

End Uses and Growth Opportunities for Engineered Polymers

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Strong, Experienced Business Leadership



Mike Smith

Executive Vice President and President, Performance Chemicals

- Joined Ingevity in 2016
- 23 years at FMC Corporation, positions included:
  - Vice President, Health and Nutrition
  - Division General Manager Hydrogen Peroxide and Active Oxidants
  - Director of Business Planning and Strategy
  - Global Business Director, Process Additives, Manchester England
- Technical Sales Positions at Hercules in Paper Chemicals and Resins
- Bachelor of Arts degree in chemistry from the University of Virginia
- Master of Business Administration degree from the University of Michigan



Steve Hulme

Vice President, Engineered Polymers

- Joined Ingevity in 2020
- Over 30 years of experience in the polyurethanes industry managing complex international businesses
- Prior to Ingevity, was Vice President, Commercial Operations at Maysta Chemical
- 27 years at Air Products & Chemicals, positions included:
  - Various sales, marketing, regional business management roles in Germany and China
  - Vice President and General Manager for the polyurethane additives business prior to sale to Evonik AG
- Studied polymer science at Manchester Metropolitan University

Today's Agenda

1 Engineered Polymers Business Overview and End Uses

2 Business Strategy for Growth

3 Exciting Growth Opportunities and New End Uses

4 Q&A

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1 Engineered Polymers Business Overview and End Uses

Engineered Polymers

Business overview

Product family description

Our Capa® caprolactone-based portfolio is comprised of three product families

- **Monomer:** Main building block for internal and customer use
- **Polyols:** Range of polymers used in polyurethane coatings, adhesives, sealants and elastomers (CASE)
- **Thermoplastics:** Specialty polyester thermoplastics used in bioplastics, medical and adhesive applications

Where we add value

Primary applications:

- Polyurethane materials
- Adhesives and sealants
- Coatings
- Polymer additives
- Bioplastics
- Medical devices

Many end-use markets, including:

- Industrial equipment
- Automotive and transportation
- Footwear and apparel
- Consumer packaging
- Electronic devices
- Medical and health

Our customers

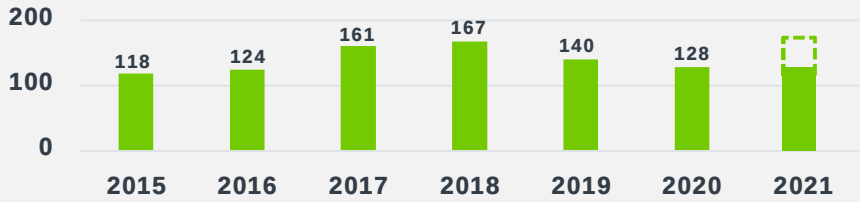
300+ customers globally:

- Chemical producers
- System houses (Formulators)
- Applicators

Highlights:

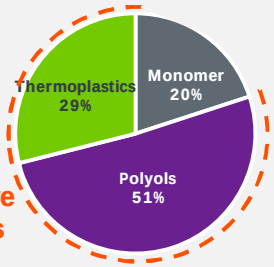
- Top 10 customers represent 40% of sales
- 40-year history with many long-term customers

Business unit growth ($M)



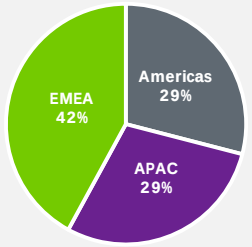
2020 Sales - $127.7M

By product family

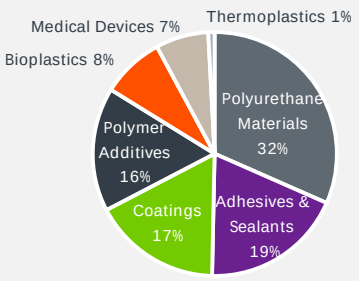


80% derivative products

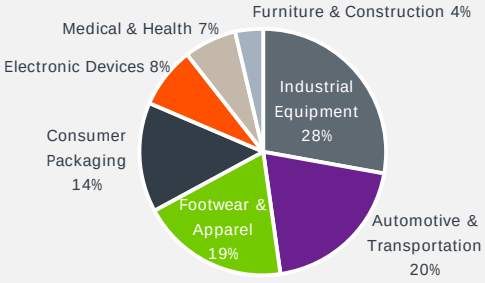
By region



By primary application



By end-use market



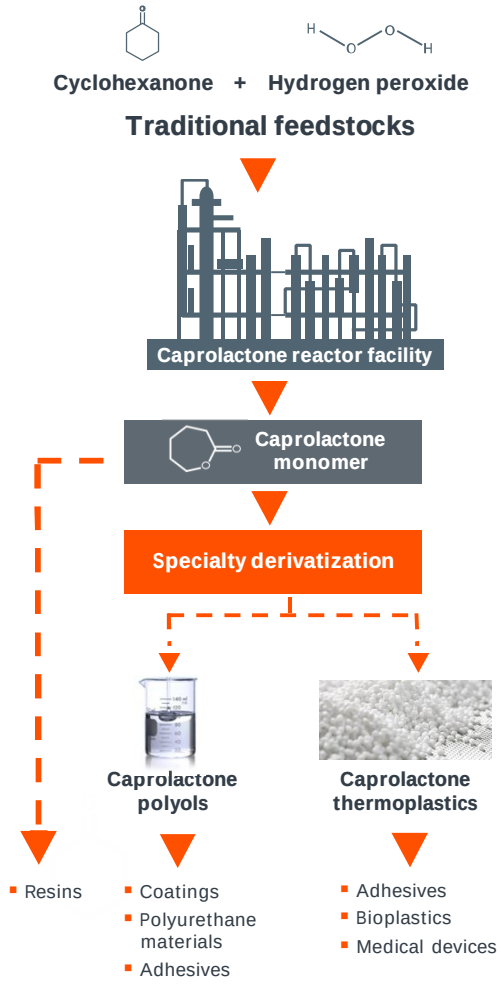
Note: NGVT growth projections are forward looking

What Are Capa Caprolactones?

How a single molecule can be derivatized into proprietary, value-added technologies that benefit a broad range of markets

Ingevity's caprolactone derivative technologies are made possible through a unique ring-opening polymerization process, whereby caprolactone monomer can be derivatized into proprietary, value-added polyols and thermoplastics.

Engineered Polymers value chain



Capa enables high-performing end-use products that are:

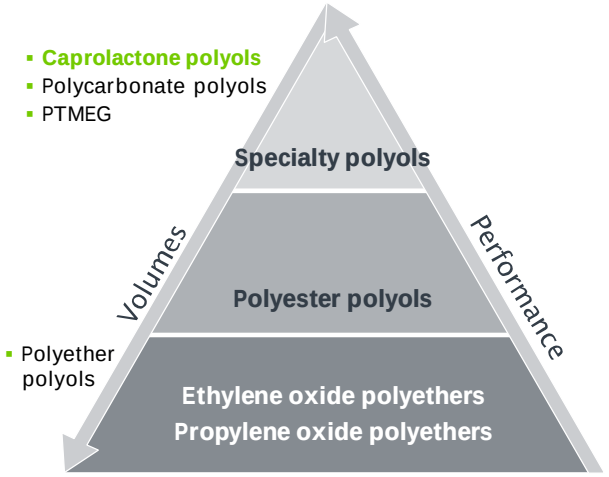
- More flexible
- Tougher and more durable
- Resistant to water, chemicals and weather
- Biodegradable
- High gloss and have improved overall appearance

How Our Polyols and Thermoplastics Compare With Competing Technologies and Materials

Capa polyols for high-performing polyurethane materials

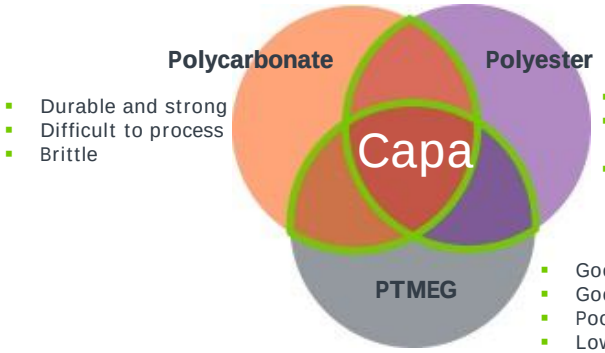
Polyol performance pyramid

Our specialty polyols are used to enhance processing, performance and/or durability in formulations.



Performance characteristics by material

Capa adds value particularly where polyesters, polycarbonate and polytetramethylene ether glycol (PTMEG) fall short.



Capa thermoplastics

Capa thermoplastics can substitute or be blended with a variety of materials.

Medical and health	Adhesives	Bioplastics
Thermoplastic elastomers (TPE) Thermoplastic polyurethane (TPU)	TPE TPU Ethyl vinyl acetate (EVA) Acrylic acid copolymers (Surlyn)	Polybutylene adipate terephthalate (PBAT) Polybutylene succinate (PBS) **Polyhydroxyalkanoate (PHA)** **Polylactic acid (PLA)** **Thermoplastic starch (TPS)**

2 Business Strategy for Growth

The Engineered Polymers Business Model

We strategically pursue growing markets and industry-leading customers

Product leadership

The Capa portfolio is a family of **innovation-driven products** that address industry drivers and provide **tailored solutions** to customer challenges.

- ~70 products
- >80% derivative product sales
- Top 10 products ~67% of sales
- Top 20 products ~85% of sales
- ~20 innovation pipeline projects

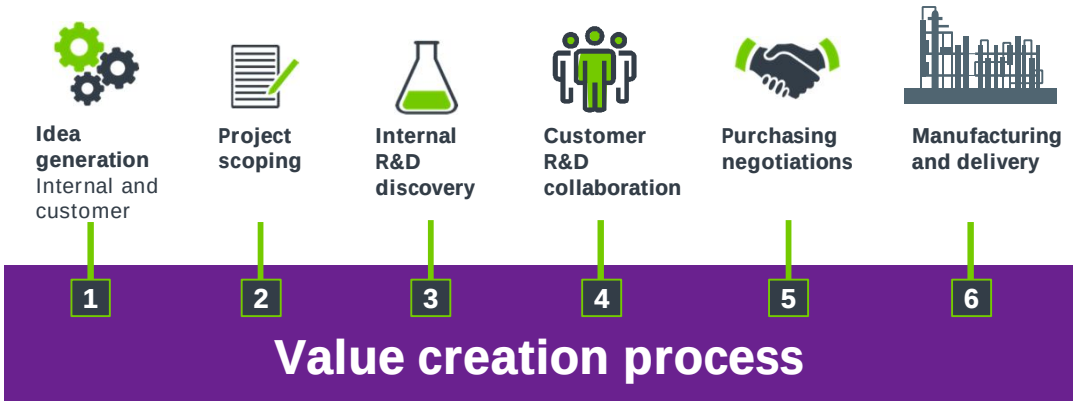
Customer-centric partnerships

Via **customer segmentation**, we focus our resources on winning customers to ensure we grow faster than the market and identify customers shaping their industry where we **collaborate on innovative projects**.

- ~350 customers
- 82% direct sales
- Top 10 customers <40% of sales
- Top 50 customers <80% of sales

Collaboration with customers

- Idea pipeline fed by customers and/or market needs
- Projects are scoped and proposed by market development teams
- Following internal R&D discovery, customer R&D teams are engaged for feedback and approval
- After successful negotiations, products are scaled and delivered



Five Strategic Pillars Are Driving Engineered Polymers Growth

After a strong rebound in 2021, we are targeting a 6-8% CAGR between 2022 – 2026.

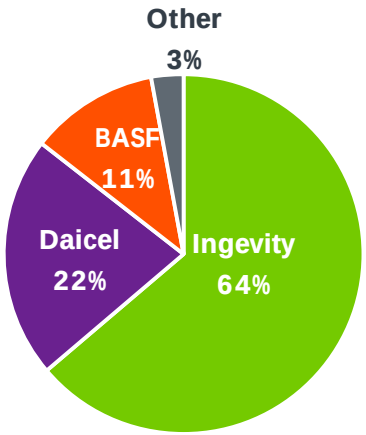
1. Prioritize derivative products while maintaining market leadership in monomer
2. Focus on strategic, higher-margin and high-growth end-use markets
3. Maintain leadership position through strategic capex initiatives
4. Leverage sustainability as a competitive advantage as part of Ingevity 2.0
5. Innovation and new business development to fuel growth

Note: NGVT growth projections are forward looking

1 Prioritize Derivative Products While Maintaining Market Leadership in Monomer

Ingevity has 64% of global production capacity

Global monomer capacity for key players



Manufacturing comparison

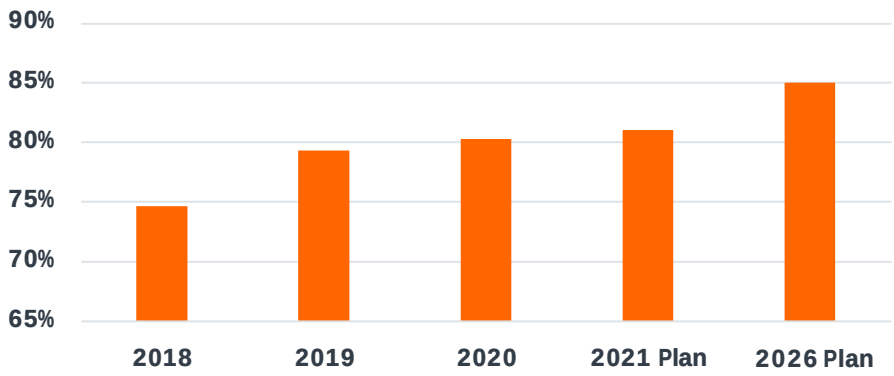
Company	Location	Markets	Polyols Production	Thermoplastics Production
ingevity	Warrington, U.K. DeRidder,Louisiana	Global	●	●
DAICEL	Hiroshima, Japan	Global	◔	◔
BASF We create chemistry	Freeport, Texas	U.S. EMEA	◔	○

Source: Ingevity management estimates

○ None ● Extensive

We continue to grow sales of our derivatized polyols and thermoplastics.

Percentage of derivatized product sales



2 Focus on Strategic, Higher-Margin and High-Growth End-Use Markets

Capa enables high-performing products that are:

- More flexible
- More durable
- More resistant to water, chemicals and weather
- Biodegradable
- Food-contact approved
- Higher gloss and improved overall appearance

+ At or slightly above market

++ Significantly above market

Industrial equipment — 28% of NGVT 2020 sales


Elastomeric seals and gaskets


Elastomeric wheels, rollers and mining screens


Industrial coatings for wind turbine blades

CAGR	Market	NGVT
	3-4%	+

Footwear and apparel — 19% of NGVT 2020 sales


Foam for shoe soles


Shoe counters


Apparel

CAGR	Market	NGVT
	4-5%	+

Automotive and transportation — 20% of NGVT 2020 sales


Paint protective films


Microcellular polyurethane foam for jounce bumpers


Polyurethane foam for electric vehicle battery pads


Aerospace coatings


Automotive coatings

CAGR	Market	NGVT
	3-4%	++

Consumer packaging — 14% of NGVT 2020 sales


Traditional plastics and bioplastics for films, bags and paper coatings

CAGR	Market	NGVT
	10-15%	++

Medical and health — 7% of NGVT 2020 sales


Splinting and patient immobilization systems for radiation oncology

CAGR	Market	NGVT
	7-8%	+

Electronic devices — 8% of NGVT 2020 sales


Gaskets and coatings for display and mobile devices

CAGR	Market	NGVT
	4-5%	++

* NGVT growth projections are forward looking

3 Maintain Leadership Position Through Strategic Capex Initiatives

With a focus on world-class assets, laboratories and people

We remain committed to continually improving:

- Our innovation capabilities
- Collaboration with customers and the overall customer experience
- The unique performance attributes of the Capa portfolio
- Best-in-class employee attraction and retention



Addition of polyol production in DeRidder, Louisiana

Increases our global polyol production capacity by 40%, enabling Ingevity to meet demand and better serve customers

- Includes installation of monomer storage to support manufacturing of polyol derivatives and streamline bulk monomer shipments to U.S. customers
- Construction begins summer of 2021 and capacity expected to be operational by Q1 2022
- Evaluating further monomer and thermoplastic expansions



Opening new innovation center in Warrington, U.K.

Dedicated to accelerating innovation and application development of Capa® technologies

- Located next to our existing central laboratory building in Warrington
- Will house state-of-the-art equipment and testing capabilities
- Expected to be operational by Q4 2021
- Added technical staff with further additions planned in U.S. and China



Strategically adding key personnel across the globe to support growth

Roles concentrated in technical marketing, customer service and innovation

- New marketing function established to drive business development and speed to market
- Increase in supply chain and customer service personnel to manage growing global demand
- Increase in project engineers to manage additional capacity projects

4 Sustainability Will Continue To Be a Driving Force Behind the Capa Portfolio

Fueling innovation, new business development and growth

Capa helps customers achieve higher-performing, more sustainable products.

Although Capa-based products are derived from traditional feedstocks, **the portfolio enables performance attributes in end-use markets that directly help our customers and consumers meet sustainability goals and preferences.**



Our commitment to making a positive global impact

Ingevity's commitment to making a positive global impact drives our approach to product development and customer success.

Our corporate sustainability contributions and innovation efforts align with six of the U.N.'s Sustainable Development Goals that promote prosperity while protecting the planet.



3 Exciting Growth Opportunities and New End Uses

5 Innovation and New Business Development to Fuel Growth

Spotlight on innovative technology adoption

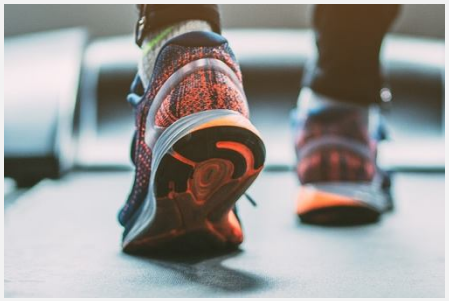
Featured examples include:

- Bioplastics
- Automotive
- Coatings
- Adhesives









Thermoplastics for Bioplastics

Plastic utensils and packaging that fully biodegrades faster than competitors





Challenge

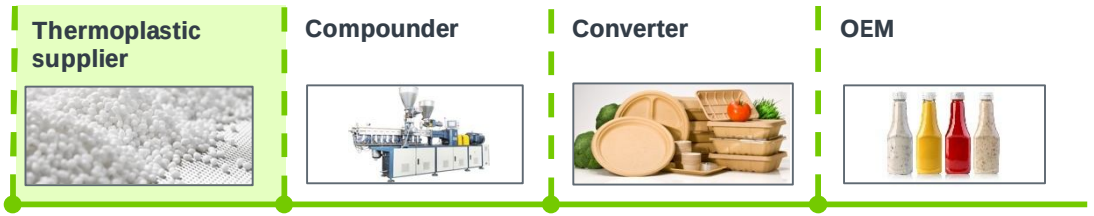
Demand continues to increase for biodegradable plasticware that can compost rather than pollute, yet still provide the same convenience and performance as traditional plastic packaging, utensils and straws.

During the COVID-19 pandemic in particular, the use of single-use plastics rose **250% to 300%** (1).

Capa benefits

- **100%** (2) biodegradability into carbon dioxide and water with Capa after 40 days, with no toxic chemicals left over. Other competitive products typically achieve less than 50%
- **Over 500%** (3) increase in flexibility and **over 300%** (4) increased impact resistance in biopolymers like PLA; similar results with PHA, TPS
- Enables home and industrial composting and more durable, greener products

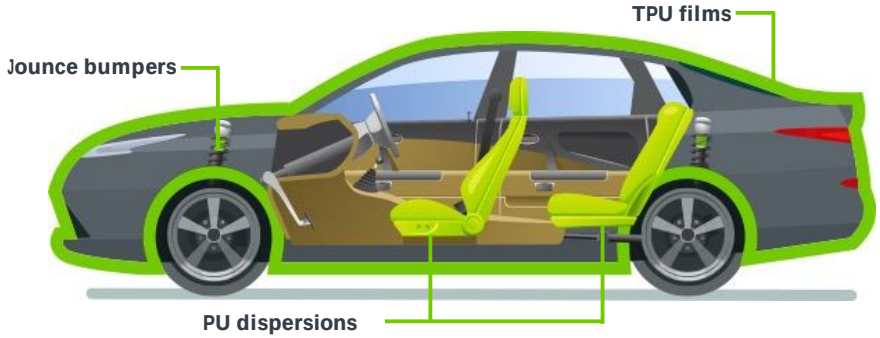
Value chain



1 The Economist, 2020
2 EN 43132: percent biodegradation according to European standard outlined in EN 13432
3 Research Institute for Applied Mechanics, Kyushu University, Japan: tensile strength of bioabsorbable PLA/PCL blend measured in MPa
4 Ingevity: fracture of absorbed energy measured in kJ/m2

Polyols for Automotive

Enabling automotive protective films, coatings and parts that are longer-lasting and more comfortable



Challenge

Automotive OEMs face continually increasing consumer demand for more durable vehicles, as well as tightening regulatory policies across the globe that require more environmentally friendly manufacturing.

Capa benefits

TPU paint protective films

Capa replaces polyvinyl chloride films and provides:

- Improved scratch, puncture, corrosion and weather resistance
- Higher gloss
- Self healing capabilities

PU dispersion (PUD) coatings

Capa replaces solvent-based coatings for high-quality interiors with:

- Improved abrasion, chemical and ultraviolet resistance
- High gloss
- Softer, more comfortable feel

Jounce bumpers

Capa enables excellent dynamic performance and durability, leading to:

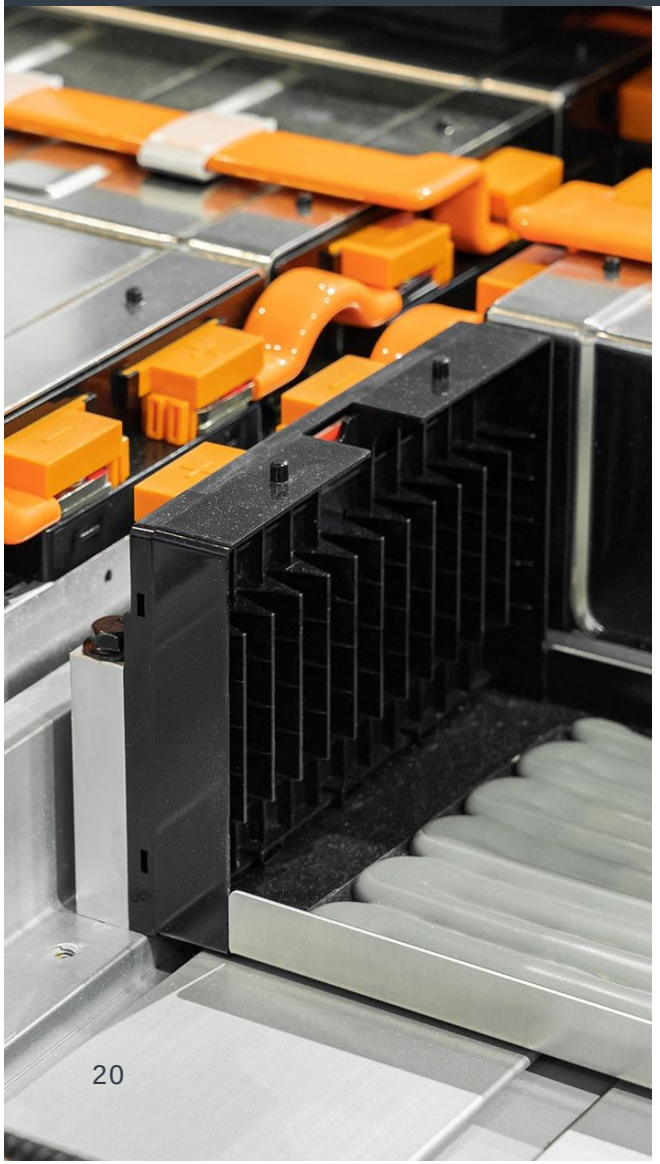
- More reliable, longer-lasting jounce bumper products
- A smoother, more comfortable ride

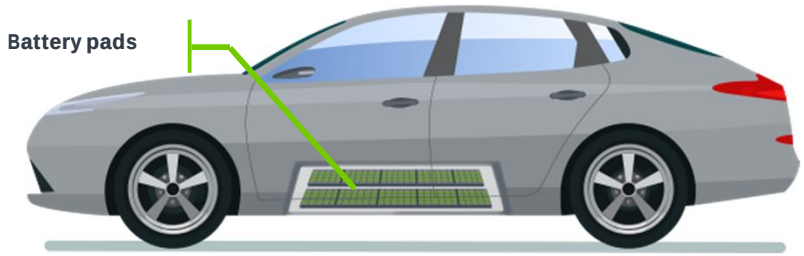
Value chain



Polyols for Automotive

Improving the working life of electric vehicle batteries





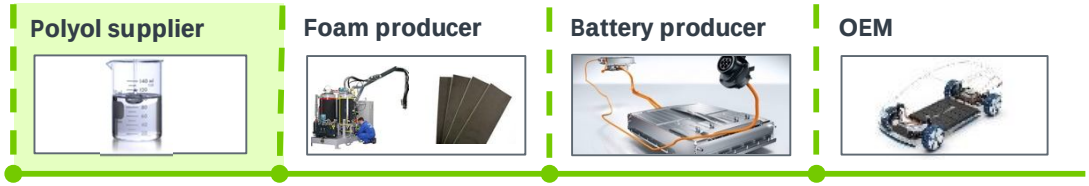
Challenge

EV battery packs have multiple cells that must be kept stable under challenging use conditions, with continuous motion and charging causing cell dimensions to change by as much as 8%. This necessitates high-performance foam cushioning that holds the stacks in place, helping to avoid battery failure or recalls and keeping passengers safe.

Capa benefits

- More durable padding protects batteries longer compared to competing materials
- Increases flame retardant properties compared to other polyols, eliminating the need for other expensive additives

Value chain

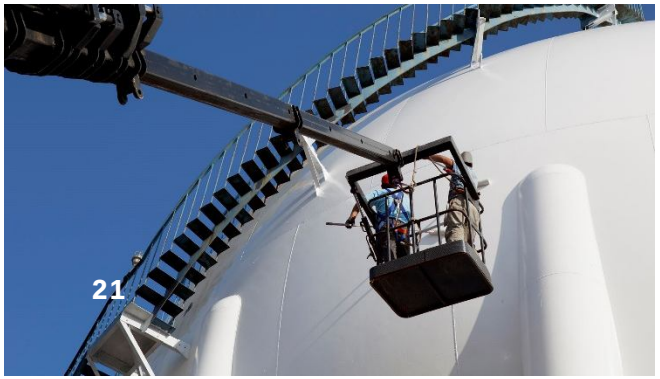


Polyols for Coatings

Longer-lasting, more environmentally friendly industrial paints and coatings







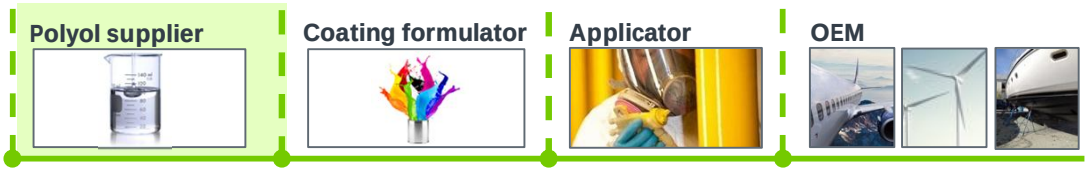
Challenge

Industrial coatings require extremely high durability to withstand harsh weather and chemical exposure. And coatings manufacturers must comply with increasingly stringent air quality requirements calling for the use of low volatile organic compound (VOC) ingredients.

Capa benefits

- Enables less use of solvent in the formulation, lowering overall VOC content
- 3x increase in both abrasion (1) and impact resistance (2), enabling longer-lasting coatings and far fewer expensive resprays and recalls

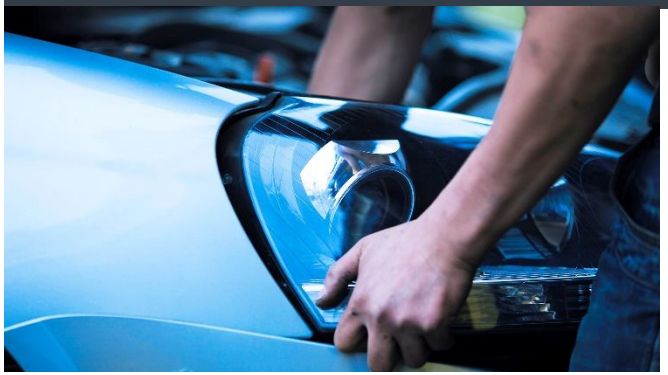
Value chain

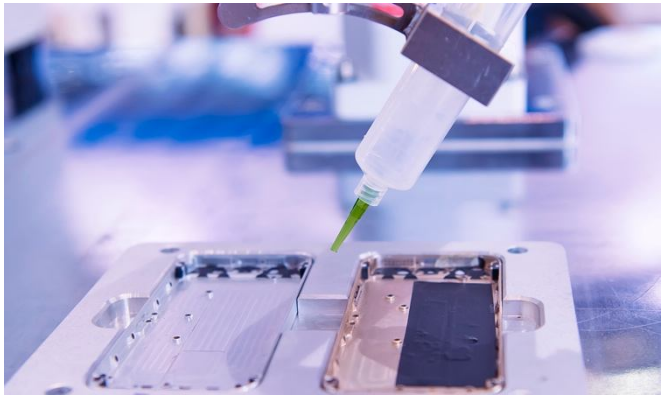


1 Ingevity laboratory testing; with only 8% Capa content in formulation
2 Ingevity laboratory testing; with only 10% Capa content in formulation

Polyols and Thermoplastics for Adhesives

Sustainable, more efficient solutions for automotive, electronics and furniture needs







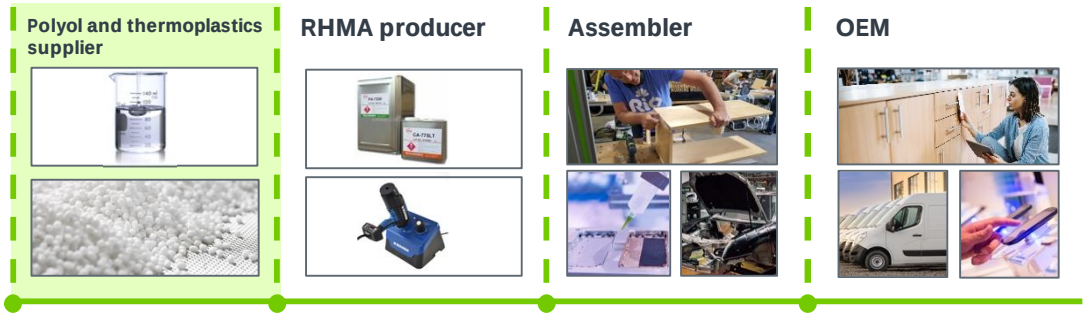
Challenge

Manufacturers of industrial adhesives in the furniture, electronics and automotive markets continue to increasingly value sustainable raw materials without sacrificing processing speed. This has led to a shift away from traditional solvent-based technologies to favor reactive PU hotmelt adhesives that are solvent-free and optimize throughput.

Capa benefits

- Can be easily substituted for traditional, less environmentally friendly adhesive materials like EVA
- Significantly improves manufacturing throughput
- Increases adhesive durability in everyday conditions like extreme hot or cold temperatures and wear and tear from continued use

Value chain



Capa Lactide Copolymers for Adhesives

Sustainable, biodegradable adhesives for packaging







Challenge

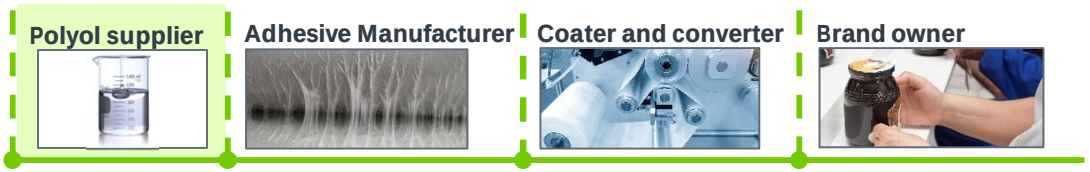
Packaging for food and consumer goods must offer high integrity and product protection as an integral component of advertising and brand recognition, while also containing greener raw materials as awareness of traditional plastics' environmental impacts increases. This has led adhesive manufacturers to use innovative technologies like Capa lactide polymers capable of biodegrading in home and industrial settings without sacrificing adhesion performance.

Capa benefits (1)

Our lactide polyols:

- Can be easily used in solvent-free formulations compared to conventional polyesters
- Inherently **contain up to 50% renewable content**, enabling more eco-friendly packaging products
- Have the potential to be **fully biodegradable** under composting conditions
- Improve the adhesion of typically hard-to-bond substrates like thin plastic films and packaging

Value chain



1 Ingevity laboratory and management estimates

Engineered Polymers

Well-positioned for value creation

- Market leader in caprolactone monomer and derivative chemistry
- Niche chemistry with defensible competitive advantages
- Targeted applications and markets with higher growth rates and significant upside in market penetration
- Technology-focused relationships drive deep customer intimacy
- Further leverage global capabilities to expand and balance business geographically
- Leverage sustainability as competitive advantage as part of Ingevity 2.0 strategy
- Continued investment in capacity, R&D and personnel to further drive innovation and enable growth

Abbreviations

Abbreviation	
CASE	Coatings, elastomers, adhesives, sealants
EO	Ethylene oxide
EV	Electric vehicle
EVA	Ethyl vinyl acetate
PBAT	Polybutylene adipate terephthalate
PBS	Polybutylene succinate
PHA	Polyhydroxyalkanoate
PLA	Polylactic acid
PO	Propylene oxide
PTMEG	Polytetramethylene ether glycol
PVC	Polyvinyl chloride
TPE	Thermoplastic elastomers
TPS	Thermoplastic starch
TPU	Thermoplastic polyurethane