



**Smooth dosage-strong
impact:
Low-Friction and Glass-
Filled Makrolon®
for Medical Devices**

**Healthcare Webinar
on 30. March 2021**

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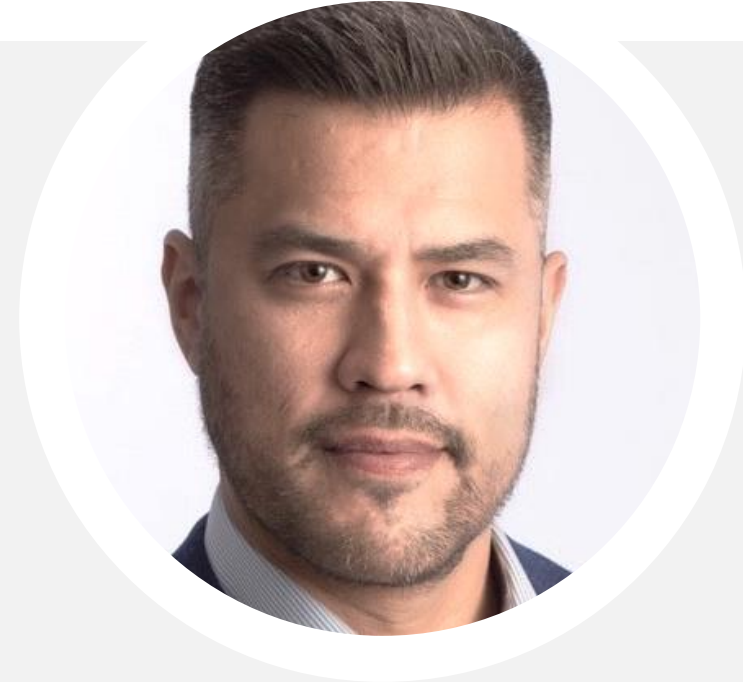
Who is presenting today?



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Covestro

Leading in the world of plastics...



Global player

- €12.4 bn in sales
- 17,200 employees
- Listed on the DAX stock exchange

- 33 production sites worldwide
- Close to markets, customers and suppliers

Large portfolio

- Products and solutions for many industries

Highly innovative

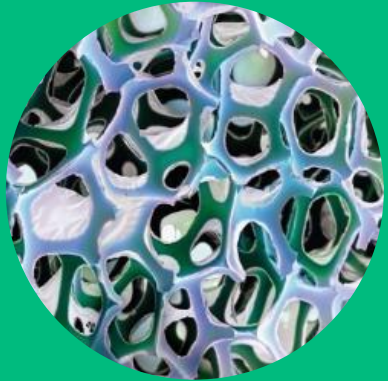
- 1,200 employees in research and development
- 80 years of ideas and inventions

Financial year 2019;
¹calculated as full-time equivalent (FTE)

Covestro at a glance

We are providing high tech material solutions within three industry-leading, business units

Polyurethanes



Raw materials
for rigid and flexible
foams

Polycarbonates



Granules for a
wide variety of
applications

Coatings, Adhesives & Specialties



Raw materials
for coatings,
adhesives and
specialties

Basic Chemicals



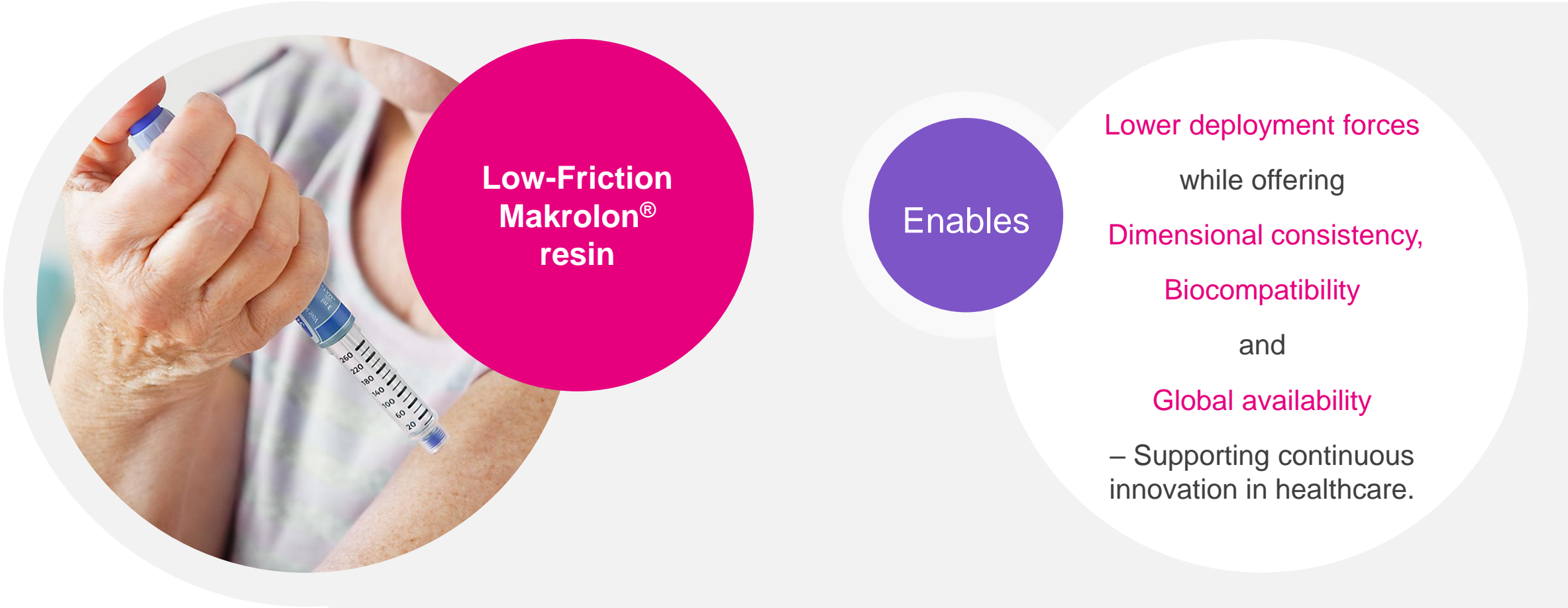
Chlorine production
as the backbone for
product manufacture

SMOOTHER MOVER.

Introducing:
Low-Friction Makrolon®
Polycarbonates



Covestro Healthcare Products - Low Friction Makrolon®



Low-Friction
Makrolon®
resin

Enables

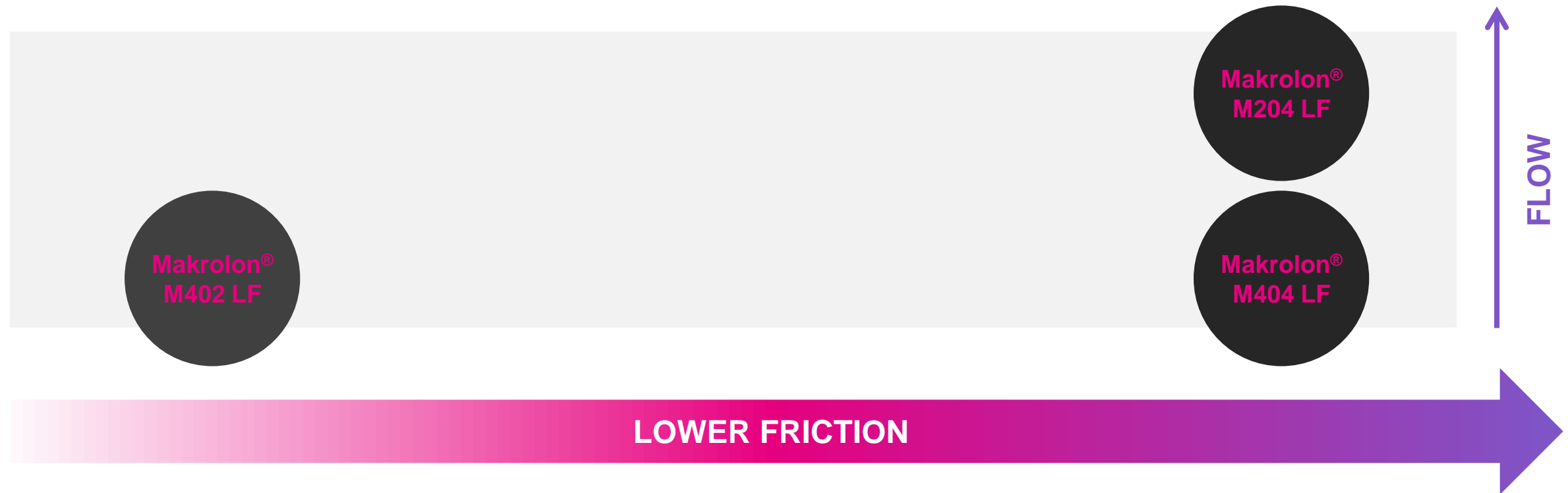
Lower deployment forces
while offering
Dimensional consistency,
Biocompatibility
and
Global availability
– Supporting continuous
innovation in healthcare.



Covestro Healthcare Products – Low-Friction Makrolon®

... with new opaque materials offering a variety of friction reduction and flow

Low-Friction Makrolon® delivers smoother movement



Covestro Healthcare Products – Low-Friction Makrolon®

...in a variety of device designs that have **plastic-on-plastic sliding** components



**Helping
deliver pharmaceuticals with ease**



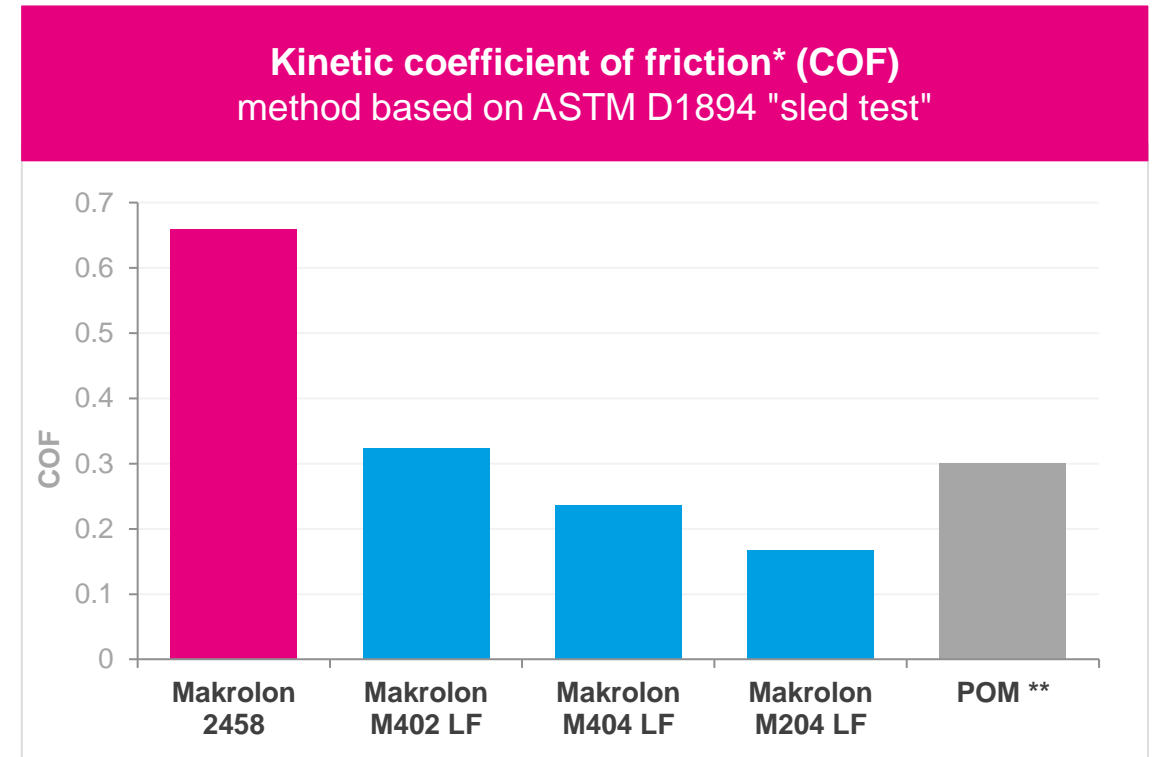
**Easing
the work of surgeons**



**Assisting
Healthcare workers**

Covestro Healthcare Products – Low-Friction Makrolon®

- With similar or better COF as POM†
- Reduces inconsistency with:
 - Manual application of a lubricant to devices
 - Including additives at the press



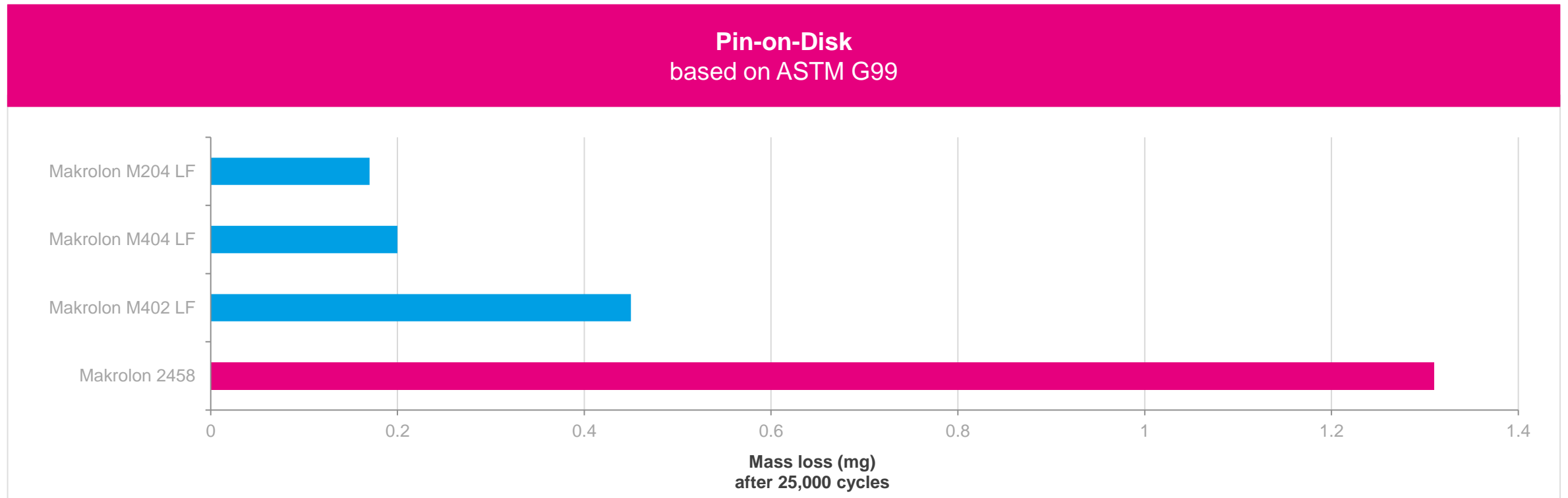
→ To make medication **delivery easier** for patients and healthcare professionals

* Self- COF

** Typical value for POM from supplier datasheets; test methods may differ

Covestro Healthcare Products – Low-Friction Makrolon®

... resin exhibits improved wear when compared to polycarbonate



→ Demonstrates **reduction in wear** that can better support mechanical operation

Covestro Healthcare Products – Low-Friction Makrolon®

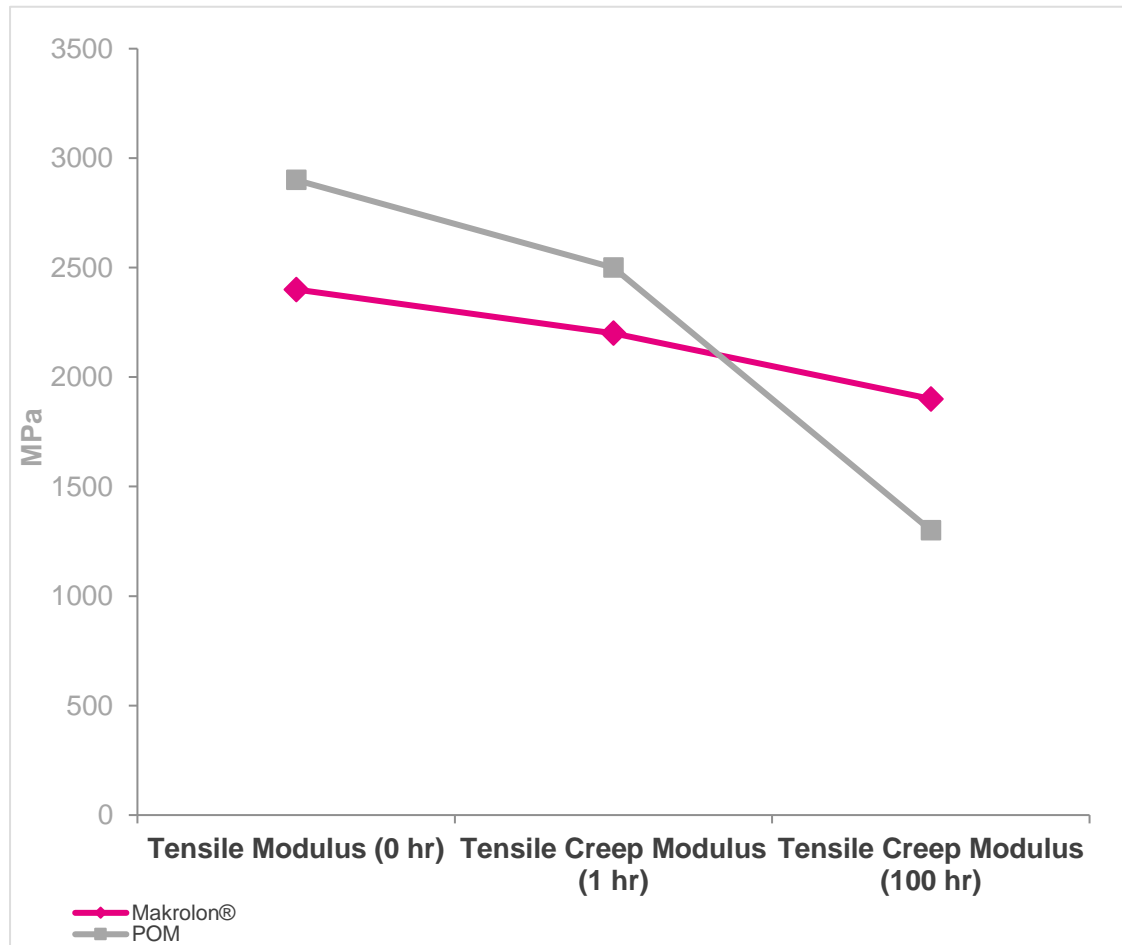
... resin has an added benefit of reduced demolding force

Products	Part ejection pressure (MPa)
Makrolon 2458	1.99
Makrolon M402 LF	1.57
Makrolon M404 LF	1.19
Makrolon M204 LF	1.13

May ease injection molding and enable more intricate part designs

Covestro Healthcare Products – Low-Friction Makrolon®

... has an added benefit of reduced demolding force



- Parts are consistently produced, with Makrolon® resin having *lower shrink rates* compared to POM

Shrink rate:

- Makrolon® 0.5%-0.7%
- POM 2%

- Makrolon® resin can be sterilized with *high energy radiation* to meet all your medical device sterilization needs
- Less creep over time* with Makrolon® allows devices to hold their fit over time



**WHEN ONLY
STRONG WILL DO.**

Introducing:
**Glass-Filled Makrolon®
Polycarbonates**



Covestro Healthcare Products - Glass-filled Makrolon®

A circular inset image showing a surgical procedure. A person in a blue surgical gown is using a surgical instrument to work on a patient's skin. The image is slightly blurred, focusing on the hands and the instrument.

**Glass-Filled
Makrolon®
resin**

Enables

Superior
and
Lasting
Product properties

Covestro Healthcare Products - Glass-filled Makrolon®

Surgical instruments



Need for single-use sterile surgical instruments to reduce risk of infection

Use of rigid thermoplastic can be more economical than metal

Drug Delivery devices



Delivery of high volume and more viscous biologic drugs require different devices

Stronger components required to maintain dimensional stability under spring load

→ Our **Medical Glass-Filled Makrolon®** polycarbonates offer a range of options with **superior rigidity, dimensional stability** and **biocompatibility** for devices that **demand lasting strength.**



Covestro Healthcare Products - Glass-filled Makrolon®

...a range of options for devices that demand superior and lasting strength

High-flow series

Makrolon® M410 GF

Makrolon® M420 GF

Makrolon® M430 GF

→ For filling larger or thinner parts

High-performance series

Makrolon® M810 GF

Makrolon® M820 GF

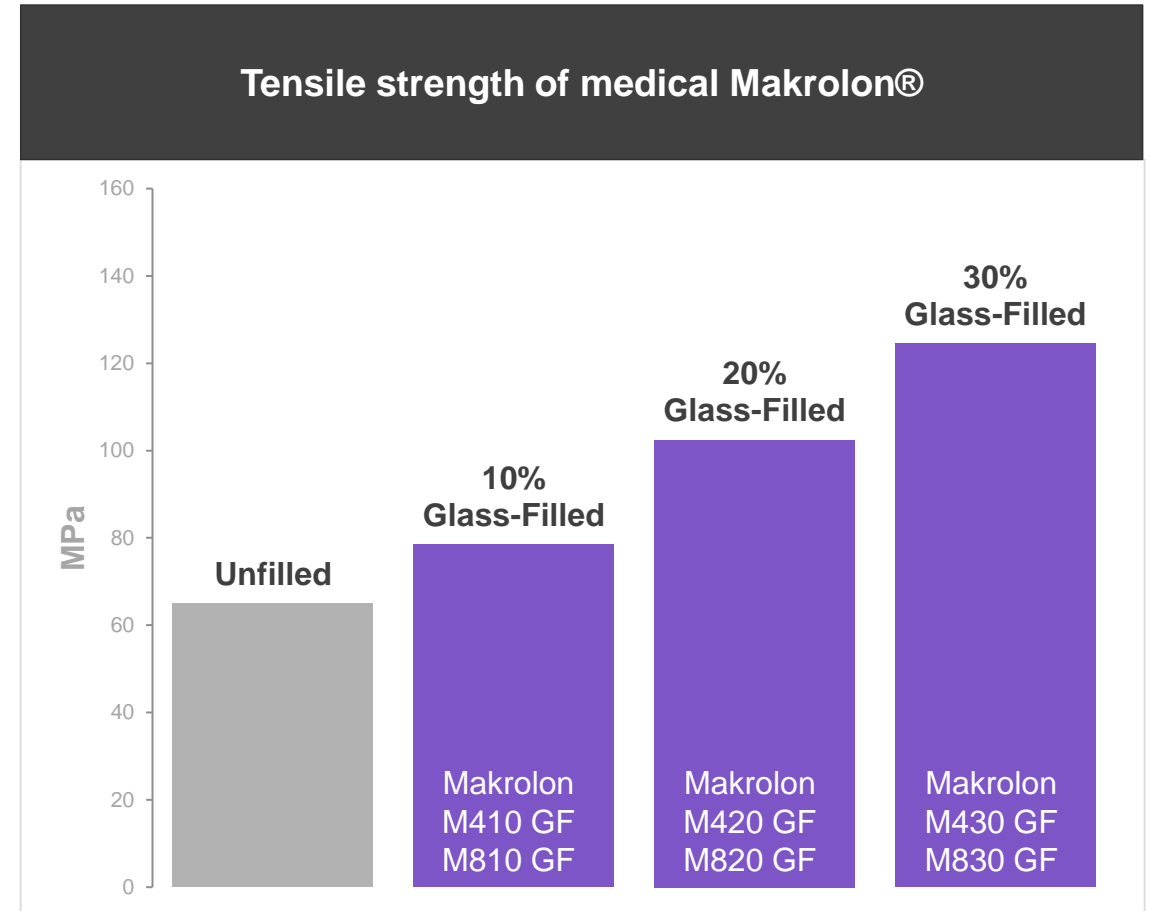
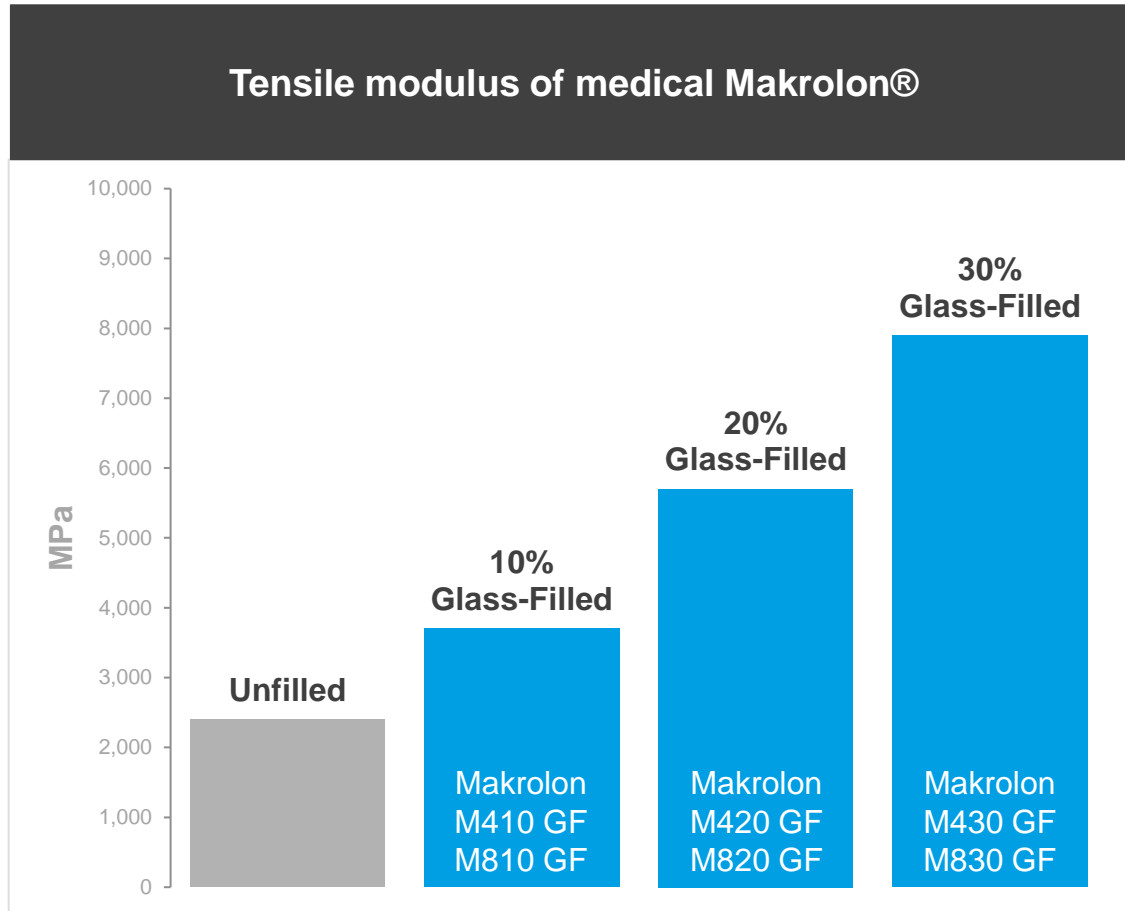
Makrolon® M830 GF

→ For better impact properties



Covestro Healthcare Products - Glass-filled Makrolon®

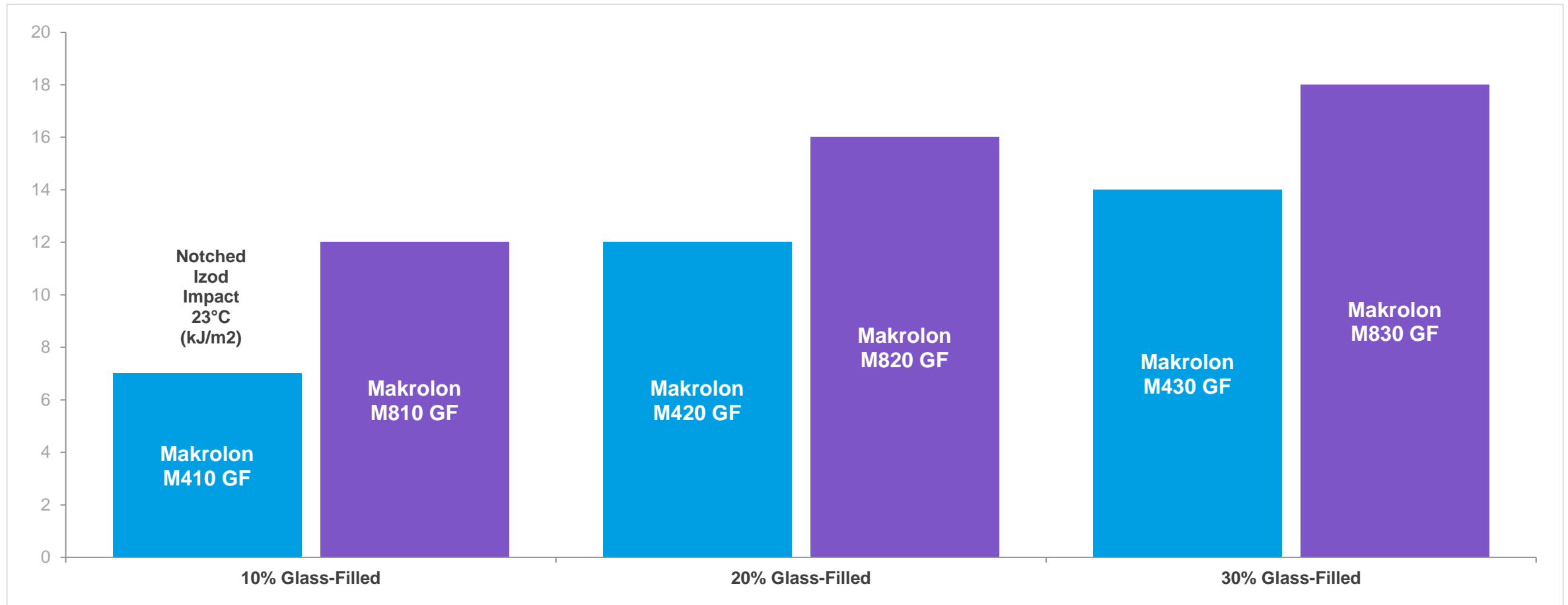
... resin is **stiffer** and **stronger** when compared to unfilled Makrolon®





Covestro Healthcare Products - Glass-filled Makrolon®

is **impact resistant** with improved values from high-performance Makrolon® M 800 series



Medical Glass-Filled Makrolon[®] resin

offers the best overall combination of properties when compared to alternative glass-filled resin

Makrolon[®] GF

less sensitive to humidity changes

less sensitive to temperature changes

lower shrinkage

more creep resistant

stiffer and stronger when conditioned

more resistant to radiation sterilization¹

Polyamide GF

higher melt flow

higher HDT

slightly higher impact resistance

→ Glass-filled thermoplastic comparison

¹ AAMI TIR17: 2017 - Compatibility of Materials Subject to Sterilization
Comparisons based on supplier technical datasheets (conditioned samples)



Medical Glass-Filled Makrolon[®] has consistent strength with less sensitivity to moisture and faster equilibration than glass-filled polyamide

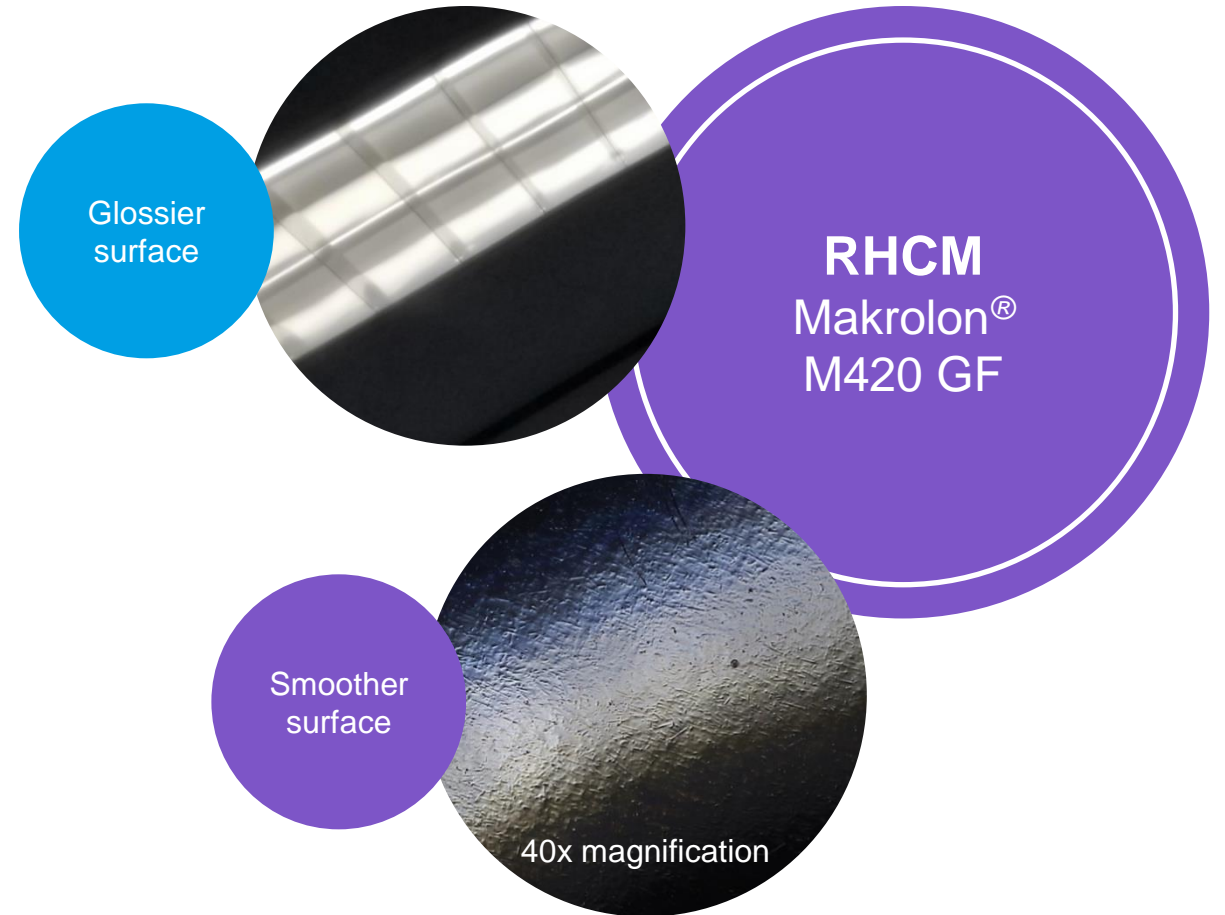
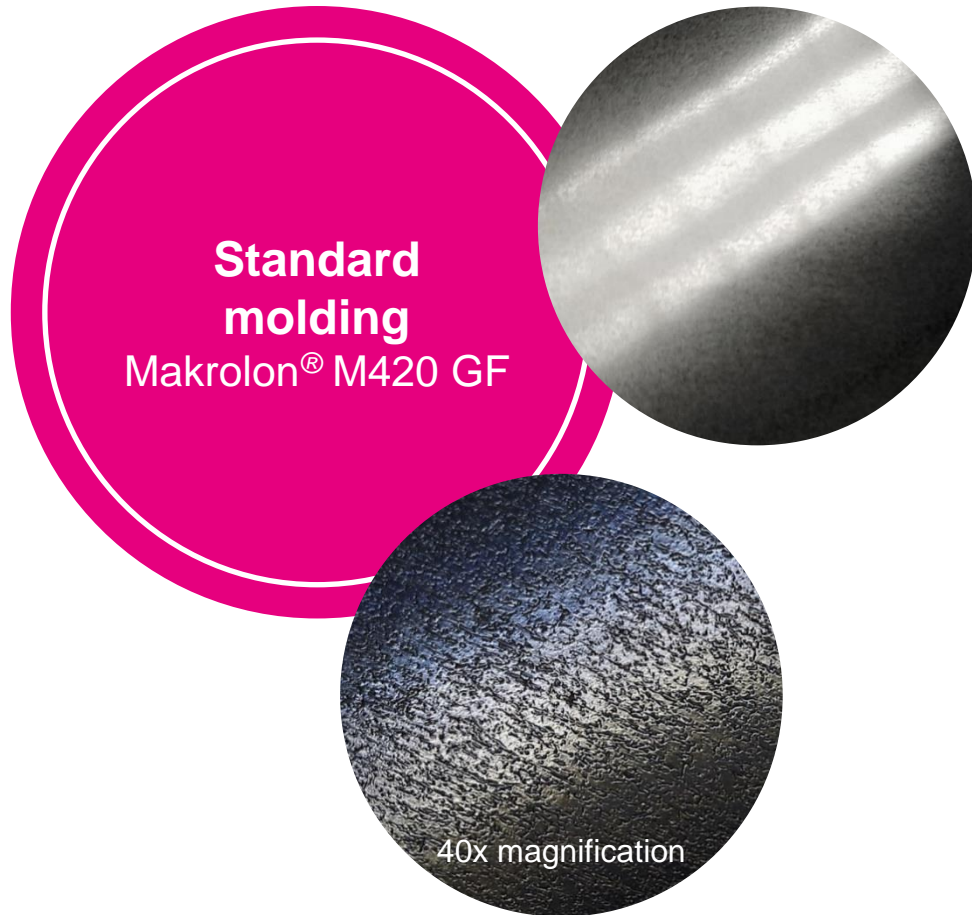
	Exposure time in 100% humidity	Makrolon [®] M430 GF	Polyamide 30% Glass-Filled
Tensile modulus	12 days	0%	- 25%
	55 days	- 1%	- 45%
Tensile strength	12 days	- 9%	- 37%
	55 days	- 11%	- 62%

→ Medical Glass-Filled Makrolon[®] is consistently strong in varying environmental conditions

Percent change in properties from dry (as molded) to wet conditions

100% humidity via immersion in water. Tensile measurements at 23°C per ISO 527 without conditioning.

Achieve the **highest surface quality** possible with Medical **Glass-Filled Makrolon[®]** and Rapid Heat Cycle Molding (RHCM)



Innovating our Healthcare portfolio

with **Medical Low-Friction & Glass-Filled Makrolon®**

Biocompatible per
ISO 10993-1 and
USP Class VI for
contact of 30 days or
less

Product
stewardship

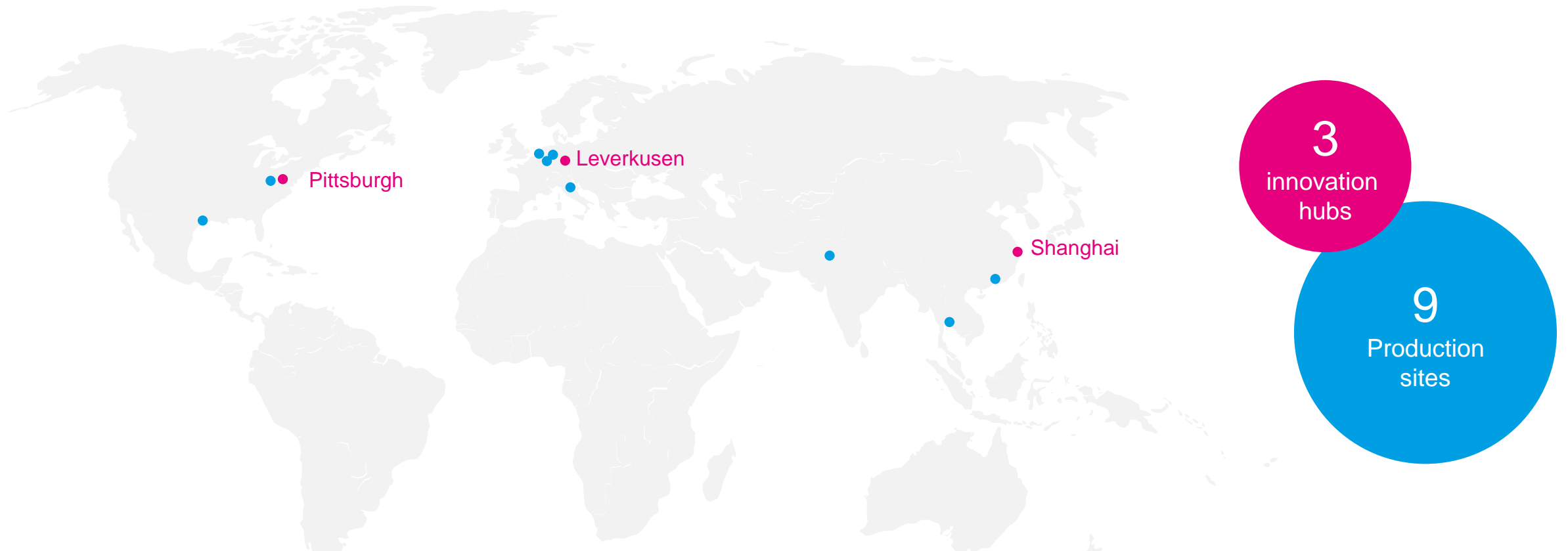
Supplier
notification of
change

FDA Device (MAF)
and Drug Master
File (DMF) can be
set up upon
customer request

Manufactured at
ISO 9001 certified
sites that follow
GMP standards



You'll find us around the world ... and just around the corner



→ We take pride in the **global consistency, quality and reliable supply** of our healthcare polycarbonate materials

A person wearing a white lab coat and a blue tie is shown from the chest down, holding a large amount of bright pink, granular material in their cupped hands. The background is a plain, light-colored wall.

**As you like it,
as you need it**

Customization
available for a
variety of
opaque colors

Additional resources

New technical information is shared via our **Healthcare Polymers eNewsletter**



- Subscribe to the newsletter [here](#)
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First Name

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Thank you for your participation!



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