

Rotomoldable Acetal for Tank Applications

Rotoplas 2021



Celanese Corporation

is a global specialty materials leader in the production of differentiated chemistry solutions and specialty materials used in most major industries and consumer applications.



Based in
Dallas, Texas USA



Global network of
43 Manufacturing Sites



~7,700 Employees
worldwide



VISION:

Improving the world and everyday life through our people, chemistry and innovation.



people



safety



customers



quality



community



shareholders

HOSTAFORM®

Polyacetal copolymer

- ✓ Outstanding wear resistance
- ✓ High strength and rigidity over a broad temperature range
- ✓ Long-term fatigue resistance
- ✓ Toughness and creep resistance
- ✓ Excellent resistance to moisture, solvents, and strong alkalis
- ✓ Low Fuel Permeation
- ✓ Very resilient (e.g. snap fit properties)
- ✓ Easy to process via traditional techniques

Traditional Processing Technology

Type	Availability
Injection Molding	✓
Blow Molding	✓
Extrusion	✓
Rotational Molding	✓

NEW

End use applications in various market sectors

Automotive	Machine Construction
Consumer Goods	Medical
Electric Appliances	Precision Mechanics
E&E	Watchmaker

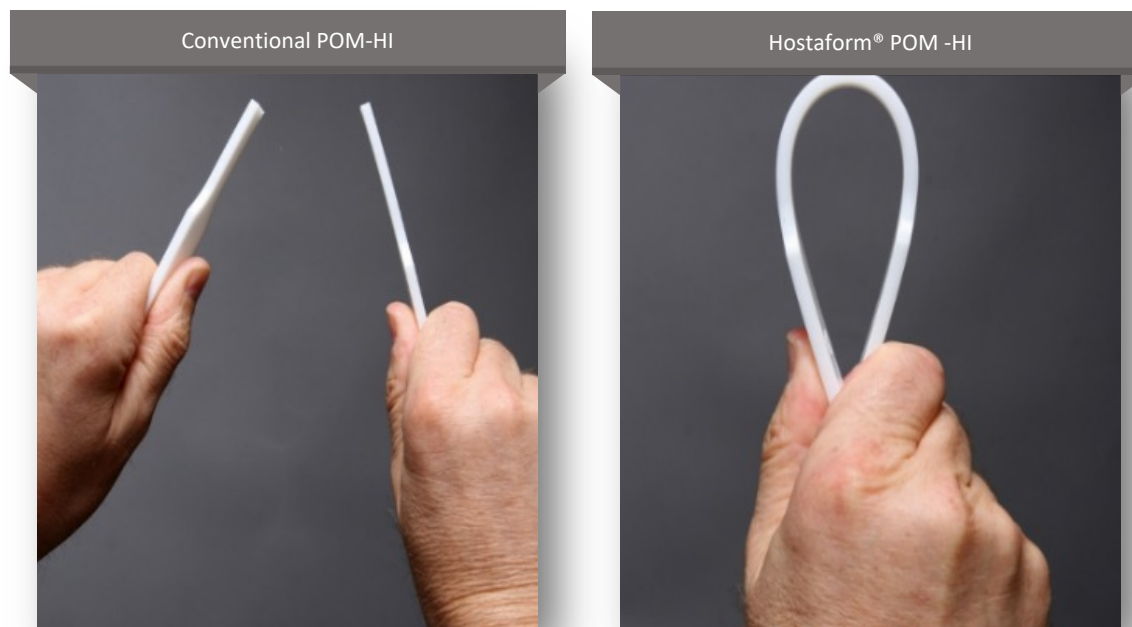
Hostaform® POM has a strong history in fuel applications



HOSTAFORM® can be modified based on processing and application requirements

Impact modification can be tailored to the individual application

- Celanese impact modification technology has continued to advance over several decades
- Impact modification of Hostaform® POM is available for a wide operating temperature range
 - -40°C to 100°C
- Ability to retain inherent chemical and fuel resistance of acetal



HOSTAFORM® RF has been formulated to meet application specific requirements

Impact modification can be tailored to the individual application

Passes **UV testing, aging** and application specific **drop tests**



Passes **EPA** and other fuel permeation requirements

Outside lab validation of fuel permeation Hostaform RF 2162				
Product ID	Nominal capacity	Test fuel	Internal Surface Area	End of Test: 05/23/2021
RF2162 Acetal Tank	4.15 liters	CE10	0.103m ²	
Volume to Surface Ratio	Test Method		Emissions Method	
40.29(l/m ²)	USEPA 40 CFR Part 1060.520		Gravimetric	EPA requirement
Soak Duration	Test Temp	Stabilization Parameter	Calculated Permeation Rate	
10 weeks	28°C	0.99	0.6 g/m²/day	

Passes **ABYC HY24** flammability and shock testing



HOSTAFORM® RF is ideally suited for fuel tanks

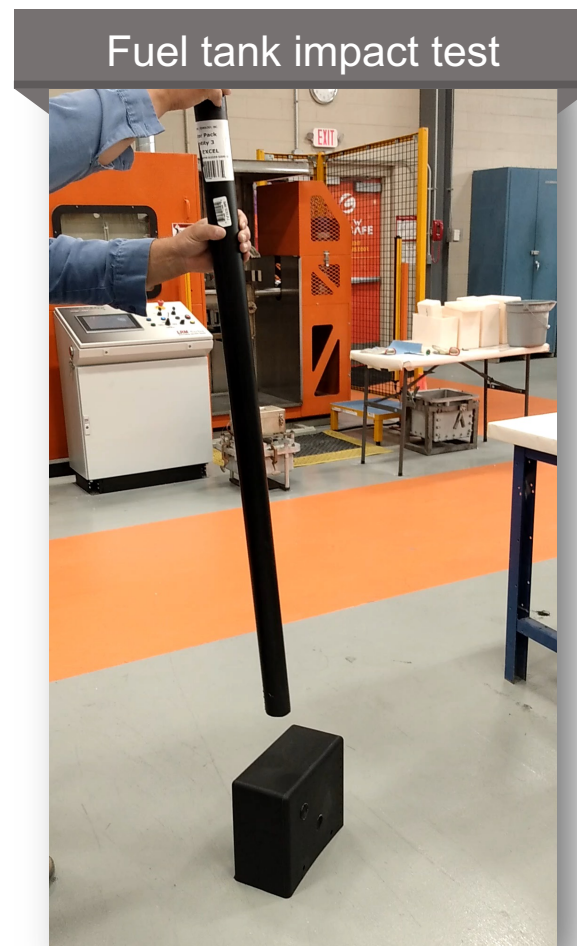
Benefits of a single layer solution

- Low Fuel permeation inherent to the base resin
 - Fuels: C, C10, Carb Lev. III, etc.
- Does not require secondary steps
 - Fluorination
 - Multilayer/Barrier layer molding
- Low swelling during exposure
- Temperature resistance
- Stiffness
- Tailorable impact resistance



HOSTAFORM® RF properties

	XLPE	Hostaform® RF 2162	PA-IM
Stiffness	-	0	+
HDT	-	+	0
Fuel Perm.	-	+	0
Impact	+	0	+
Density	+	-	0
Mold Shrink	0	0	0



HOSTAFORM® RF

Typical processing parameters

Typical Oven Times (440°F typical set temp.)

- 0.150" wall (3.8 mm) 15-18 minutes
- 0.200" wall (5.1mm) 18-21 minutes

Typical Air Cooling

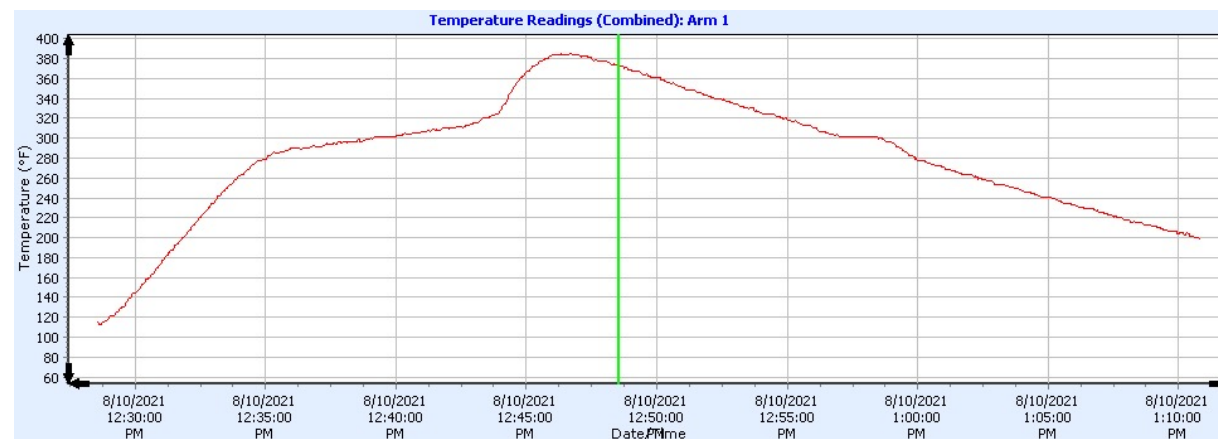
- Rotate in air 0-20 minutes
- Rotate in forced air 10-30 minutes

Ideal Internal Air Temp (IAT)

- 375°F (190°C) 4-12 minutes
- 405°F (207°C) do not exceed
- <150°F (93°C) demold temp.

Outer wall Temp.

- 410-450°F (210-232°C) Typical
- 450°F (232°C) do not exceed



HOSTAFORM® RF

Processing observations

- Existing molds usually suitable.
- Standard Pulverizers (attrition mills) are suitable. Reduce pellets to 35 mesh powder.
 - Cryogrinding not required
- ARM 2.1 Flowability and Bulk Density Funnels are suitable to test powder.
 - 35 mesh RF 2162 flows between 15 and 19 seconds.
- Pre-Drying powder not necessary
- Nitrogen not necessary
- Mold Release or special tool coatings typically not needed.
- Typical 4:1 ratio Major/Minor axis rotational speed (8:2, 6:1.5, etc.)
- Adequate ventilation at demold stations
- Good Flow and Seal around inserts
- In mold labelling



CONCLUSION

Celanese is a global leader in chemistry solutions such as POM and is the right company to bring POM to the rotomolding market.

Hostaform® POM provides a good balance of mechanical properties with low fuel permeation for a single layer tank solution.

Hostaform® Resins have been designed to use standard Rotomolding equipment at typical cycle times.
