



AUTO-INJECTOR APPLICATION STUDY

MATERIAL TECHNOLOGIES +
SERVICES FOR NEXT
GENERATION DESIGNS

Innovating Design

Medical innovations and plastics have gone hand-in-hand to make healthcare **safer, cleaner, and more accessible for all.**

Auto-injectors are a prime example of innovation with a **focus on patient needs**, bringing greater convenience and control to patients' lives.

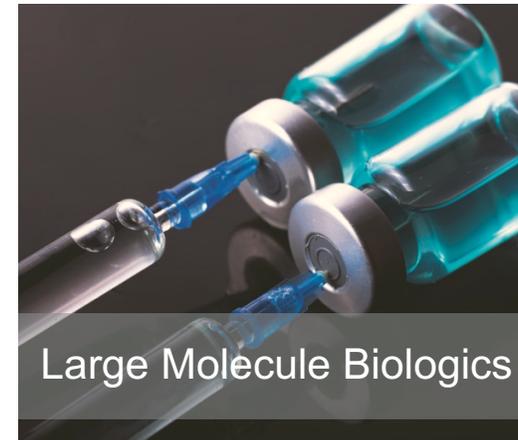
All auto-injector designs and renderings in this presentation were produced by Avient Design for conceptual purposes



Trends

Patient and drug development needs are **evolving** at a rapid pace.

What services and innovative polymer solutions could you leverage to **solve challenges** in your next generation designs?

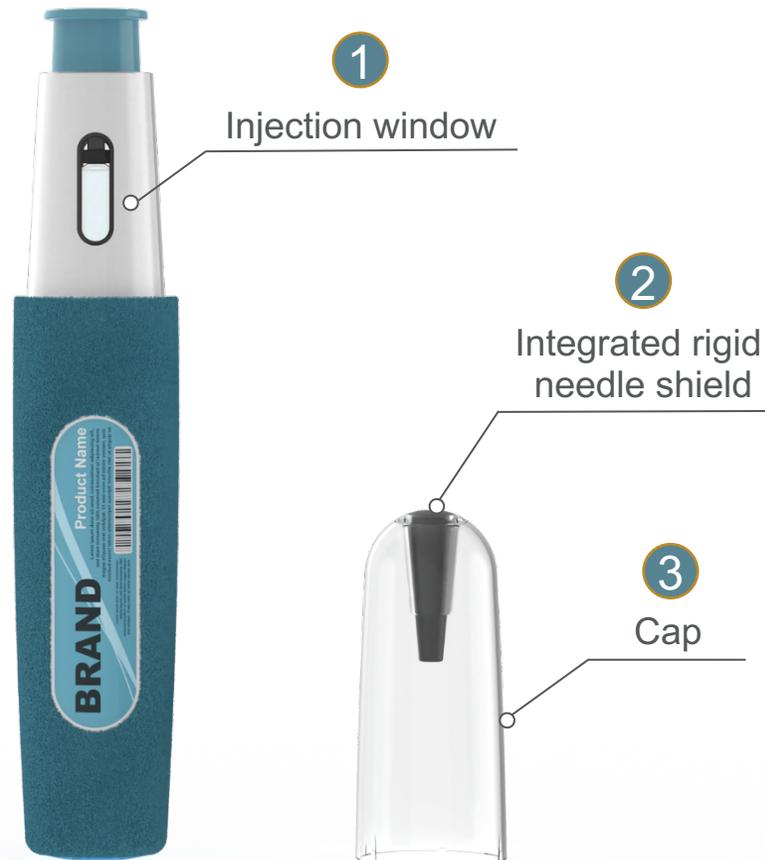


Healthcare Solutions

Products and components must meet **regulatory standards and application-specific demands** that deliver patient safety, security and comfort.

We can help **tackle your toughest challenges** with our

- In-depth industry knowledge
- Expansive material solutions
- Far-reaching technical capabilities and services



1. Requirements:

Excellent clarity, scratch resistance and exceptional toughness for visualization of medicant levels

Solution:

Avient Distribution HC Portfolio: Acrylic, copolyester, PC

2. Requirements:

Biocompatibility, durability, overmolding TPE

Solution:

Versaflex™ HC TPEs

3. Requirements:

Excellent clarity, scratch resistance and exceptional toughness

Solution:

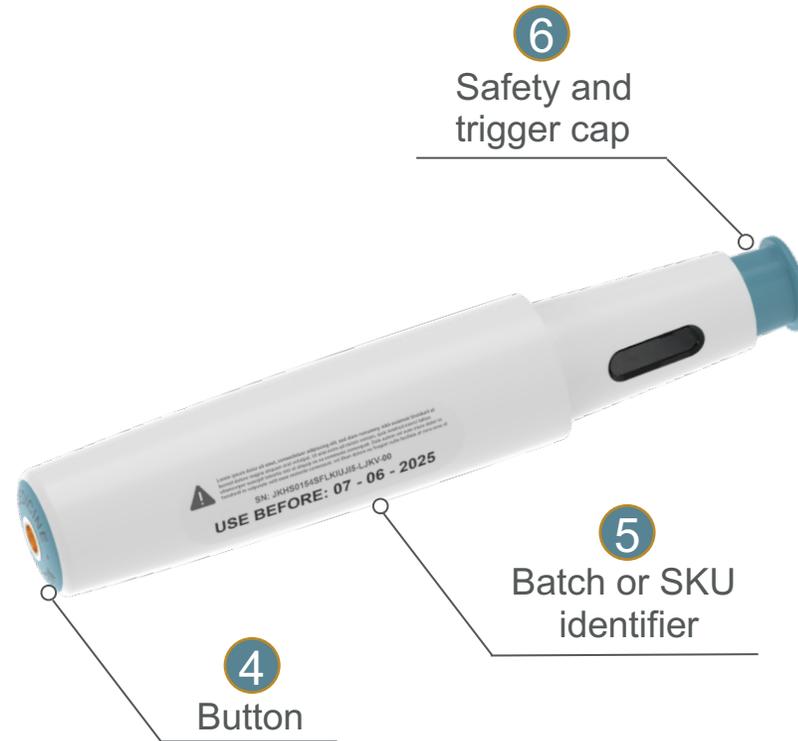
Avient Distribution HC Portfolio: Acrylic, copolyester, PC, clarified PP

Visual Identification

Use colors and additives to **differentiate and identify** your brand, product or batch.

Global manufacturing and product stewardship support help mitigate risk.

- Pigments and eye-catching special effects
- Prompt, precise and custom color matching
- Biocompatible functional additives
- FDA CFR 21, USP VI, ISO 10993-X, and/or USP 661-X
- ISO 13485 facilities



4. Requirements:

Skin contact colorant certified for ISO 10993 biocompatibility

Solution:

OnColor™ HC Plus, MEVOPUR®

5. Requirements:

Dark mark for rapid labeling

Solution:

OnCap™ Fast Mark™ Laser Marking Additives, MEVOPUR®

6. Requirements:

USP Class VI skin contact colorant for drug differentiation

Solution:

OnColor™ HC, MEVOPUR®

	DRUG CONCENTRATION 1
	DRUG CONCENTRATION 2
	DRUG CONCENTRATION 3

Patient Handling

Age or certain disease states can severely limit patient dexterity making the **self-administration of medication** difficult and frustrating.

Improve patient experience with specialty polymers designed to **optimize handling of the device.**

- Industrial design expertise in ergonomics and human factors
- Improve performance and efficiency with the design freedom and easy processing of plastics



7. Requirements:

Textured, overmolded soft grip for comfortable and controlled hold

Solution:

Versaflex™ HC TPEs

8. Requirements:

High density injection molded plastic for weighting and balancing and noise isolation from spring mechanism

Solution:

Trilliant™ Gravi-Tech™ Density Modified Formulations

Color, Material & Finish

Differentiate the same base injector for multiple price points, medications, or even licensing opportunities with body and grip material, color and texture.

- Design conceptualization and rendering services can help **bring your vision to life** and embody your brand
- Recommendations on overmolding and texture will **optimize your production and performance**

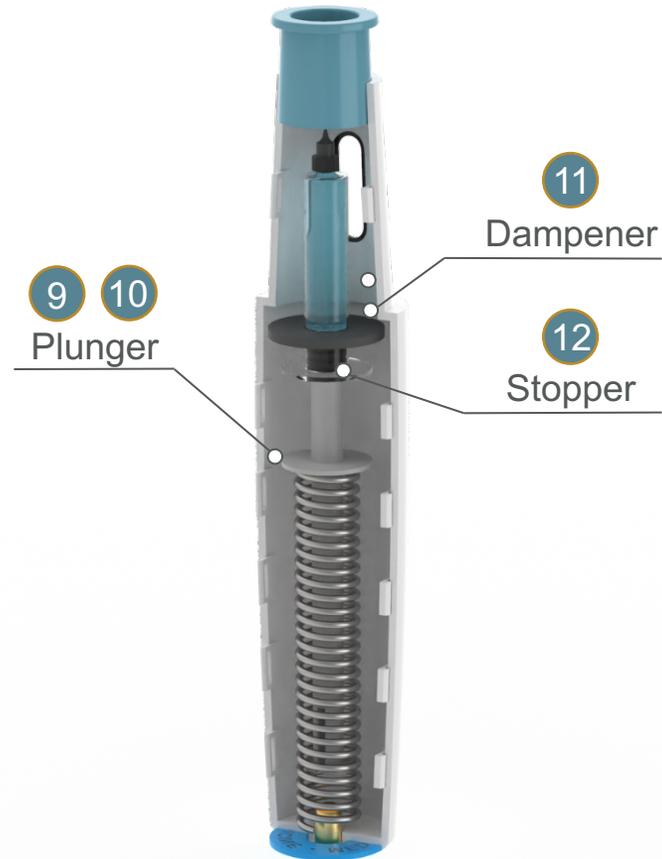


Internal Mechanical Performance

Performance and reliability are vital when designing for more effective treatments and better patient outcomes.

Our engineered polymers will address a vast array of property requirements.

- Find or formulate the best material for your application
- FEA analysis to simulate and predict static, vibrational, and dynamic performance



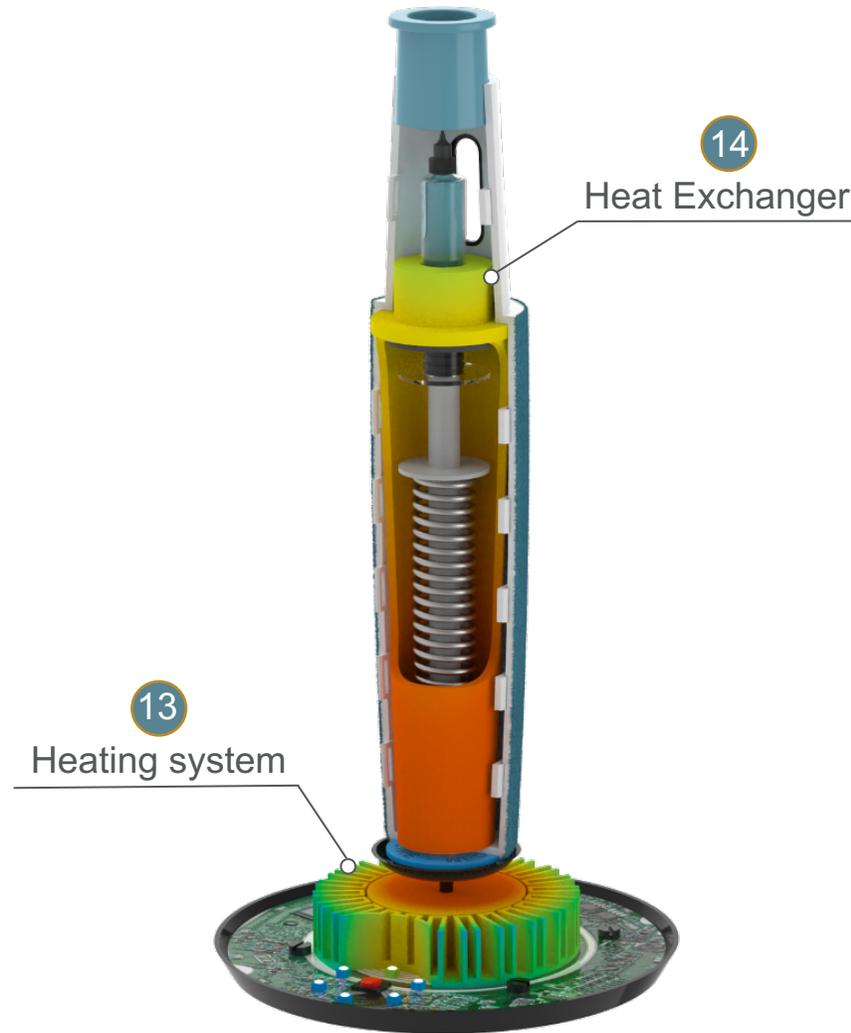
- 9. Requirements:**
Self lubricating for reduced friction and improved durability
Solution:
Trilliant™ LubriOne™ Internally Lubricated Formulations
- 10. Requirements:**
Strength and stiffness
Solution:
Nymax™ / Bergamid™ fiber reinforced materials
- 11. Requirements:**
Soft dampening to protect the vial and other components
Solution:
Versaflex™ VDT TPEs
- 12. Requirements:**
Sealing the syringe and displacing the medicant
Solution:
Versaflex™ HC TPEs

Temperature Control

The **expansion of new drugs** for different disease states allows more patients to experience the convenience of auto-injectors.

Thermal conductivity in a heat exchanger body help to **warm and reduce the drug viscosity** of biologics.

- Services to aid in the design of a heat exchanger in a polymer
- FEA thermal (CFD) simulations
- Design freedom, weight reduction and cost advantages of thermoplastics



13. Requirements:

Heat transfer

Solution:

Trilliant™ Therma-Tech™
Thermally Conductive
Formulations

14. Requirements:

Thermal conductivity for warming
of medicants

Solution:

Trilliant™ Therma-Tech™
Thermally Conductive
Formulations

Technology Enabled Design

Connected medical devices are **transforming the way care is delivered** by making it simpler, easier, more collaborative, and more data driven.

Smart health devices improve patient medication adherence and monitoring.

- Component materials must be carefully selected for either transparency or shielding to wireless signals
- Expertise in design for human factors improves ease-of-use and intuitiveness of the device



15. Requirements:
Light diffusing optical properties
Solution:
Avient Distribution HC Portfolio:
Light diffusing acrylics, PC

16. Requirements:
Soft touch overmolded material
Solution:
Versaflex™ HC TPEs



Who We Are

We are a premier provider of specialized and sustainable polymer materials, services and solutions. We are dedicated to serving our Healthcare customers with:

- Unparalleled **breadth and innovation in material technologies**
- **Design and engineering services** to optimize applications for production and performance
- Streamlined **global supply chain and regulatory coordination** to mitigate and reduce risk

WHY AVIENT?

Because we are really good at solving the world's most complex material science problems.

Our people are knowledgeable and tenacious.

Our materials portfolio is vast and unparalleled.

Our manufacturing capabilities are deep and far reaching.

Our services go beyond what our customers need.

Our company is a great place to work.

Challenge Accepted.