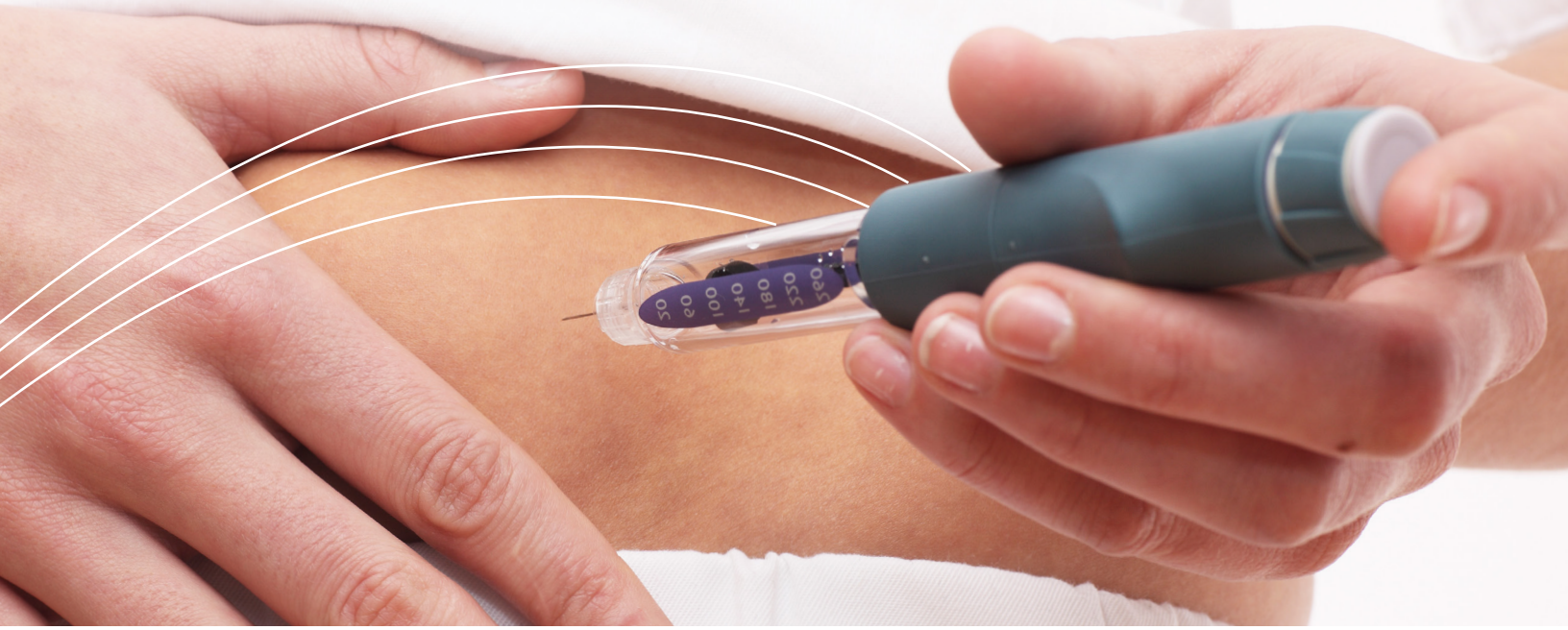
SOLUTION SHOWCASE

Integrated approach to patient-centric drug delivery

Harnessing advanced polymers for enhanced safety, reliability, and user experience in autoinjectors



Transforming patient experience through effective self-administration devices

By giving patients the means to safely self-administer injectable therapies at home, auto-injectors are playing an increasingly important role in the patient-centric future of drug delivery. To facilitate this shift, manufacturers of auto-injector devices must accommodate the specific properties of a medicine dose within a robust and user-friendly device. This requires the use of high-performance materials that meet mechanical, dimensional, and regulatory performance requirements.

Enhanced durability: Achieved through superior creep resistance, impact performance, and weld-line strength.

Smooth injection operation: Improved low friction for enhanced performance and reduced wear.

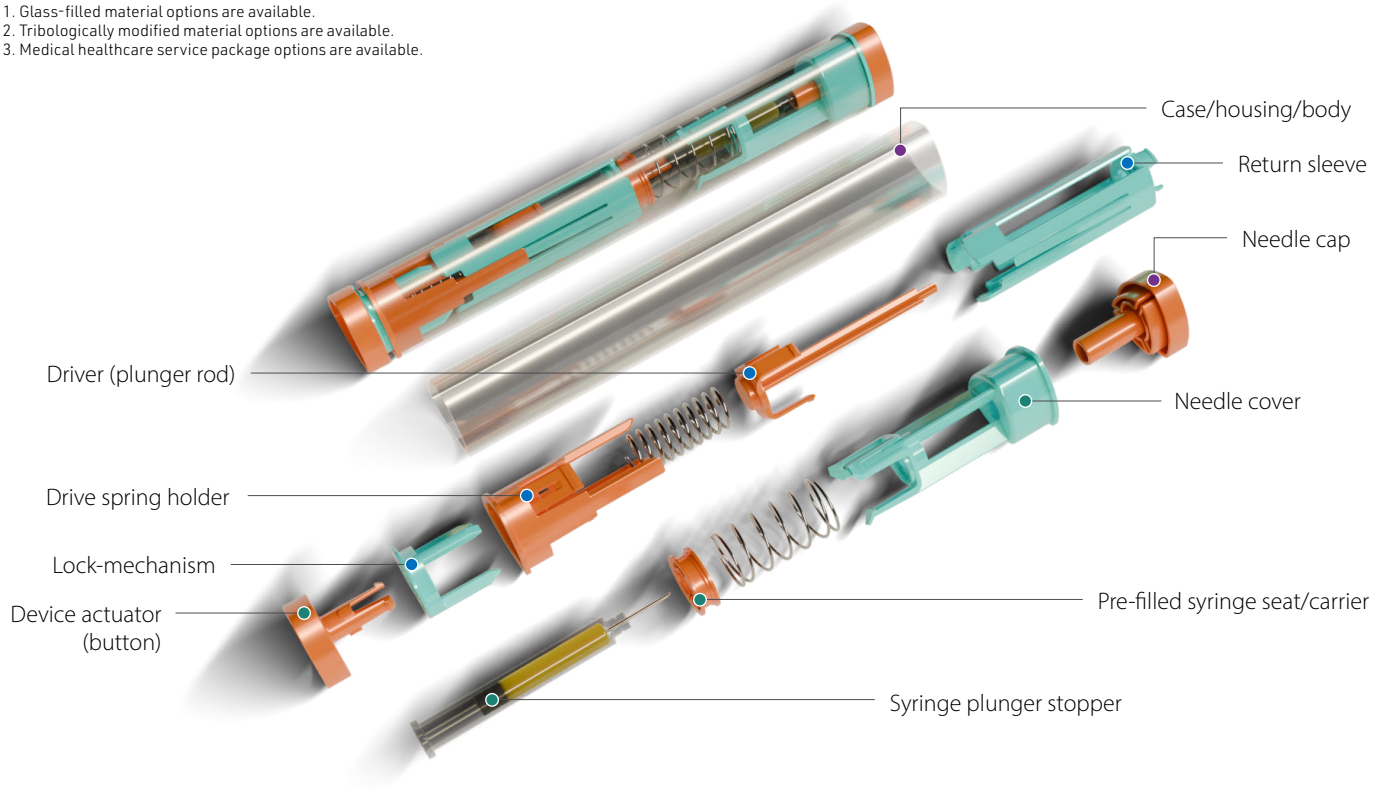
Sustainability: Biobased (ECO-B), carbon capture (ECO-C), PFAS-free, approved grades.

Celanese

Components and Celanese product options

Brand		Celanex® MT®	Hostaform® MT®	OmniTech® HCT®	Santoprene* MED	Fortron® MT®	Vectra® MT®	Zytel®
	Polymer	PBT[1/2]	POM[2]	ABS	TPV	PPS[1]	LCP[1/2]	PA66[1/3]
Outer structure	Case/housing/body/ device actuator			•				
Injection mechanism (power-pack)	Driver (plunger rod)	•	•			•	•	•
	Drive spring holder	•	•			•	•	•
	Return sleeve	•	•			•	•	•
	Lock-mechanism	•	•					
User interface and safety	Buttons/device actuator	•	•	•				
	Syringe plunger stopper				•			
	Pre-filled syringe seat/carrier	•	•		•			
	Needle cover/cap		•		•			

1. Glass-filled material options are available.
2. Tribologically modified material options are available.
3. Medical healthcare service package options are available.



Proven performance

Every auto-injector is designed to deliver a single medication injection, demonstrating **safety, reliability**, and **ease** of use to ensure users can administer an accurate dose intuitively and on demand. The key design criteria include dose accuracy and push force.

This might be a third-party caregiver administering an emergency injection to treat patients with a condition such as epilepsy or an allergic reaction. Alternatively, it might be the patient using the device to conveniently manage the delivery of their prescribed therapy, whether a small daily dose or a larger amount of a more viscous, biologic drug injected weekly or monthly.

Critically, all elements of the auto-injector device must combine to support a one-time injection without fail. This underlines the requirement to employ materials that have **enhanced mechanical properties** to meet patients' expectations and pharmaceutical regulators' stringent demands.

One-stop medical materials solutions partner

Celanese is a one-stop supplier of engineered materials for autoinjectors and drug-delivery devices. Celanese supports global healthcare partners and drug delivery system manufacturers in the development and selection of engineered plastics. With its expertise, Celanese helps ensure that products adhere to critical safety and functionality standards while also enhancing the overall user experience.

Committed to innovation and quality, Celanese provides a diverse range of high-performance materials tailored for pharmaceutical and medical applications, with a strong focus on sustainability.

The company offers a **comprehensive medical portfolio**, customized color compounds, and risk-mitigating medical service packages. By maintaining local connections for reliable support, we effectively cater to our partners' needs by **reducing risk, increasing reliability, and enhancing speed to market**.

Additionally, our ECO-B, ECO-C, and PFAS-free offerings further reflect our commitment to environmentally responsible solutions, making us a key partner in the industry.

Advancing auto-Injectors: The role of high-performance polymers in enhancing drug delivery

With the shift toward more viscous biologic drugs and long-acting therapies, the need for auto-injectors with greater injection forces and improved spring strength has risen. This trend emphasizes the importance of **creep-resistant polymers that provide superior mechanical performance and meet regulatory standards**, allowing engineers to optimize designs for future auto-injectors.

Low-friction, glass-filled reinforced polymers are essential for meeting the high demands of auto-injector components, particularly the plunger rod and spring holder, which must withstand increasing spring forces from highly viscous drugs. Traditional materials can increase the risk of device failure, making advanced materials crucial for minimizing creep and ensuring dose integrity.

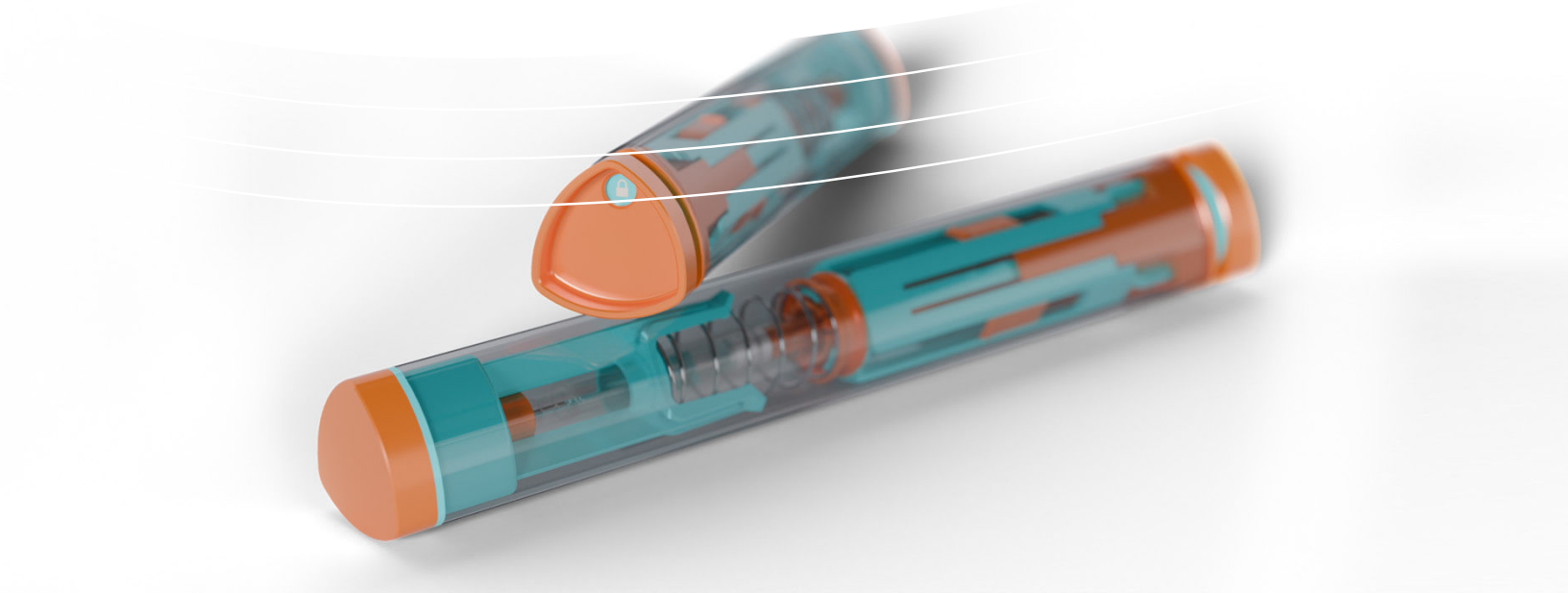
Celanese's commitment to sustainable medical solutions

Recognizing the increasing desire of the value chain to deliver sustainable solutions, Celanese has developed commercially available sustainable options for many of its brands. These sustainable options for medical solutions include:

- **ECO-B** grades utilizing bio-circular feedstock and a mass balance approach to deliver drop-in solutions.
- **ECO-C** grades, produced from captured CO_2 emissions and low-carbon hydrogen, also adhering to the mass balance principle.
- **PFAS-free medical thermoplastic compounds** for low-friction medical device components

Celanese is expanding its differentiated chemistry and specialty materials solutions to help customers lower their product's carbon footprint and move towards a sustainable economy.

The company supports its customers by providing detailed **life-cycle analysis (LCA)** material data. This data offers insights into the environmental impact of Celanese products from cradle to gate, allowing customers to make informed and sustainable choices that benefit the environment.



Autoinjector component enhancing materials – medical grades

Product	Polymer	Key attributes
Celanex® MT®	**PBT**	• Good balance of strength and stiffness • Good surface appearance and colorability (custom color compounds available) • PFAS-free tribologically-modified and/or glass-filled grades • Broad range of viscosities • ECO-B grades made from bio-circular feedstock (organic waste-based) are available
Hostaform® MT®	**POM**	• Excellent stiffness and good dimensional stability • Inherently low wear- and friction performances (PFAS-free tribologically-modified versions available) • Good colorability (custom color compounds available) • Inherently low CO_2 footprint compared to most other engineering materials • ECO-B grades made from bio-circular feedstock (organic waste-based), and ECO-C grades made from captured CO_2 emissions converted into methanol are available
OmniTech® HCT®	**ABS**	• Excellent balance of impact resistance and dimensional stability (low shrinkage) • Superior aesthetical properties (superior colorability, gloss, and haptics) • Excellent weld-line strength and processability
Santoprene® MED	**TPV**	• Superior haptics (soft touch applications) • Soft/hard material combinations possible with modified grades for easy bonding with ABS, PS, PC, PMMA, ASA, PET, and PPO/PS blends • Excellent compression set and sealing performance • Easier to process vs. thermoset rubber (TSR) • Excellent colorability
Fortron® MT®	**PPS**	• Superior balance of mechanical strength and stiffness • Superior creep resistance and creep modulus • Very low moisture absorption and excellent hydrolytic resistance • Low and isotropic shrinkage
Vectra® MT®	**LCP[1/2]**	• Rapid cycle times and superior flow to fill sub-mm wall sections • Improved strength & stiffness for <1mm thick parts • Low shrinkage for complex designs with tight tolerance requirements • ECO-B grades made from bio-circular feedstock (organic waste-based) are available
Zytel®	**PA66[1/3]**	• Good balance of mechanical strength and stiffness (conditioned state) • Versatile sterilization performance • Excellent weld-line strength • Good resistance to a broad range of chemical disinfectants • Good colorability

1. Glass-filled material options are available.
2. Tribologically modified material options are available.
3. Medical healthcare service package options are available.

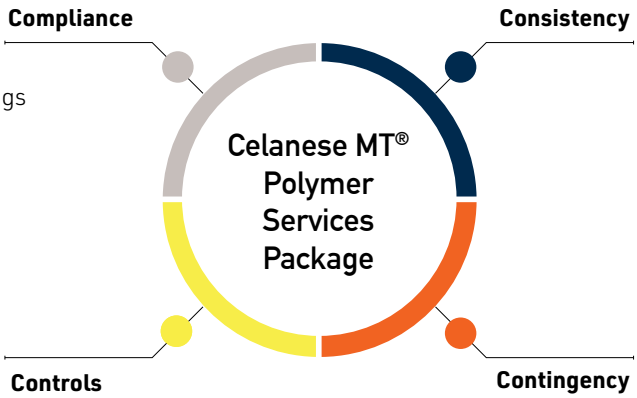
Differentiated capabilities and services

At Celanese, we are committed to providing your team with customized polymer services packages designed for medical industry projects. We offer industry-leading experience in part design and development, extensive expertise in tribological testing, robust in-house testing capabilities, and strong quality and supply assurances.

Highlights of features in the **MT® Polymer Services Package** include

- Material compliance with FDA and EU food contact requirements
- Long-term supply assurance and defined change management processes
- Animal-free and latex-free formations
- Certified biocompatibility (USP 23 Class VI / ISO 10993, etc.)
- Access to FDA Master Files, including Drug (DMF) and Devices (MAF) listings
- Expanded certification of inspection
- Support in Regulatory Approvals
- Melamine-free materials

Please contact your Celanese representative to learn about this MT® and additional medical polymer services packages.



Transforming industries and improving lives through materials science

The foundation of everything we do at Celanese centers around what our customers need. It's not just about the solutions we innovate, but also how we work with our customers. Through our worldwide network of innovation and technical centers, our leading researchers work in close collaboration with customers, from concept to commercialization, using a wide range of processing, prototyping technologies, and testing expertise.

Discover more

For more information about **innovative polymers for high-performance auto-injectors**, contact your Celanese representative.

Celanese – your partner throughout the medical device lifecycle

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