



2019

## PTFE micro powders (HEROLUB)

## HEROFLON

- Joined the Daikin group in 2017
- Is a leading Italian company processing fluoropolymers and technical compounds with 30 years of experience
- Has been established in 1986 as start-up of the production of PTFE micro powders
- Has 3 subsidiaries in Italy and sales offices in Brazil and USA

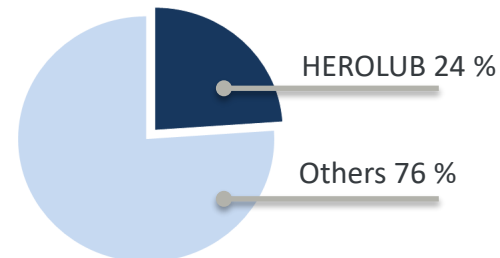
## Business ranges

- 1) Heroflon virgin PTFE
- 2) HEROCOMP PTFE Compounds
- 3) **HEROLUB PTFE micro powders**
- 4) HEROMELT PEEK and special products
- 5) HEROMELT fluoro-master batches
- 6) Heroflon Repro PTFE

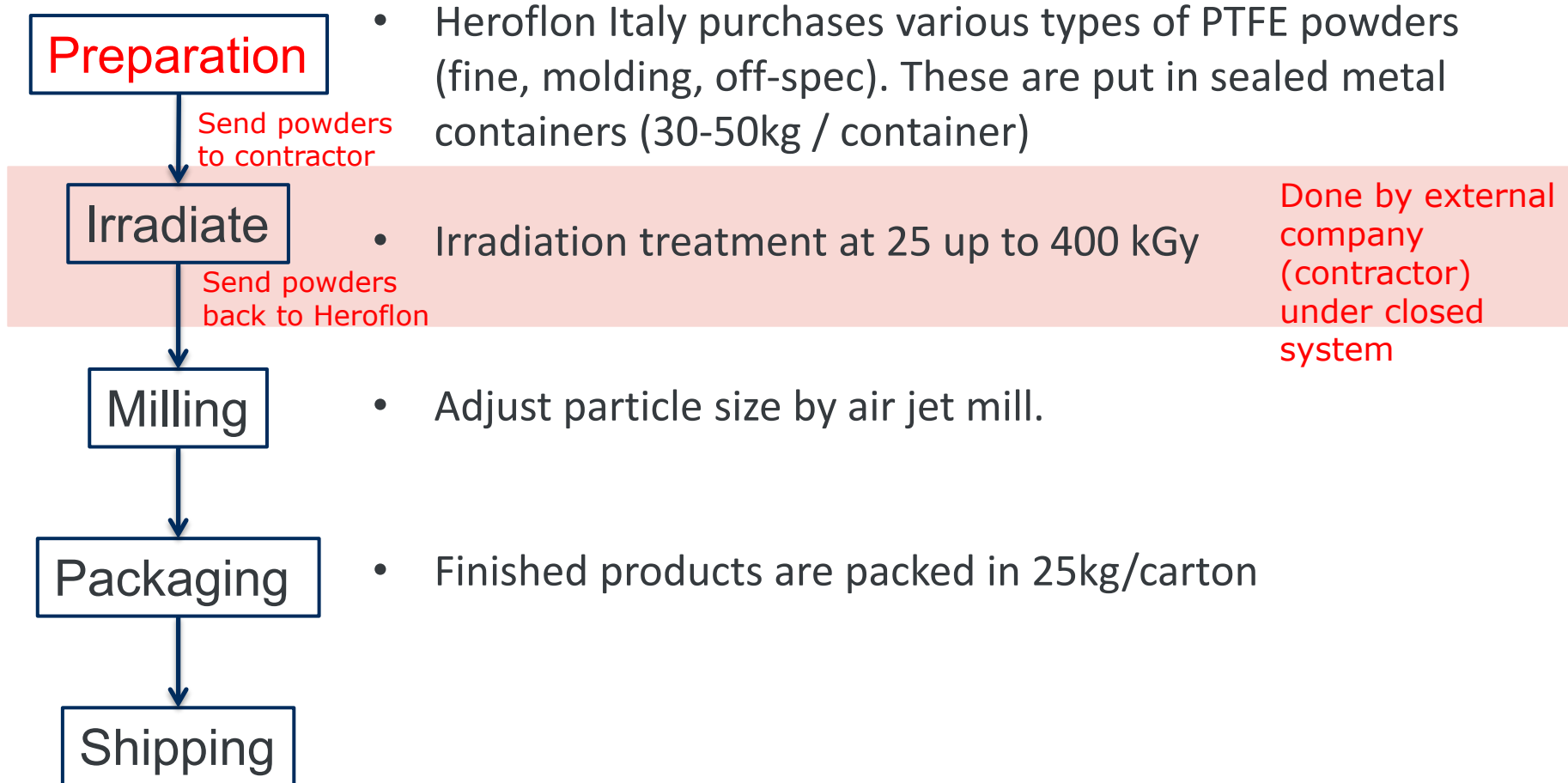


## PTFE micro powder business for HEROFLON

Sales 2017 (Qty) [REDACTED] (Amt) [REDACTED]



HEROFLON business in 2017



[REDACTED]

| Site       | Treatment quantity 2017 (MT) |
|------------|------------------------------|
| [REDACTED] | [REDACTED]                   |
| [REDACTED] | [REDACTED]                   |
| [REDACTED] | [REDACTED]                   |

- HEROLUB is a PTFE micro powder with a range of particle sizes from a few microns to several hundred microns.
- **C9-C14 substances are NOT used for producing HEROLUB.** However, **during Electromagnetic irradiation, C9-C14 PFCAs may be generated** and ultimately present in the resulting PTFE micro powder.



- PTFE

Molecular weight (M.W.): Several million



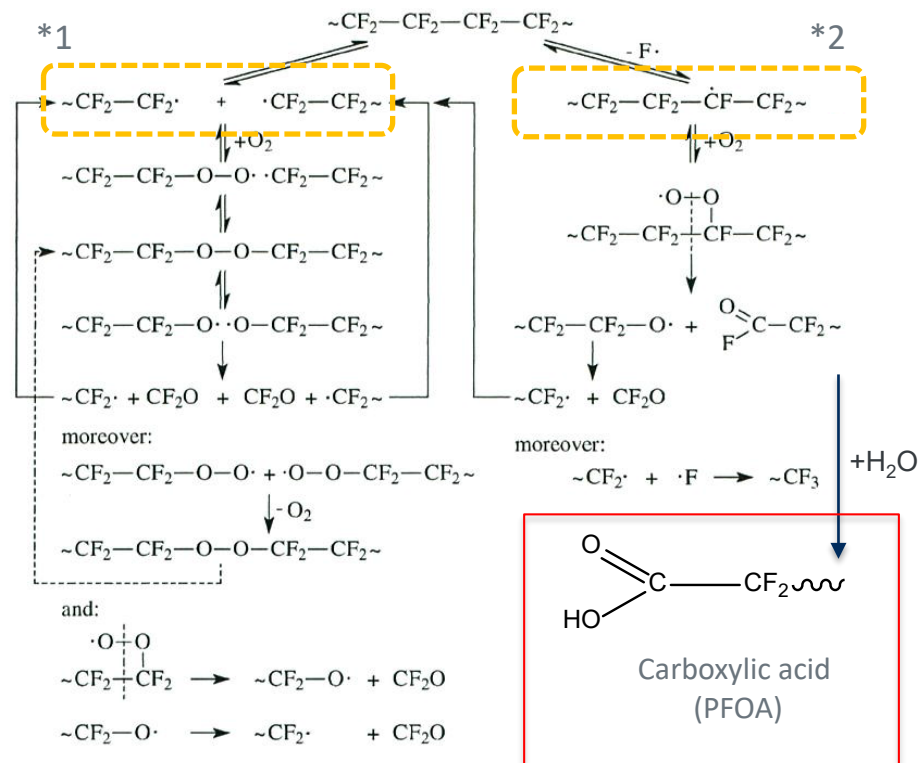
- PTFE micro powder

M.W. : Several hundreds of thousands



When PTFE decomposes by receiving irradiation to decrease molecular weight, some carboxylic acid is generated, being PFOA as well as other C9-C14 substances.

According to *THE JOURNAL OF CHEMICAL PHYSICS VOLUME 46, NUMBER 10 15MAY 1967*, the yield of the chain radical (\*1) is 10 times that of the propagating radical (\*2).



Ref.

K. Lunkwitz et al./ *Journal of Fluorine Chemistry* 125 (2004) 863-873

## HEROLUB's applications

PTFE micro powder is added into various matrix materials to reduce surface friction and wear. It reduces or avoids the need for lubrication of the finished components, both injection molded or extruded.

Sliding materials: additives to synthetic oils & greases, thermoplastics, elastomers, inks, painting

Thickening materials: additives to fluorinated oils

## HEROLUB's main downstream markets

Automotive, Industrial machinery

Semi-conductors/Electronics

Printing, Paints

## Typical Application of Lubricating Grease with PTFE micro powder

|                                                                                                                                      |                                                                                                                                                                                                               |
|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Automotive</b><br><br>                           | <b>Body &amp; exterior</b><br><br>Door lock cylinder<br>Sliding door - spindle drive<br>Roller shade - axle and guides<br>Wash water pump seals<br>Headlight telescope washer - seal                          |
|                                                                                                                                      | <b>Drive train</b><br><br>Steering angle sensor<br>Idle speed actuator<br>Fuel line connectors                                                                                                                |
| <b>Food processing</b><br><br>                      | <b>High temperature use</b><br><br>Rolling bearings and linear guides<br>Assembly paste for maintenance                                                                                                       |
|                                                                                                                                      | <b>Valves and fittings</b><br><br>Beverage valves and fittings<br>Beverage valves and fittings in sterile environments<br>Beverage, drinking water and heating valves<br>Sanitary beverage and heating valves |
| <b>Pharmaceutical processing machines</b><br><br> | <b>Blister packaging machine</b><br>Deep-drawing unit, film-sealing unit and elevation guides near the heated plates unit                                                                                     |
|                                                                                                                                      | <b>Coater, fluidised bed system</b><br>Seals (e.g. O-rings) of the spray nozzle                                                                                                                               |
|                                                                                                                                      | <b>Filling machine (for liquids)</b><br>Seals, O-rings for filler heads                                                                                                                                       |
|                                                                                                                                      | <b>Speciality lubricants</b><br>Seal lubrication under hygienic conditions                                                                                                                                    |

Daikin would need a **company- specific exemption** for the impurities of C9-C14 substances during the production of PTFE micro powder.

*‘a 5-year exemption for the production, use and placing on the market of PTFE micro powder produced by Electromagnetic irradiation up to 400 kGy with concentration **limit of 1000 ppb for the sum of C9-C14 PFAS**’*