



# RTP Company

## *Solutions for PFAS in Compounds*

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# AGENDA

- Current Legislative and Regulatory context for PFAS
- RTP Company Action Plan
- What is tribology, and why is it important?
- Review of wear additives
- APWA Compounds vs. PTFE: how do they stack up?
- Results
- Summary

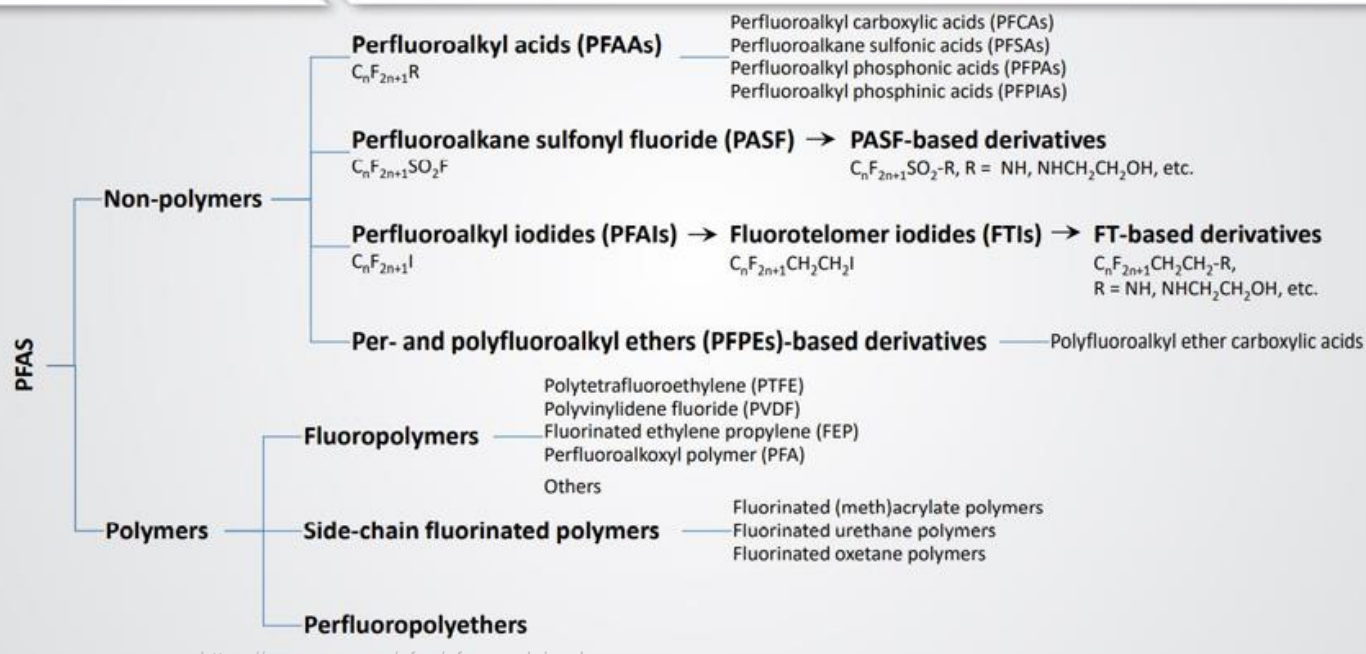
# PFAS CONCERNS

- Governing bodies have positioned all PFAS as being the same and have proposed broad regulation that effects all equally, including fluoropolymers
- Not all PFAS are the same. Different classes of PFAS have different properties. These differing sizes effect mobility and create different health and environmental concerns
- Casual use of “PFAS” when talking about substances like PFOA and PFOS creates confusion and may lead to policies with unintended consequences

# PFAS CONCERNS



## Thousands of Chemicals: More Than Just PFOA and PFOS



<https://www.epa.gov/pfas/pfas-explained>

# USA LEGISLATIVE CONTEXT

- Starting in 2023, over 250 PFAS related bills have been introduced
- These have been primarily left up to state legislation, leading to inconsistencies in regulation
- One commonality, overly general definition of PFAS
  - ✓ Fluorinated organic chemicals containing one fully fluorinated carbon atom
  - ✓  $\text{CF}_3-$
  - ✓  $-\text{CF}_2-$

# EU LEGISLATIVE CONTEXT

- Under development from supervision of European Chemicals Agency (ECHA)
- Restriction proposal has been submitted by national authorities of 5 member states
  - Denmark, Germany, Netherlands, Norway, Sweden
- Intend to ban/limit usage of 10,000 PFAS substances
- ECHA's scientific committees for Risk Assessment (RAC) and Socio-Economic Analysis (SEAC) are evaluating public comments
  - Many comments have been received proposing not to restrict polymers of low concern
- Finalization is expected to occur after these evaluations, but a date has not been set yet

# STATES WITH PFAS LEGISLATION

- California
  - ✓ AB 1200 (2021) - Food packaging restrictions, Notification in Cookware
  - ✓ AB 652 (2021) - Ban on intentionally added PFAS to juvenile products and components
- Colorado
  - ✓ HB22-1345 (2022) – Bans in several product categories from 2024 with more categories in '25 and '27. Cookware disclosure
- Maine
  - ✓ Public Law 477 (LD 1503) 2021 – Bans on certain products and mandates reporting
- Several other states have passed legislation regarding disclosure, reporting or limits which may lead to bans in the future
  - ✓ Michigan
  - ✓ Washington

# STATES WITH PFAS LEGISLATION

## Minnesota SF834/HF 1000

- January 1, 2025: Illegal to sell/distribute certain products with intentionally added PFAS
  - Carpets/rugs, cleaning products, cookware, cosmetics, dental floss, fabric treatments, juvenile products, menstruation products, textile furnishings, ski wax, upholstered furniture
- January 1, 2026: Product manufacturers need to provide the Minnesota Pollution Control Agency with an inclusive list of intentionally added PFAS
  - Illegal to sell/distribute products not reported
- January 1, 2032; Full ban on intentionally added PFAS in products that are not “currently unavoidable”



# RTP COMPANY ACTION PLAN

- RTP Company is committed to follow the legislation wherever it operates
- Already meet stringent European limits for all products globally
  - ✓ EU REACH Regulation 1907/2006 Annex XVII
  - ✓ EU Regulation 2019/1021 on Persistent Organic Pollutants (aka, the “Stockholm Convention”), as amended by EU 2020/784
- Short term
  - ✓ Continue to offer solutions to manufacture where it is possible and legal
  - ✓ Move to alternate wear technologies such as APWA
- Longer term
  - ✓ Develop new wear technologies where current options fall short

# TRIBOLOGY DEFINITION

## Tribology:

The study of friction, lubrication, and wear mechanisms on interacting surfaces that are in relative motion



# IMPORTANCE OF TRIBOLOGY

RTP Company engineers use their knowledge of tribology to produce quality, wear resistant and internally lubricated thermoplastic compounds that:

- Reduce part failure rates
- Reduce system friction
- Reduce labor and cost of part maintenance/replacement
- Provide custom engineered formulations for multi-property solutions



# CURRENT WEAR ADDITIVES

PTFE



Silicone Fluid



PFPE



Fibers



Solid Additives



APWA



# APWA COMPOUNDS

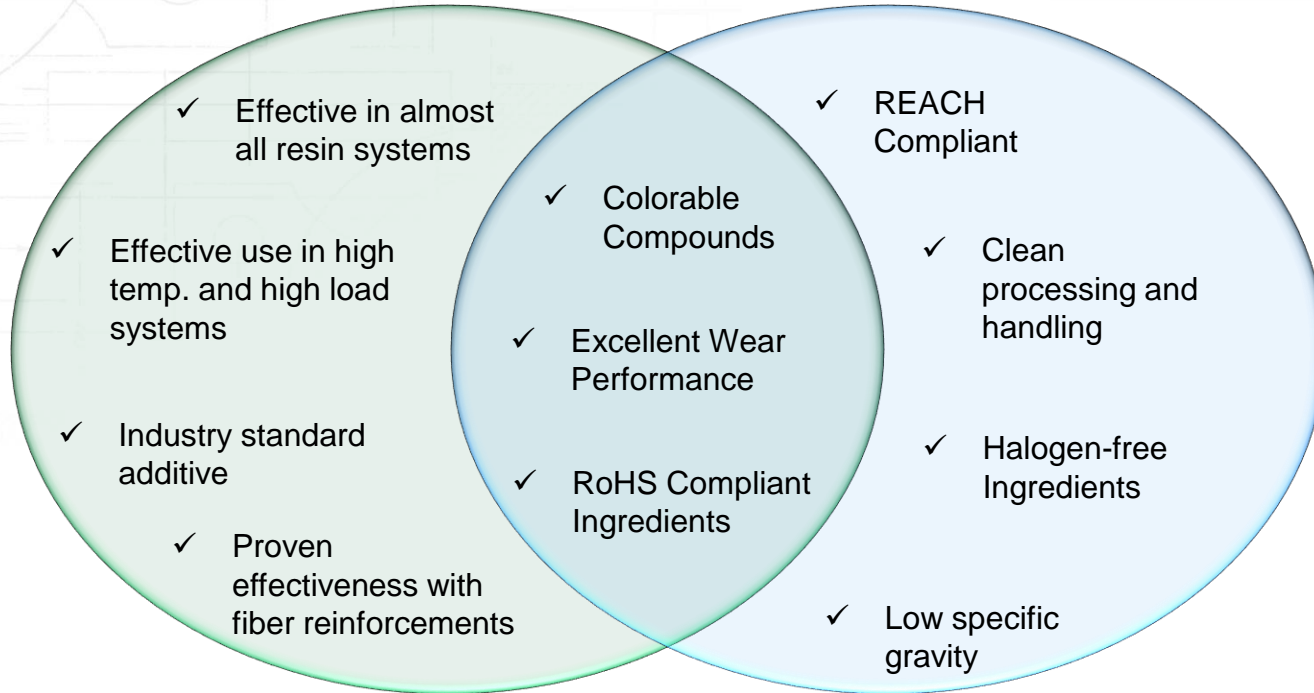
## A unique polymer alloy technology offering:

- Improved wear and friction performance
  - ✓ especially effective in plastic vs. plastic wear
- Safe/easy handling (halogen-free, RoHS)
- Good retention of base resin physical properties
- Lower specific gravity than PTFE
- Reduction/elimination of plate-out associated with PTFE
- Colorable

# WEAR ADDITIVE COMPARISON

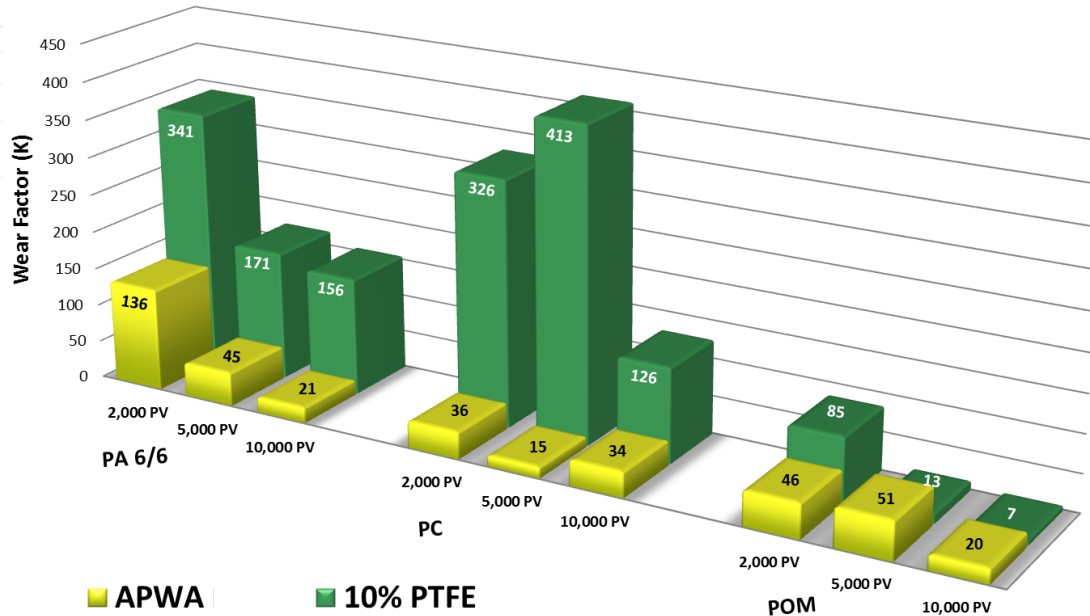
PTFE

APWA



# TESTING RESULTS

## Wear Performance of 10% PTFE Vs. APWA in PA6/6, PC, and POM



Tested against C1018 Steel

# ADDITIVE PERFORMANCE

## Comparison of properties: Nylon 6/6

|                | Specific Gravity | Notched Impact |     | Tensile Strength |     | Tensile Strain | Flexural Modulus |       |
|----------------|------------------|----------------|-----|------------------|-----|----------------|------------------|-------|
|                |                  | ft-lb/in       | J/m | psi              | MPa |                | psi              | MPa   |
| RTP 200        | 1.14             | 1.0            | 54  | 12,000           | 83  | 10+            | 400,000          | 2,759 |
| RTP 200 (APWA) | 1.12             | 1.1            | 59  | 10,000           | 69  | 10+            | 400,000          | 2,759 |
| RTP 200 (PTFE) | 1.20             | 1.0            | 54  | 10,500           | 72  | 10+            | 430,000          | 2,966 |



# ADDITIVE PERFORMANCE

## Comparison of properties: Polycarbonate

|                | Specific Gravity | Notched Impact |     | Tensile Strength |     | Tensile Strain | Flexural Modulus |       |
|----------------|------------------|----------------|-----|------------------|-----|----------------|------------------|-------|
|                |                  | ft-lb/in       | J/m | psi              | MPa |                | psi              | MPa   |
| RTP 300        | 1.19             | 15.0           | 795 | 8,500            | 59  | 10+            | 340,000          | 2,345 |
| RTP 300 (APWA) | 1.15             | 12.3           | 652 | 7,000            | 48  | 10+            | 310,000          | 2,138 |
| RTP 300 (PTFE) | 1.25             | 3.5            | 186 | 8,500            | 55  | 10+            | 330,000          | 2,276 |

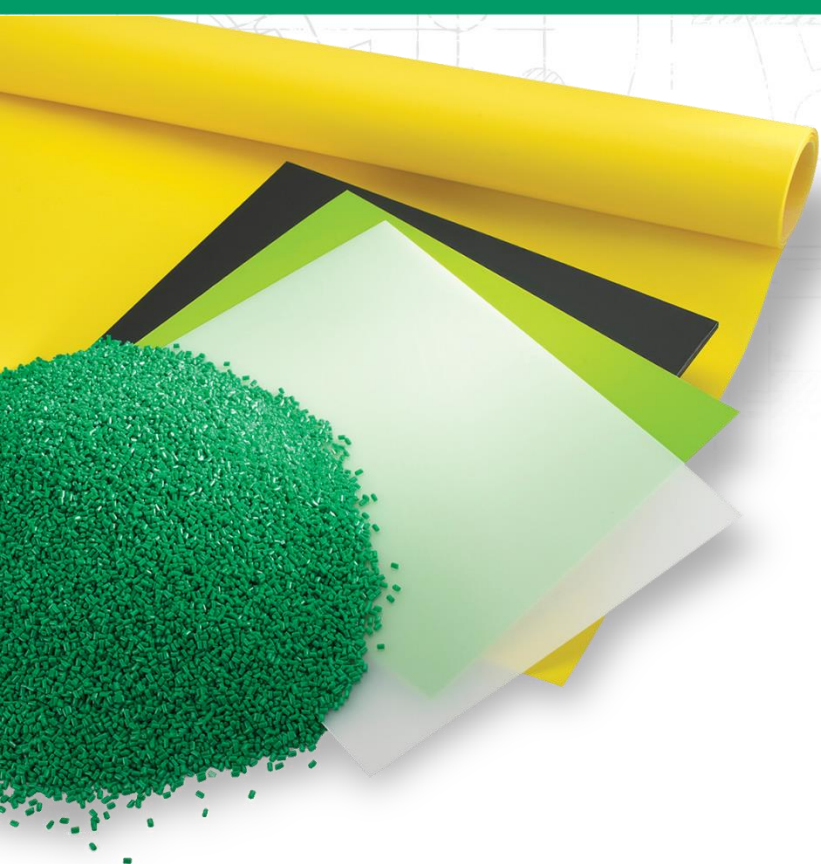
# ADDITIVE PERFORMANCE

## Comparison of properties: POM

|                | Specific Gravity | Notched Impact |     | Tensile Strength |     | Tensile Strain | Flexural Modulus |       |
|----------------|------------------|----------------|-----|------------------|-----|----------------|------------------|-------|
|                |                  | ft-lb/in       | J/m | psi              | MPa |                | psi              | MPa   |
| RTP 800        | 1.41             | 1.5            | 80  | 8,700            | 60  | 10+            | 350,000          | 2,414 |
| RTP 800 (APWA) | 1.36             | 1.1            | 59  | 7,000            | 48  | 10+            | 300,000          | 2,069 |
| RTP 800 (PTFE) | 1.45             | 1.0            | 54  | 7,500            | 52  | 10+            | 320,000          | 2,207 |

# SUMMARY

- APWA is a PTFE-free, effective wear & friction technology
- It offers significant and unique value by offering (compared to PTFE)
  - ✓ Significantly lower gravity (more parts per lb/kg)
  - ✓ Outstanding tribological performance
  - ✓ Less detrimental effects on physical properties of the base resin as it is a polymeric **alloy** not an additive/particulate
  - ✓ Improved processing (less process plate out)
  - ✓ No halogen chemical content
  - ✓ Improved surface
  - ✓ Biocompatibility tested grades are available
- Where APWA may not fit, RTP Company has custom solutions to PTFE replacements



# THANK YOU!

*Questions?*

[rtpcompany.com](http://rtpcompany.com)

