

## Engineering Plastics for the Offshore Industry

### Trends

Engineering plastics are replacing metal components in a wide variety of critical applications in the offshore exploration and production fields. Plastic components have to withstand extreme pressure, temperature and hostile environments.

### Key Properties

Quadrant's plastic materials deliver the highest reliability and performance for this market. Customers all over the world benefit from their outstanding properties:

- High mechanical strength
  - Materials operating in temperatures of -200 °C (arctic oil exploration) to 500 °C
  - Low coefficient of friction
  - Excellent dimensional stability
  - Chemical and corrosion resistance
  - Low weight compared to metal components
  - Low moisture absorption
  - Low coefficient of thermal expansion
  - Industry certified materials
- New:** NORSOK M-710 (sour gas ageing) compliance for Ketron® PEEK stock shapes

### Customer Benefits

Flexibility in product portfolio and manufacturing capabilities provide our clients with a competitive edge. Quadrant's global partnerships provide technical service and application development. High volume moulded parts to lower volume custom cast and machined components, Quadrant has the solution. Quadrant can provide the platform for bringing your concept to the production line.

### Applications

- Pipeline systems (pipe in pipe spacers, pipe clamps, lined pipe)
- Sub sea vehicles (thruster cowlings)
- Lifting equipment (cable sheaves, hook blocks, bearing pads)
- Instrumentation (insulators, sensor protectors, guidance probes)
- Compressor, pump and valve components (seals, bearings and wear components)
- Offshore equipment (bushings, slide pads)

## Quadrant solutions based on global experience

### Cable Sheaves

#### Challenges:

Lifting devices on rig platforms are equipped with wire or rope sheaves reaching diameters of 5 meters. The wire or rope run across the sheaves that are made of welded steel. Excessive wear reduces the life of the wire or cables producing a potential safety hazard.

#### Solution:

Nylon cable sheaves made of Quadrant's materials handle the high load requirement. Because the material is made of non-abrasive plastic, it reduces wear on the cable or rope. UV protective additives in the material also provide exposure to the harsh environment.

#### Benefit:

The longer wear and reduced safety hazard are an extreme benefit for operators. All materials are available in various sizes customizable and certified to operators needs.



### Compressor and Pump Seals and Wear Parts

#### Challenges:

Pump and Compressor dependability and performance relies on the seals and wear components in the unit. Standard aluminum labyrinth seals provided with turbo compressors can become bent during a compressor disruption. They can also experience chemical attacks in harsh environments. The lost efficiency in the compressor train reduces production output costing thousands to operations. Wear rings in pumps using metal or low quality components require more frequent and costly rebuilds.

#### Solution:

Polymer labyrinth seals will flex not permanently bend, they are chemically inert and can run at tighter tolerances providing a superior performance. Wear rings made with self-lubricating properties that can handle the high temperatures and pressures provide longer life. Parts based upon Quadrant's Fluorosint®, Ketron® PEEK and Duratron® materials have been proven to provide superior performance in Compressor and Pump applications.

#### Benefit:

Improved efficiency and longer running time between repairs are a few benefits for using polymers in compressors and pumps. Proper selection of material and design can insure increase efficiency and uninterrupted performance.



## Quadrant solutions based on global experience

### Bending Restrictors

#### Challenges:

Flexible pipe and cables are most prone to failure when attached to a fixed device such as a sub-sea riser base. Bend restrictors are designed to support, decouple load and prevent the pipe from over bending. The restrictors see excessive wear and friction from the movement of the pipe.

#### Solution:

Quadrant's engineering plastics outperform on the most critical aspects, such as reduced galling, outstanding compressive strength and wear resistance, and deliver a superior solution to the customer.

#### Benefit:

Quadrant's materials provide operators with confidence in their piping installation. Failures and premature wear are reduced in the application; materials are available in many formulations and sizes.



### Valve Components

#### Challenges:

Extreme pressures and temperature continue to challenge valve manufactures. While valve manufactures understand the benefits of plastics these extreme applications requiring -70 °C to over 400 °C need solutions.

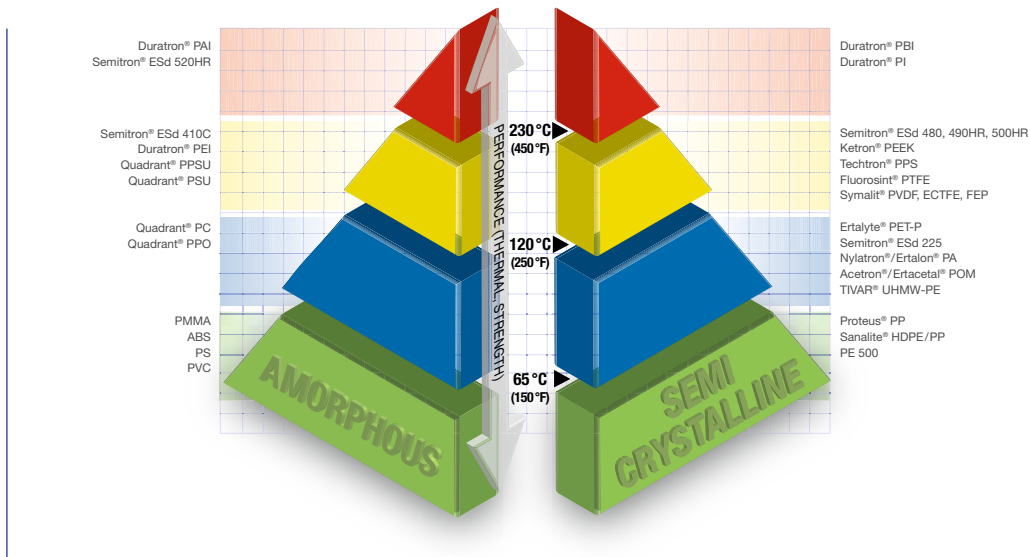
#### Solution:

Advancements in polymers provide new solutions for valve seats, thrust washers and bushings. The Fluorosint product portfolio meets customer's demands for HPHT (high pressure high temperature) applications. The mica filled PTFE product provides extreme wear performance for longer life than traditional PTFE compounds. Duratron® PAI has an extremely low coefficient of thermal expansion making it an excellent material for designing valve components from cryogenic to 260 °C service.

#### Benefit:

Quadrant's wide product portfolio from Nylatron® MC 901 Nylon to Duratron® PAI allows the client to choose the best performing and economical solution. The low deformation materials lead to higher load carrying capability. Low coefficient of thermal expansion means materials are stable providing tighter tolerances for sealing. Low coefficient of friction provides low torque requirements for operating valves. Increased temperature capability for standard PEEK valve components provides a competitive edge over your competition. These benefits add up in total savings for operators.





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