economies were beginning to open up & consumer goods orders began to spike: autos, electronics, appliances...
3. Industries such as Automotive & Consumer Goods began to procure large amounts of plastics to insure steady supply chain producing a ripple effect of over demand
4. Supply of resin to shapes manufacturers tends to be lower priority due to low volume / high mix as well as higher viscosity materials required for extrusion
5. Shapes distributors & their customers began placing orders globally at the onset, panic buying for commodity industries ensued, back logs grew & the shape manufacturers
6. Capacity at shapes manufacturers tightened, as the backlog grew, price increases became monthly from all links in the value chain
7. Labor became tight to run 3rd shift at resin converter plants further constricting supply
8. Vendors notifying us that orders need to be placed now for 1 QTR 2022 delivery, expect this issue to compound
9. Then came Hurricane Ida.... (PVC...)



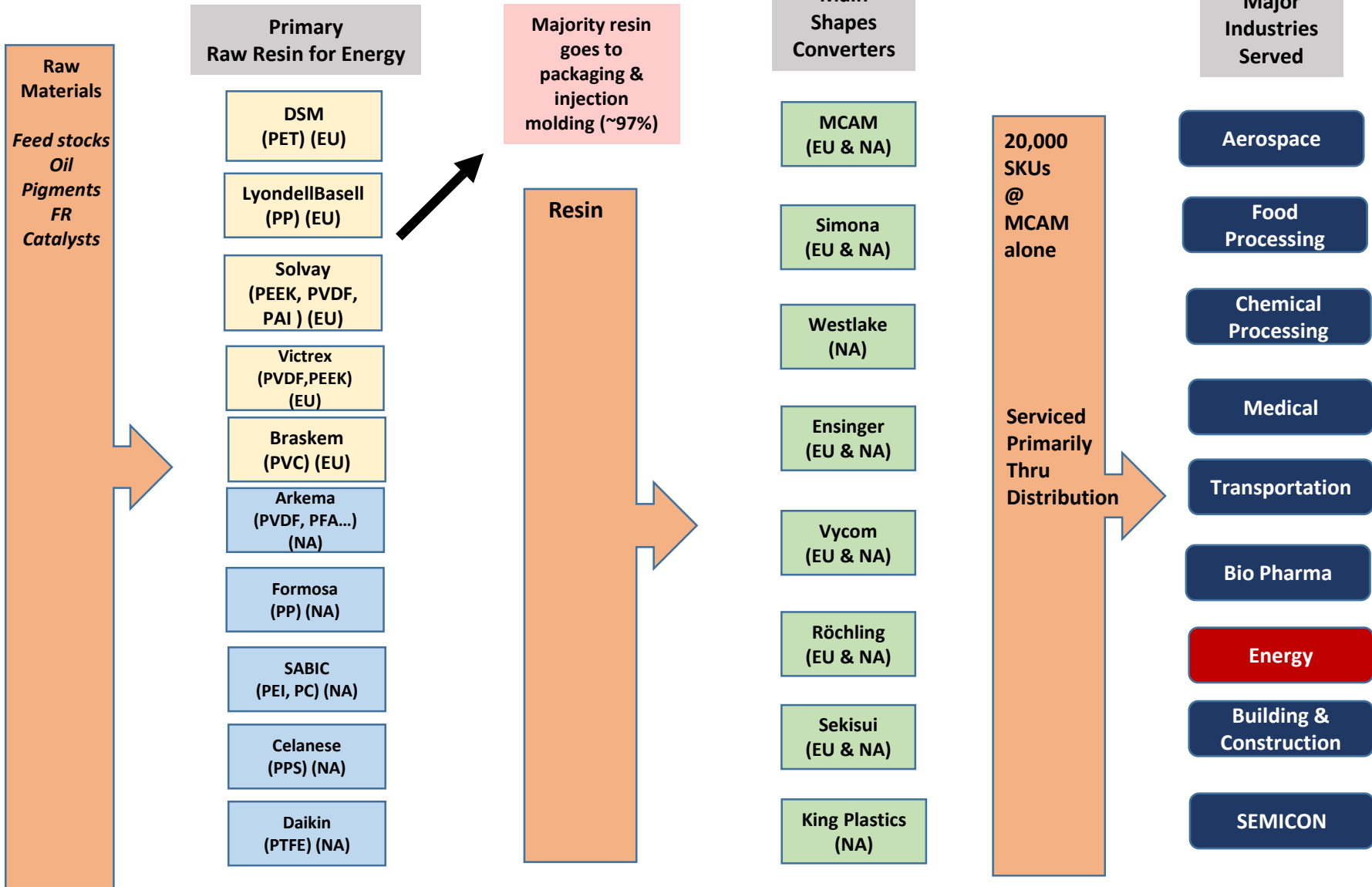
What's Our Vendors Are Telling Us...

1. Depending on the resin family, if you do not order by end of the 3rd QTR you will likely not see your requirements until 2nd QTR 2022
2. If you order now, and we make it, it will ship, or you lose it.
3. So, we either order early or risk not getting it, or take it & find space for it & sit on it...
4. We need to do this within a business that is growing by up to 70% next year...

Simplification of The Global Plastics **Shapes** Supply Chain



PORT PLASTICS



Oil & Gas Market Trends



MCAM – Focus change in 2020/21

Upstream – with the collaboration in the middle east, OPEC has agreed to stabilize production in order to improve the global oil price. 2020 has prompted a new start with challenged oil price per barrel from \$40 - \$50. As the oil price continues to elevate, so does the production restart in the US with Europe on a slower gain. Subsea exploration and production will restart slowly as the global Market gains further momentum and as COVID issues begin stabilize with medical advances, this could help the market regain balance.

Midstream – In the US, a pipeline expansion has begun to rollout with the support of the US Gov't. The new pipeline expands the transportation of Oil and other Hydrocarbons across North America. High inventory and storage capacity heavily impacting sustainability.

Downstream – Refining and processing continue to be the concentrated profit center with continued low-cost crude oil supply from various global sources. Expansion and overhaul of rotating equipment continues to thrust forward. Challenged market with COVID & low consumption have impacted the market globally.

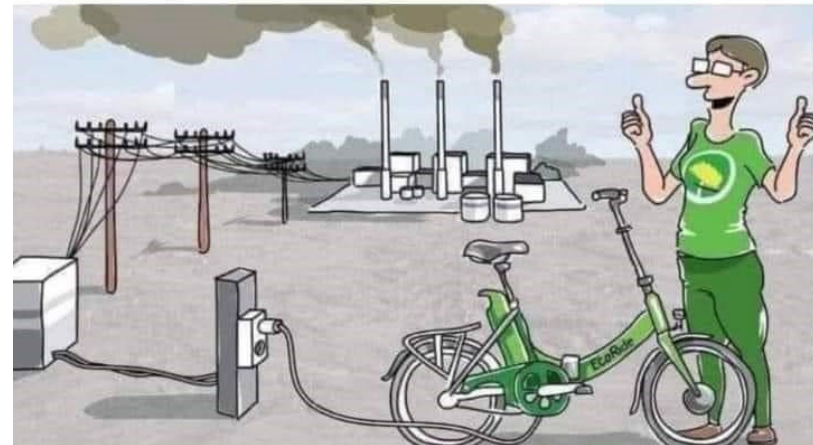
Increased Activity in NA Upstream Starting late 2019 with a new Oil price per barrel globally including Midstream and Downstream segments

Industry Challenges

Capturing new energy markets for polymers



THE GREAT DELUSION



- Fossil fuels still account for 80-89% of energy costs
- Renewable energy only accounts 1-3% - issues Solar & wind energy storage
- Cost to build renewable energy systems such as panels and storage is expensive still
- Solar panels have a limited operating life
- *Carbon capturing, hydrogen renewable, geothermal are new energy methods*

Oil & Gas Strategic Business

Global Technology Drivers

- Safety
- Reduced Weight
- Regulatory Compliance
- O&G compliant shapes & solutions
- Continuous Efficiency
- Industry need of Global Plastic Leader
- Thermoplastics & composites for new environments

Regional Positioned

Numerous metal to polymer conversions to improve performance

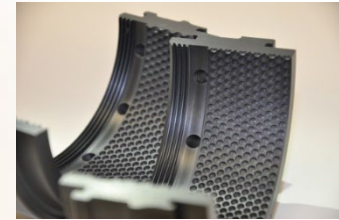
Market knowledge of industry changes

Large Portfolio of Approved & Tested OEM Materials

Focused technically on HTHP and corrosive applications



HTHP Connectors



Tight Tolerance Labyrinth Seals



Precision Backup Rings



Upstream

- Downhole tools, Pumps, compressors, ROV's, Skid Plates, pressure pumping
- Frac balls, bridge plugs, pipe clamps, risers seals, high pressure connectors



Midstream

- Actuated Valves, Valve seats, Compressors, pipe liners
- Flexible pipes, flow meters, Pumps



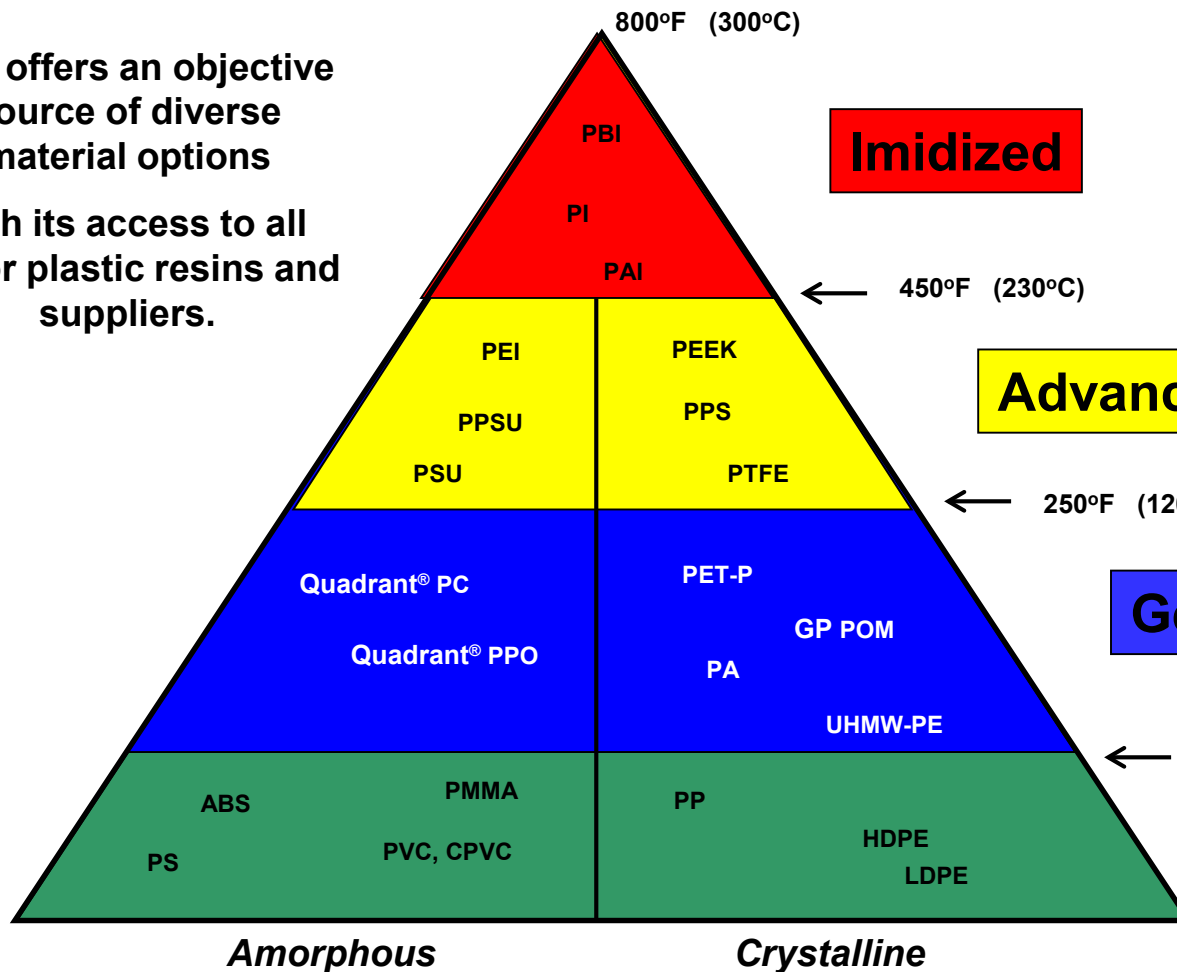
Downstream

- Tank liners, Valves, couplers, Compressors, comp components
- Pumps, pump parts, wear pads, valve seats, Flow meters , FPSO systems



Port Plastics Broad Product Portfolio

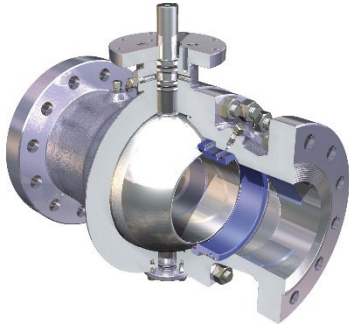
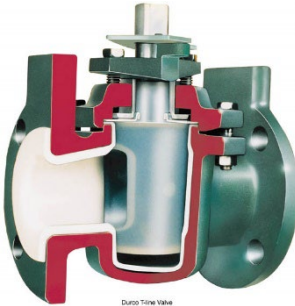
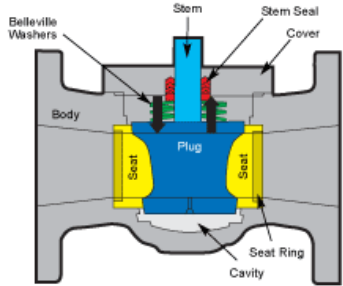
Port offers an objective source of diverse material options with its access to all major plastic resins and suppliers.



Amorphous

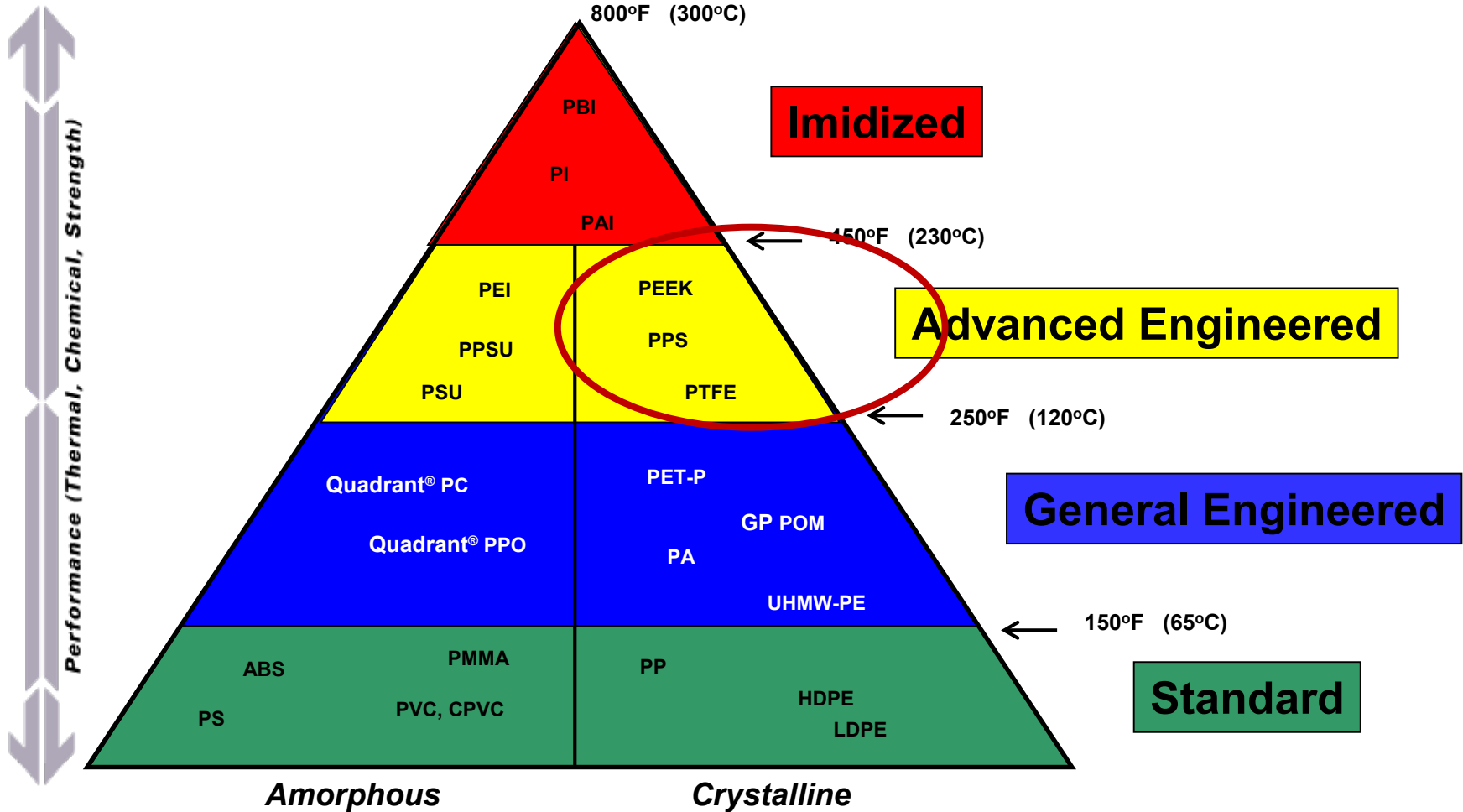
Crystalline

Energy Market & Rotational Equipment Materials

	Ball Valve	Plug Valve	Actuators
Applications	Valve Seat Sleeve Bushing Mechanical Seals	Sleeve Bushings Seals Plug	Sleeve Bushings Rider Bands Seals
Typical Materials	Duratron® Ketron® Nylatron®	Fluorosint® Techtron® TIVAR®	Duratron® Ketron® Nylatron®
We Supply	Parts and Shapes (Tubes)	Parts and Shapes (Tubes)	Parts and Shapes (Tubes)
			

Energy Market can be Defined as 95% "FLUID MANAGEMENT"

Engineered Materials Triangle



Crystalline Engineering Plastics (Bearing & Wear)



General Engineered - UHMW-PE, PA, POM, PET-P,

Advanced Engineered - PTFE, PPS, PEEK, PVDF

- Good to extreme chemical resistance
- Good heat resistance
- Modified versions have great wear properties
- Easily machined



Typical Applications:

Standard bearings and bushing ideal for nylons, acetals, and PET. Pump and valve components including seals are well suited to the advanced PEEK and PPS. Their chemical resistance and good strength help them excel.

Using PTFE or filled PTFE Today?

- Too much cold-flowing or loss of strength?
- Too much movement or loss of stability?

Advanced PTFE

Fluorosint® Product Line – Mica filled PTFE

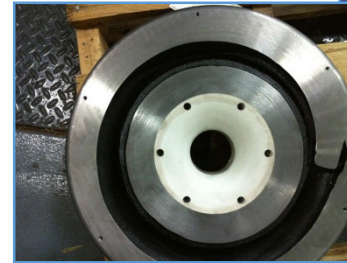
- Replaces low performing filled PTFE products, such as Rulon
- Reduces Cold Flow / Deformation under load
- Replaces metal wear components such as bronze bushings
- Designed for low friction and high wear applications
- CLTE similar to metal components
 - Fluorosint 207..... FDA w/ lowest COF
 - Fluorosint 500..... Dimensional Stability to replace AL Seals
 - Fluorosint HPV..... Wear Grade for Highest PV (also FDA)
 - Fluorosint 135..... Cost Effective & Ideal for Piston Rings
 - Fluorosint MT-01..... Extreme gasket material at high temperatures

PTFE Filled Grades

- (mica-filled PTFE)

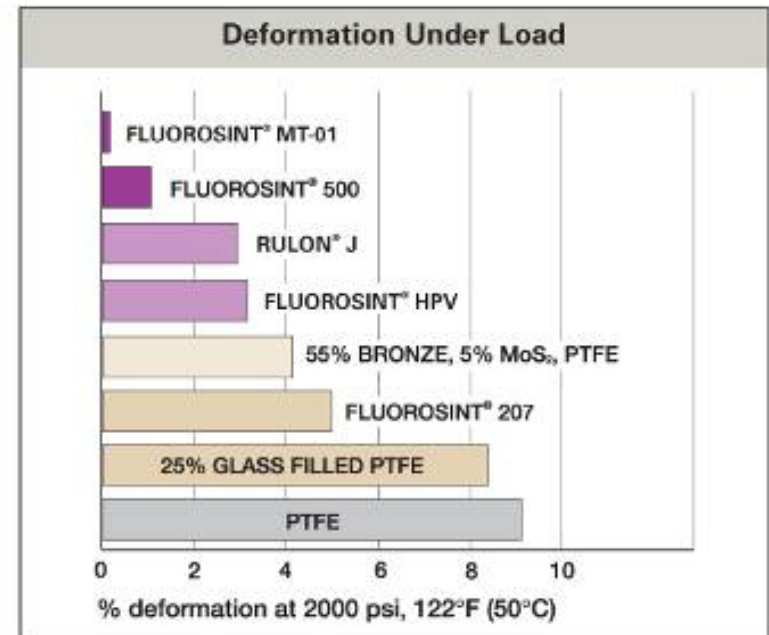
Strengths

- Thermal stability to 500°F (260°C)
- Dimensional stability (low CLTE)
- Very slick (low COF)
- Applications – Seals, gaskets, bearings



Combination of mica & PTFE provides:

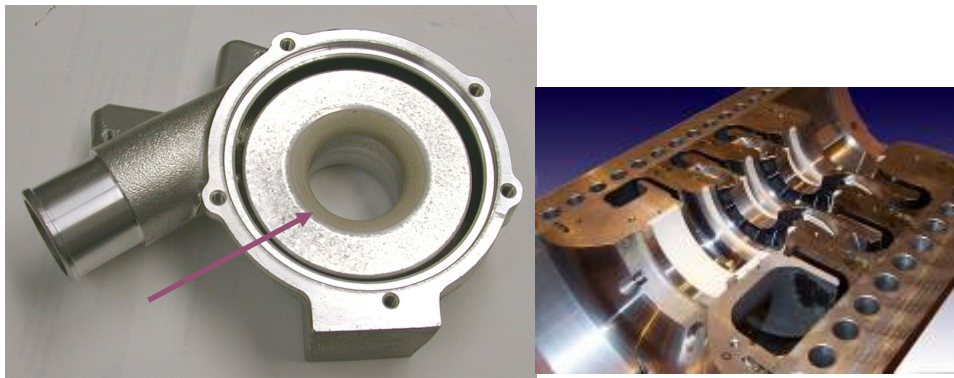
- Significant reduction in deformation under load compared to glass-filled PTFE
- CLTE close to that of Aluminum



Enhanced PTFE

Fluorosint 207

- **Extreme slickness** with lowest COF of any Fluorosint grade.
- FDA compliant.
- Applications include food industry bearings, seals, gaskets...even radial split seal in hydroelectric turbine.



Fluorosint 500

- Specifically designed to replace aluminum seals.
- **Extremely low deformation under load and low CLTE.**
- Applications – high speed rotating equipment seals.

Enhanced PTFE

PEEK HPV

- Used in extreme bearing and wear applications.
- **Higher limiting PV than other filled PTFEs (20,000 psi-fpm).**
- Plus FDA COMPLIANT !!



High Temp Peek

- **Used in extreme sealing applications to 675°F (350°C).**
- Proprietary fillers.
- Extremely low deformation under load.



Enhanced PTFE

Fluorosint 135

- Balance of hardness and great wear performance makes it **Ideal for Piston Rings / Rider Bands.**
- Most economical grade of FL providing high level of dimensional stability and wear performance

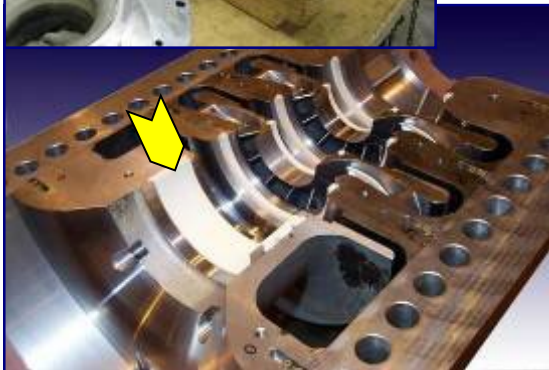
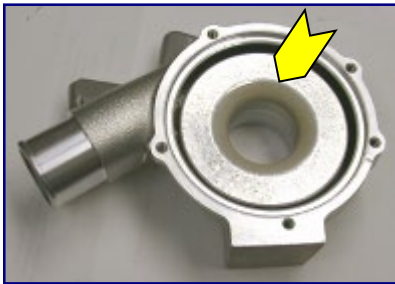


Fluorosint MT-01

- **Used in extreme sealing applications above 600°F (315°C).**
- Proprietary fillers.
- Extremely low deformation under load.

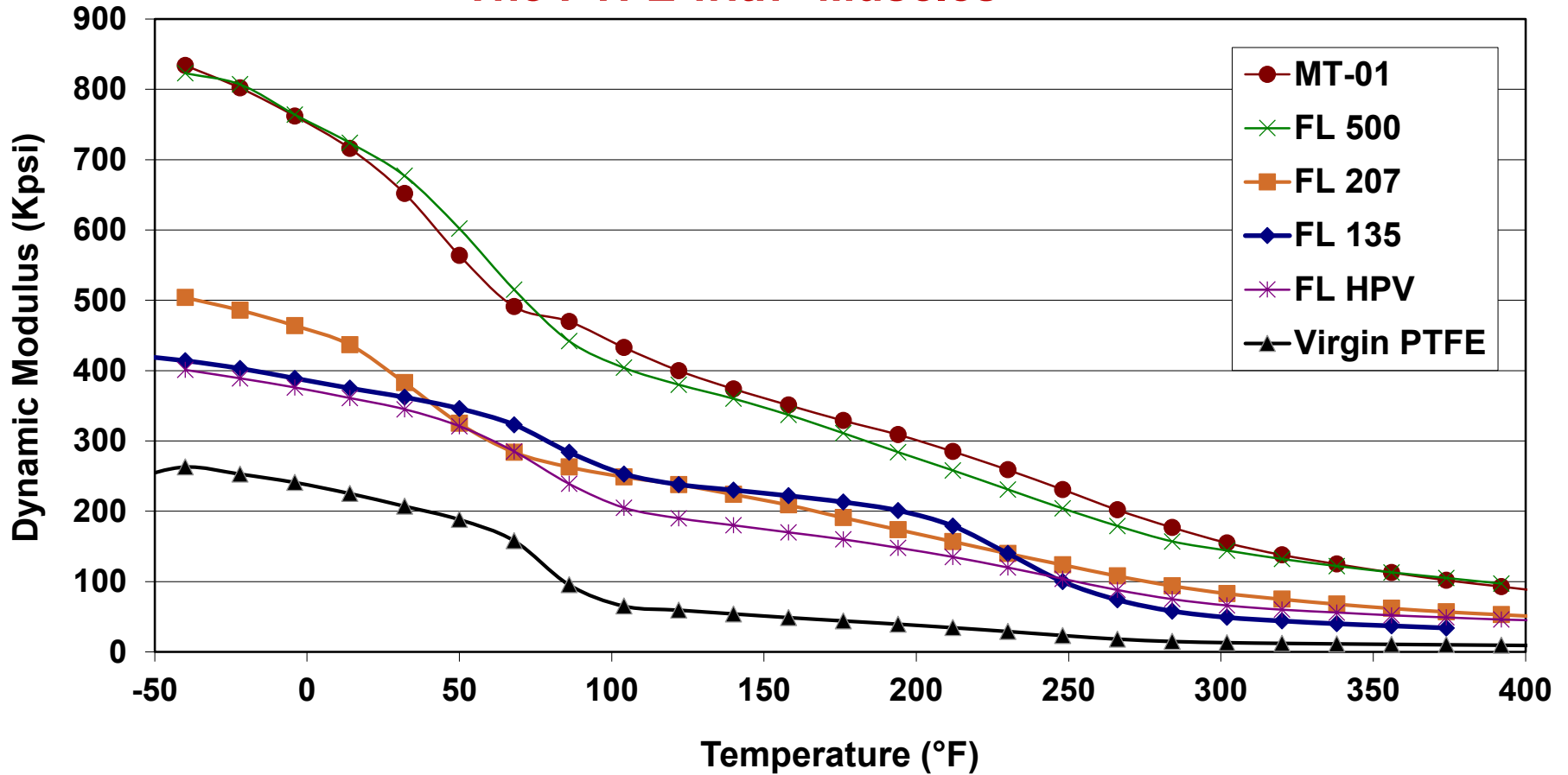
Enhanced PTFE

Ideal material for low pressure bearings, valve seats, rotational seals and anywhere that standard PTFE is struggling.





The PTFE with "Muscles"



Fluorosint[®] 500 – Application

Compressor/expander Shrouds

Industry – Gas transmission and transition

Previous material – Metal shroud or aluminum seals

Problem – Loose clearance between metal impeller and metal shroud. Also, during upset conditions where impeller touches shroud, unit crashes with severe damage.

Fluorosint 500 Shroud

- CLTE close to Aluminum provides easy design
- Abradable shroud equals tighter clearances at on-set
- Efficiency gains equals more production
- Catastrophic failure means FL-500 sacrificial part... not the entire compressor.



Advanced Engineered Plastics



PPS (polyphenylene sulfide)

Strengths

- **Excellent dimensional stability (low moisture abs. and low CLTE)**
- **Excellent chemical resistance**
- Thermal stability (HDT) to 250° F (120°C)

Limitations

- Lower Heat Deflection Temp. than PEEK.

PEEK (polyetheretherketone)

Strengths

- **Thermal stability (HDT) to 320° F (160°C)**
- Good wear and abrasion resistance
- Excellent dimensional stability
- FDA compliant

Limitations

- Lower Chemical Resistance vs PPS
- Chemical Resistance to some high temperature halogens and their acids...i.e. Bromine, Chlorine, Fluorine, HBr and HF.

Extreme

PPS HPV & Peek HPV

developed to drastically improve the wear resistance of these materials.

PPS & PEEK

Advanced Engineered Plastics



- Temperature and chemical resistance ideal for valve components and process equipment.
- Industry Standard for Back-up Seals and many other advanced material applications.



HPV PPS.. An Alternative to PEEK

Meets or exceeds many application requirements served by PEEK in the 200° - 300° F (90° - 150° C) range.

- Lower CLTE than PEEK
- Lower Moisture absorption than PEEK



Six times better wear resistance than PEEK

- Tougher than PEEK
- Extends chemical resistance beyond PEEK
- Withstands temperatures under load to 240° - 250°F (115° - 120°C)
- Mechanical properties comparable to traditional bearing and wear products like nylon, acetal.
- Unique formulation far tougher than standard PPS



More cost-effective where PEEK is over-engineered.

HPV PEEK – When you need the temperature

HPV PEEK, CA30 PEEK, and GF30 PEEK used where extreme conditions require improved bearing performance, stiffness, and stability to 380°F.



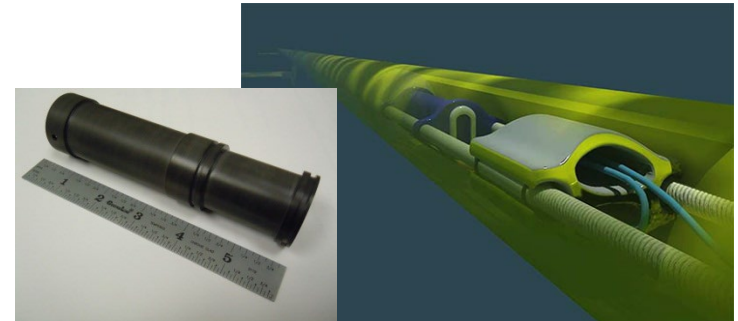
HPV turbocompressor seals



HPV pump throat bushings in fertilizer plant



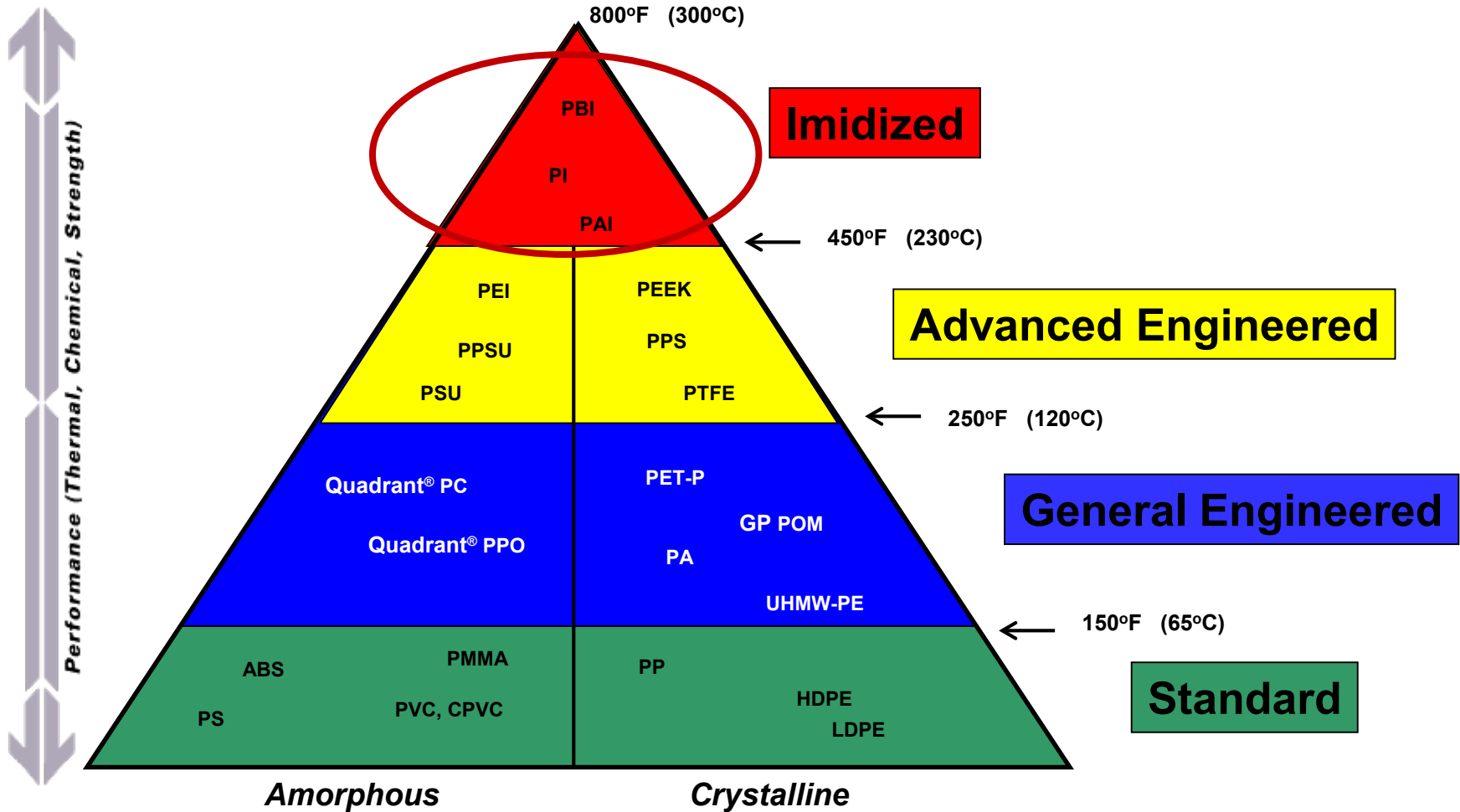
PEEK CA30 HPLC components



HPV Subsea Sensor Housing

PEEK HPV PEEK offers 4X longer wear life than virgin PEEK.

Engineered Materials Triangle



Imidized Plastics (Structural or Bearing)



PAI, PI, & PBI

- **Extreme temperature resistance**
- **Modified versions are the most extreme bearing materials**
- **Capable of maintaining tight tolerances at high temperatures**
- **Handle high loads and speeds**



Typical Applications:

Torlon, Duratron and Celazole are widely used as insulators and isolators and bearing components for **Extreme** service applications.

KEY LIMITATION for IMIDIZED MATERIALS – Reduced Chemical Resistance

Imidized Plastics – PAI, PI, and PBI



- **PAI (Torlon)**

- Advantages

- Superior strength / stiffness to **520°F (270°C)**
 - Excellent dimensional stability
 - Excellent wear resistance

- **PI**

- Advantages

- High Strength & Stiffness to **620°F (325°C)**
 - Higher stiffness vs othe PIs
 - Excellent wear resistance

- **PBI (Celazole)**

- Strengths

- Highest strength and stiffness to **815°F (435°C)**
 - Excellent wear resistance



- Limitations

- Chemical Resistance to Strong Bases, Steam and Some High Temperature Acids
 - High Cost, but.....
 - Hygroscopic

Imidized Plastics – PAI, PI, and PBI



- PAI (Torlon)



- PI



- PBI (Celazole)







