



Delrin[®] as a PFAS-free solution for low wear/low friction applications

Ned LeMaster, Ian Wands, Mark Hazel, Dave Minnick, Ram Ratnagiri,
Liz Stubbs

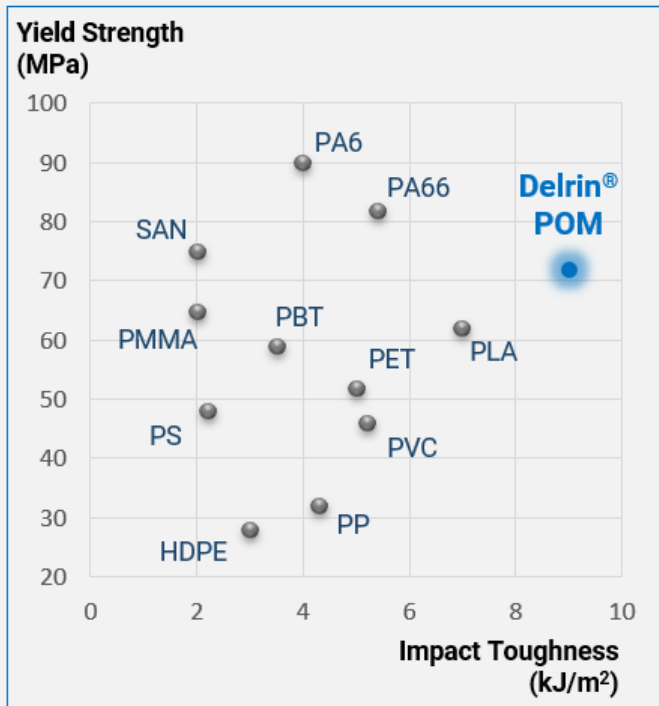
North America Medical-Grade Materials Consortium (MGMC) 2024

August 13th-14th, 2024

60-year track record of customer value creation, grounded in commitment to customer success and trusted partnerships

Delrin® POM

Unique Product



Global Capabilities

Local Relationships



4

Production Locations



4

Technology Centers



Local

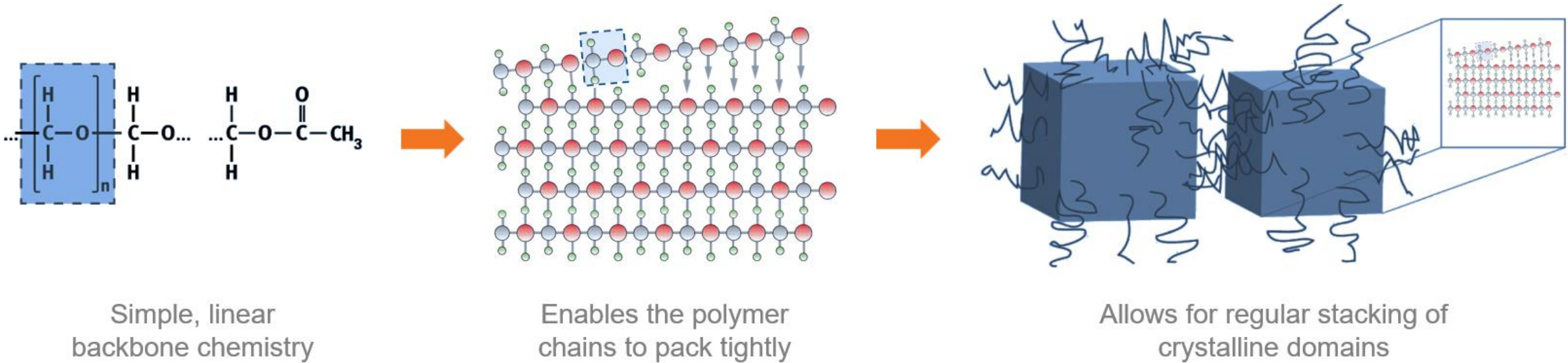
Field & customer support

Partner of Choice

Total Solution Provider

- **Deep technical expertise** in development, design, and molding
- **Longstanding reputation** for quality and supply reliability
- Trusted **product performance** in **safety-critical** applications
- **Engagement across the value chain** with all stakeholders
- **Innovative solutions** for **eco-design** initiatives and to deliver total system **cost savings**

Delrin[®] homopolymer acetal – structure defines properties



Linear, regular structure defines properties

Advantages of Delrin[®] homopolymer acetal



High stiffness



Low friction & wear



Fatigue & creep resistance



Chemical resistance



Dimensional stability



Low moisture pickup



Temperature toughness



Sustainability

The unique combination of Delrin[®] properties enables its use in demanding applications without glass or other reinforcements.

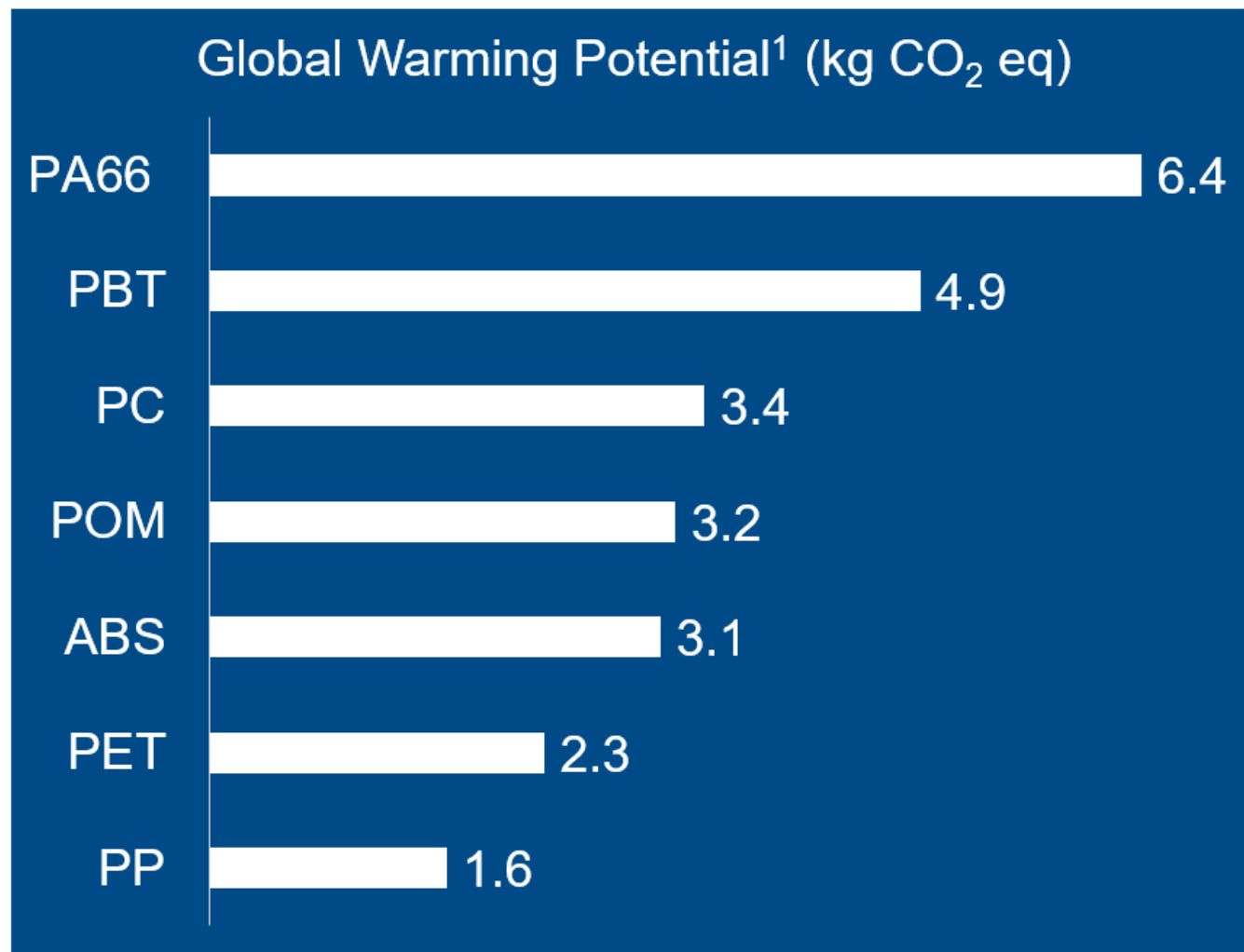
Plastics are the leader in sustainability



Polymers have an inherent GWP

Factors to reduce a material's GWP:

- Biobased monomer/feedstock
- Recycled content
- Energy used during manufacturing



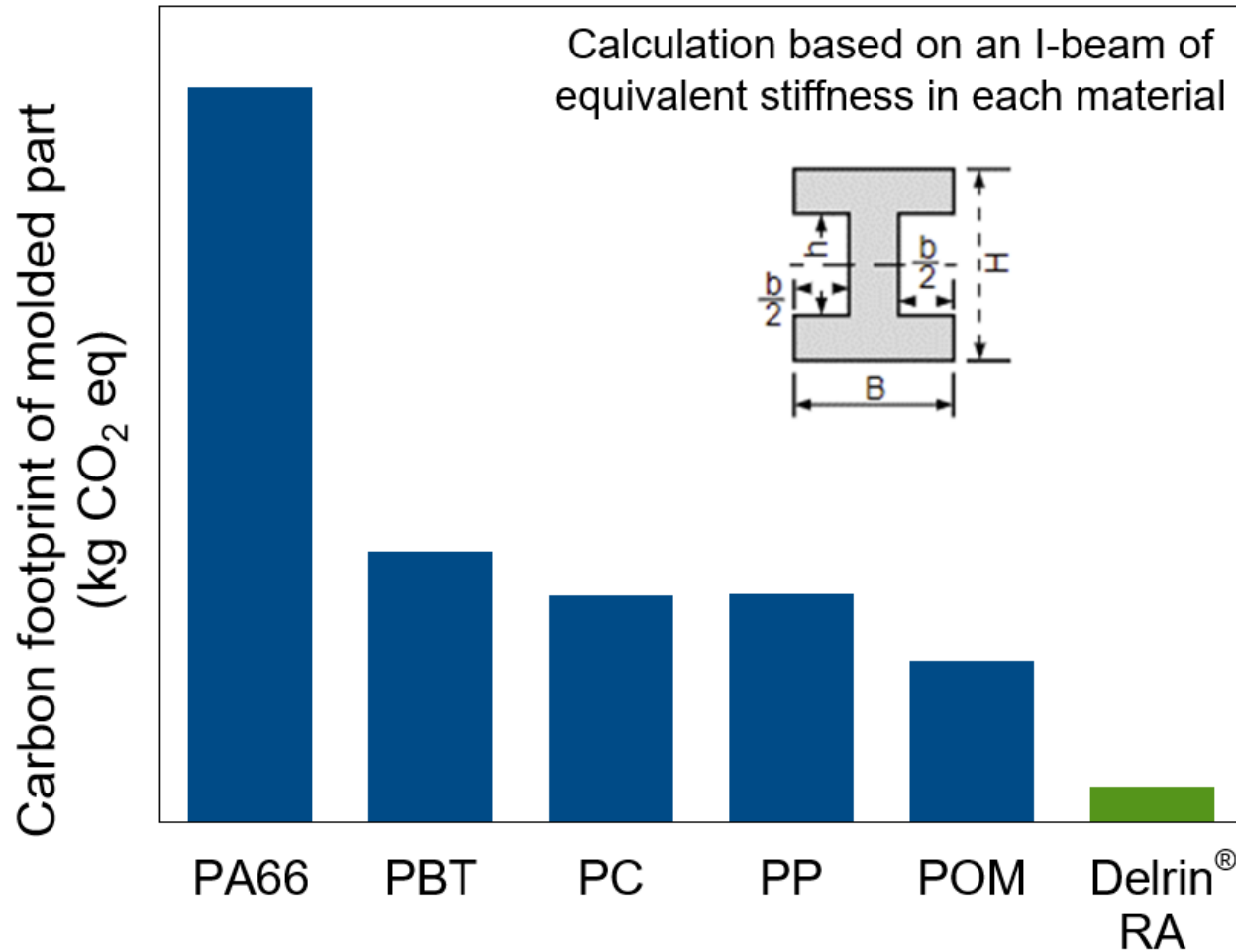
Delrin® Renewable Attributed – Breakthrough Sustainability





Optimizing design to achieve a lower carbon footprint

Carbon footprint of a molded part*



Optimize design utilizing mechanical properties



Potential in weight saving and reduced cycle time



CO₂ per part reduction



Cost reduction

Green chemistry revolution pushes for elimination of PFAS



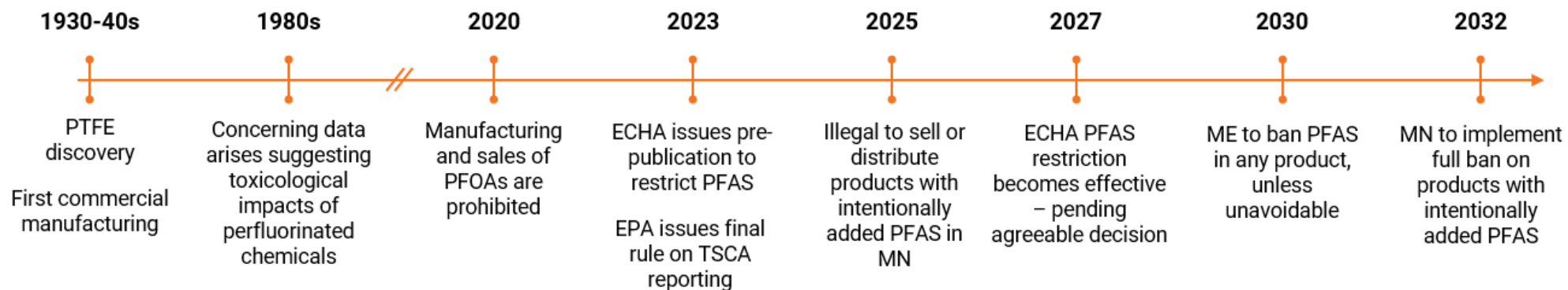
PFAS: Per- and polyfluoroalkyl substances

Any chemical with at least a perfluorinated methyl group ($-\text{CF}_3$) or a perfluorinated methylene group ($-\text{CF}_2-$) (without any H/Cl/Br/I attached to it)

Includes >9,000 chemicals

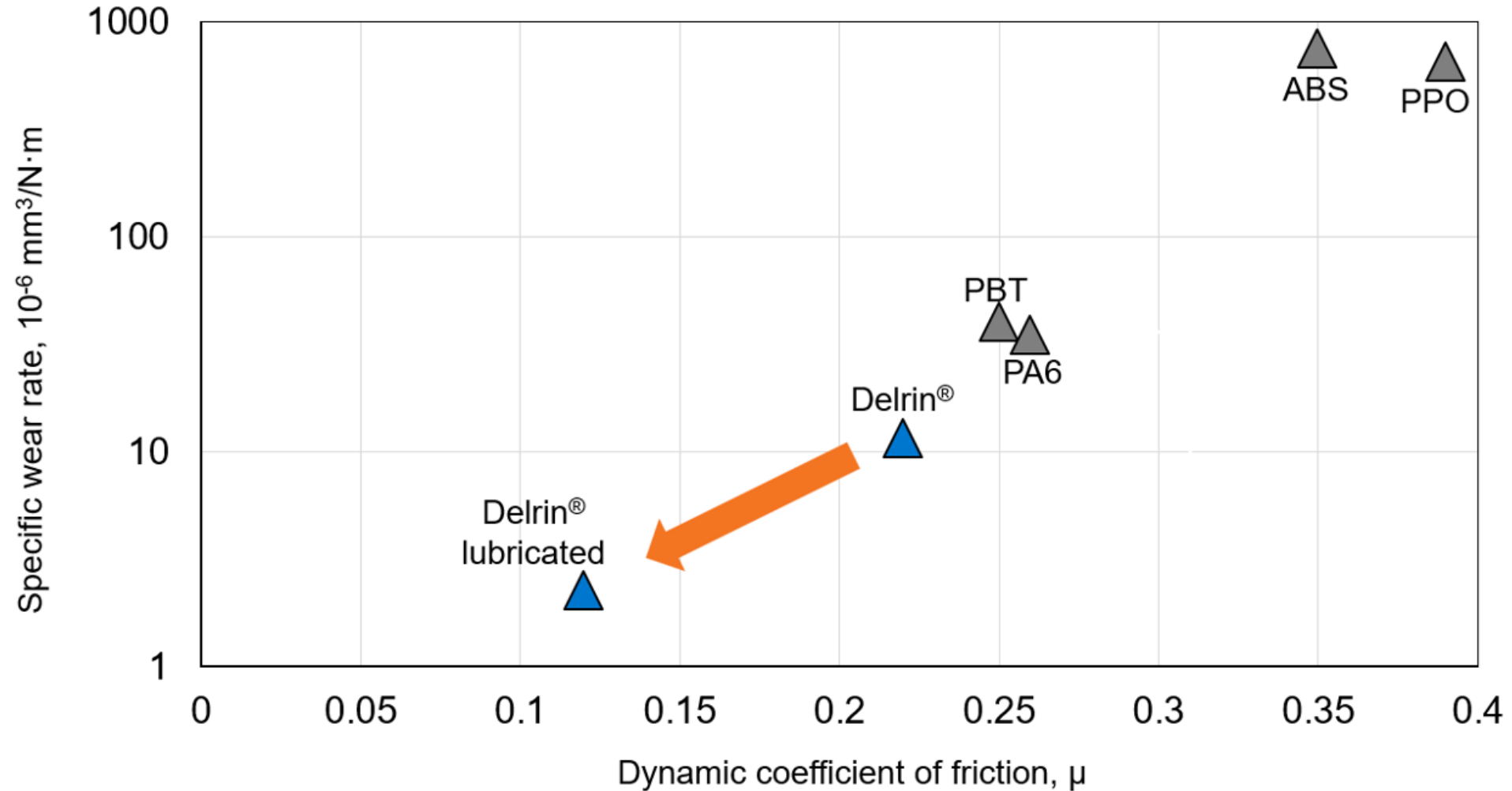
PFAS are widely used in healthcare applications

Benefits	Drawbacks
<ul style="list-style-type: none">+ Biocompatible+ Highly chemical resistant+ Excellent anti-adhesive, wear, & friction properties	<ul style="list-style-type: none">- Undesirable toxicological and ecotoxicological properties- Persistence in the environment



Increasing regulatory pressure suggests that PFAS-free healthcare solutions are needed

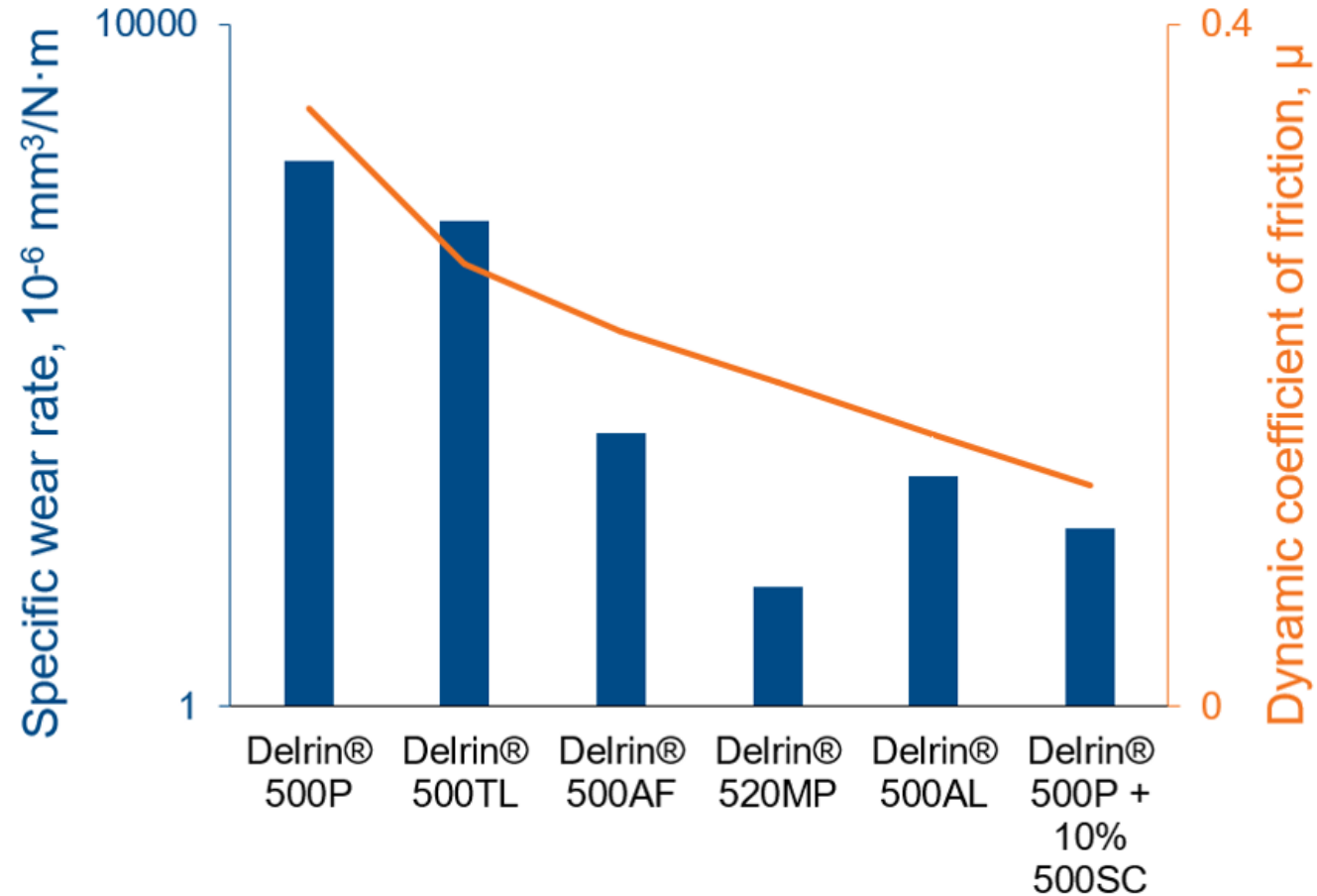
POM has inherently low wear and low friction properties



Low COF is attainable with non-PTFE Delrin® solutions



Flow Family	"100" MFR 2.3	"500" MFR 15
Characteristics	High Viscosity, High Impact	Medium Viscosity
Low Wear / Low Friction Grades		
PTFE Fibers	100AF	500AF
PTFE Micropowder	100TL	500TL 520MP
Kevlar® Aramid Resin	100KM	
Internal Chemical Lubricant		500CL
Advanced Lubricant	100AL(E)	500AL
Silicone Concentrate		500SC



Low friction, PFAS-free grades for medical applications



Flow Family	"100" MFR 2.3	"500" MFR 15	"900" MFR 25
Characteristics	High Viscosity, High Impact	Medium Viscosity	Low Viscosity
Special Control Resins			
Standard, Unmodified Grades	SC631	SC655	SC690, PC690
Low Wear and Friction		PC652	SC698

All grades can be available as Renewable Attributed versions with up to 75% reduction in CO₂ footprint.

Special & Premium Control grades come with additional regulatory support:



Manufactured according to GMP principles



Food contact statements (EU/FDA)



Tested against selected parts USP Class VI



Tested against relevant parts ISO 10993



Sterilization data



Global availability

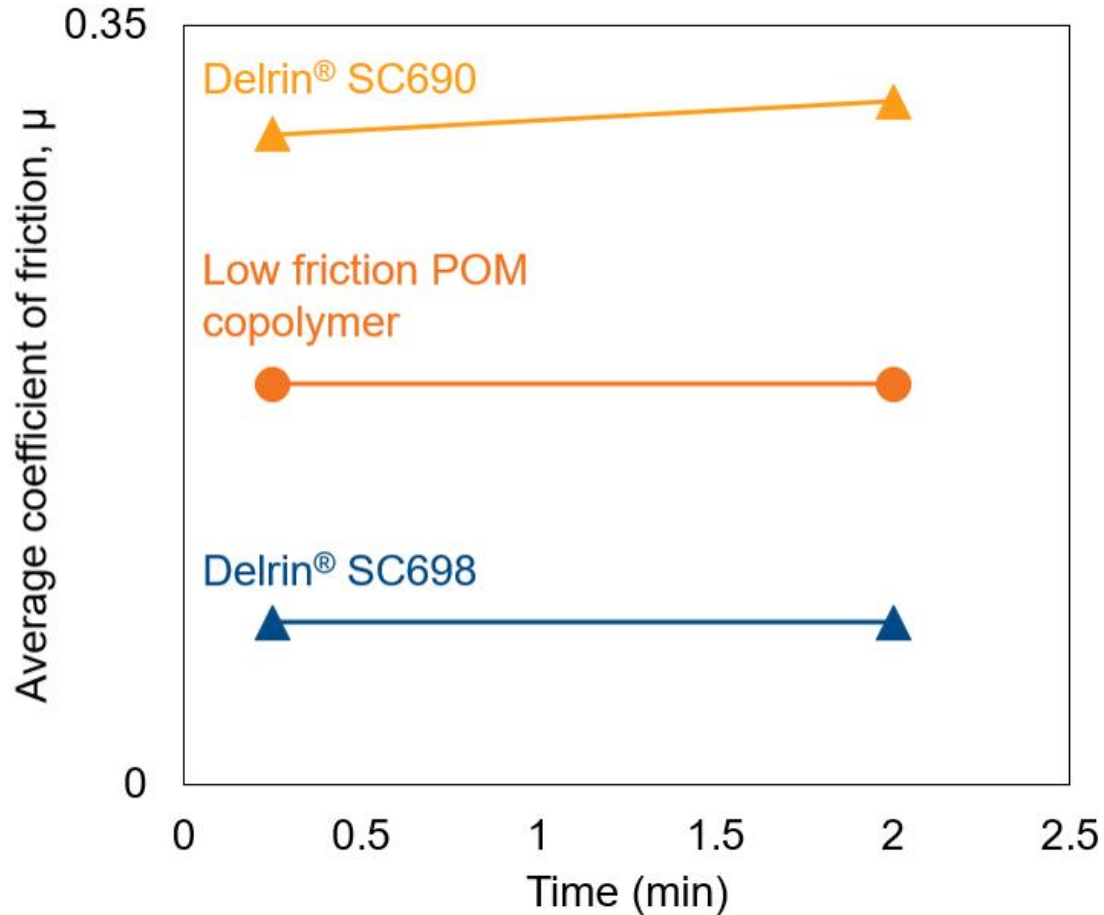


Extended change notification

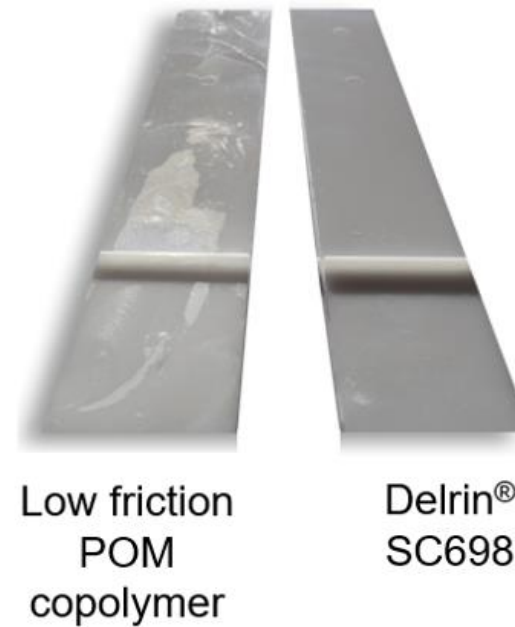
Delrin® SC698: Delivering ultra-low friction for healthcare applications



Low friction Special Control grades



Delrin® SC698
Delivering low friction for smooth and precise actuation of medical devices

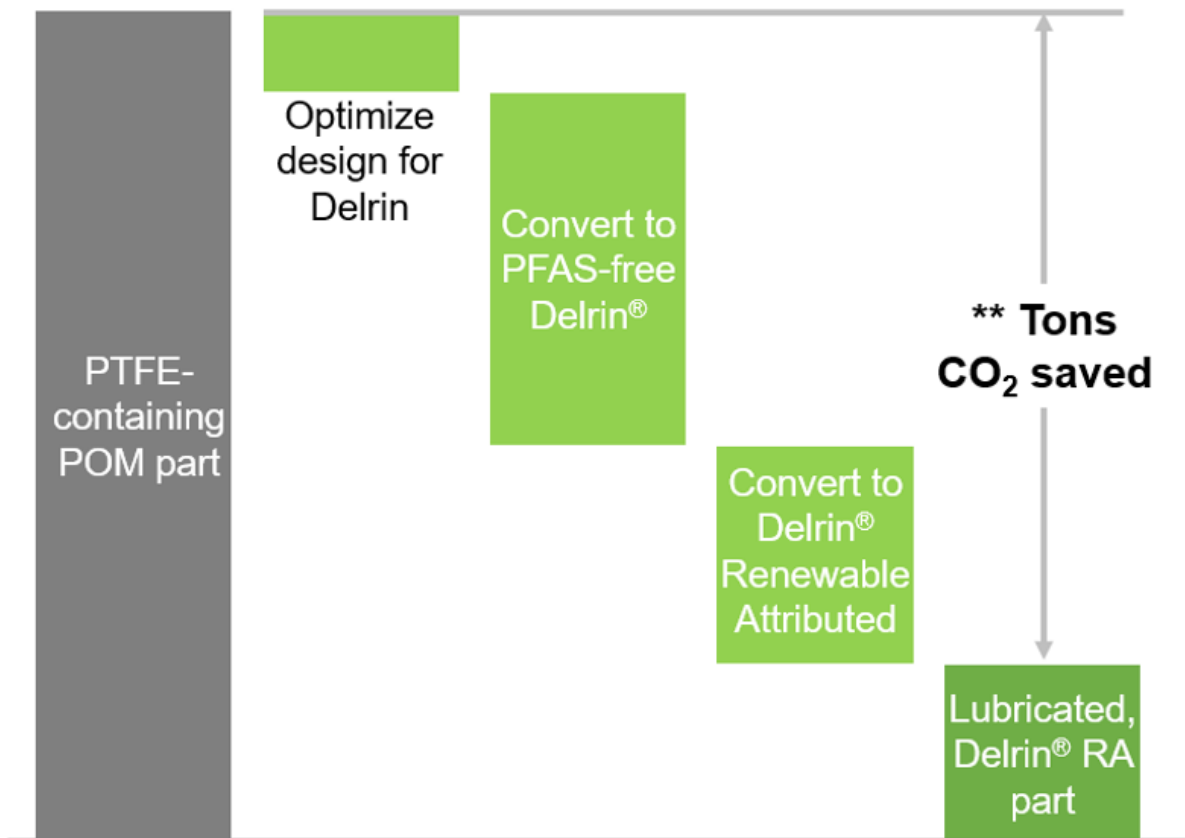


- Excellent wear/friction performance
- Lower energy costs
- Removes need for external lubrication
- Enhanced surface finish
- Renewable Attributed version available

Leveraging low friction design and CO₂ savings



Example of potential CO₂ savings***



Combining inherently low COF
POM with formulation
proficiency and end-to-end
lifecycle expertise unlocks the
ability for Delrin® to be a total
solution provider and partner
of choice

** Delrin GWP data can be shared upon formal request placed through the sales organization.

*** Data for Delrin and Delrin® Renewable Attributed are based on a peer-reviewed ISO 14040/14044 compliant LCA study executed in SimaPro using the EcolInvent 3.8 database and IPCC's 6th assessment report methodology and reflect a 100-yr time horizon (GWP-100). Assumed redesigned weight savings is 10%.

Delrin® as a sustainable and PFAS-free solution



**Improved CO₂
footprint**

Delrin® Renewable Attributed offers an improved CO₂e footprint & reduced use of fossil resources



**Inherent
lubricity**

Leveraging the inherent lubricious properties of Delrin® with creative formulation expertise unlocks PFAS-free solutions



**Healthcare
solutions**

Healthcare solutions with regulatory support & extended change notifications



**Design partner
of choice**

Technical, processing, application & regulatory expertise dedicated to smart, safe and sustainable healthcare

Delrin® – Long-term Commitment to Healthcare Industry

Thank you

J&J
MedTech | **Ethicon**
R&D Materials
OneMDSpecEngineering

Delrin®

Contact us at:

Liz Stubbs
elizabeth.stubbs@delrin.com

Ned LeMaster
Ned.e.lemaster@delrin.com



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