

# EMPOWERING INNOVATION ON DEMAND

Styrenic solutions for the household appliance industry



**INEOS**  
**STYROLUTION**

Driving Success. Together.

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# IMAGINE

## REALIZING

# THE POTENTIAL

As Head of Engineering for a major European appliance maker, Katarina knows that change does not happen overnight. But what if it could? In order to meet the growing demand for sleek aesthetics, greater energy efficiency and lighter weight, Katarina teamed up with a designer proficient in the advantages of specialty copolymers. They chose styrenics because of technical characteristics like environmental stress cracking resistance (ESCR), color consistency and easy processability. In record time they were ready to go to market with an innovative line of small kitchen appliances.

“WHAT ARE THE UNIQUE PROPERTIES OF STYRENICS THAT MAKE THEM SO ATTRACTIVE TO THE HOUSEHOLD SECTOR?”



Picture: Lars Dombrowski/LD

## BALANCING THE CHANGE

In the household industry, trends in global production, trade and consumption are driving demands for less weight, greater stability and optimized energy and water efficiency. At the same time, digitization, connectivity and convergence are raising the stakes for everyone. Meanwhile, transformations in lifestyle and work are pushing changes in usage behavior, as well as creating

a growing number of smaller households. In nearly every global market the value chain is becoming more diverse and more complex. For everything from aesthetics and haptics to the bottom line, change is trending up.

## DESIGNING VERSATILE VALUE

Styrenics are a family of unique polymers with a broad range of applications – from washing machines, automotive trim and laser printers, to inhalers, refrigerators and toys – making styrenics one of the world’s most important thermoplastics. The balanced performance of such properties as excellent aesthetics, high color consistency, and lower density make styrenics attractive to designers and manufacturers at every level. Their superior processing abilities also make changes in design or lower volume production simpler and more cost-effective – one big reason styrenic solutions are being used in ever more household products.

INEOS Styrolution is the worldwide leader in household specialty styrenics, with a deep understanding of the industry, its applications and value chains. As a reliable global supplier, INEOS Styrolution also delivers broad application expertise, a long-term commitment to innovation, and opportunities for product co-development right from day one of a new idea. In addition, INEOS Styrolution dedicates significant resources to the development of household solutions for tomorrow, e.g. to meet new performance and surface aesthetic requirements.

## SUSTAINABLE STYRENICS SOLUTIONS

Our products provide high-quality, safe and functional solutions and contribute to enhancing the comfort of consumers’ everyday lives. As the global market leader in styrenics, we are committed to developing innovative and circular solutions for the materials we produce. Our performance and progress on sustainability has been acknowledged with a gold rating from EcoVadis. This achievement now places us best in class in the category of plastics manufacturers and we are committed to continue on our path forward.

We are driving multiple projects forward to recycle post-consumer styrenics waste in close collaboration with a number of best-in-class companies. We strongly believe that these recycled solutions will contribute towards a true circular economy for styrenics materials, thereby helping reduce landfills and the incineration of valuable resources.

## STYRENIC PROPERTIES THAT STAND OUT

Here are some of the reasons styrenics are becoming the polymers of choice for both major and smaller domestic applications:

VERY GOOD FLOWABILITY **EXCELLENT ESCR**  
**HIGH COLOR CONSISTENCY** **SUPERB SURFACE GLOSS**  
**CONSISTENCY** **HIGH IMPACT STRENGTH**  
 LOW MATERIAL DENSITY  
**SUPERIOR PROPERTY RETENTION** **EASY TO PROCESS**  
**EXCELLENT WEATHERING RESISTANCE**  
 DURABLE COLOR FASTNESS  
 HEAT STABILITY **RESISTANCE**  
**LOW RESIDUAL CONTENT**  
**OPTIMAL SCRATCH RESISTANCE** COMPLETE TRANSPARENCY  
**SUPERIOR SELF-COLORABILITY** **CONSISTENT**  
**DIMENSIONAL STABILITY**  
 SUITABLE FOR FOOD CONTACT

A close-up photograph of a person's hand in a white shirt sleeve pointing at a bar chart on a laptop screen. The background is blurred, showing a desk with a keyboard and other office equipment. The word "DISCOVER" is overlaid in large white letters on the right side of the image.

DISCOVER

ENABLING

# LONG-LASTING SUCCESS

Daniel founded a large white goods manufacturing firm using old-fashioned common sense and traditional plastics. As he prepared to hand over his company to the next generation, he decided to upgrade the product line with the superior aesthetics and improved mechanical properties of styrenics. Daniel's children are now successfully expanding up-market sales, while Daniel can rest assured his legacy is on the right track.

“WHY ARE STYRENIC SOLUTIONS SO ATTRACTIVE  
TO CUSTOMERS, DESIGNERS AND MANUFACTURERS?”



## STRENGTHENING THE ATTRACTION

Styrenics are everywhere in the home, whether we realize it or not. For instance, the inner linings of refrigerators are typically made of styrenic thermoplastic products such as ABS or HIPS, where chemical resistance, stiffness and toughness are all required.

Styrenics-based products look better, too. The exceptional aesthetics bring excellent color consistency and high gloss to any household product. And their design and manufacturing flexibility make styrenics attractive to engineers and designers, as well. That flexibility is also pointing the way toward future household applications, such as those requiring high resistance to chemicals, greater transparency, low density, or metal plating. Here are some of the many other places you can find versatile styrenic polymers at work:

## STYRENIC APPLICATIONS – WORKING SOLUTIONS FOR THE HOME

### KITCHEN APPLICATIONS

- Refrigerators
- Coolers
- Dishwashers
- Microwave ovens
- Cookers
- Exhaust fans (extraction units)
- Coffee machines
- Toasters
- Mixers
- Blenders
- Filtered water containers

### LAUNDRY ROOM APPLICATIONS

- Washing machines
- Dryers
- Irons

### PERSONAL HYGIENE APPLICATIONS

- Electric toothbrushes
- Electric razors/shavers
- Hair dryers

### GENERAL HOUSEHOLD APPLICATIONS

- Vacuum cleaners
- Carpet washers
- Air conditioners
- Air cleaners
- Humidifiers/de-humidifiers
- Water purifiers

STYRENIC SOLUTIONS MAKE THESE  
HOUSEHOLD PRODUCTS POSSIBLE

**Small Appliances**

Terluran® (ABS)  
Novodur® (ABS)  
Novodur® HH (ABS)  
Luran® (SAN)



**Air Conditioner**

Styrolution® PS  
Terluran® (ABS)  
Novodur® (ABS)  
Luran® S (ASA)



**Microwave Oven**

Terluran® (ABS)  
Novodur® (ABS)  
Novodur® HH (ABS)  
Luran® (SAN)



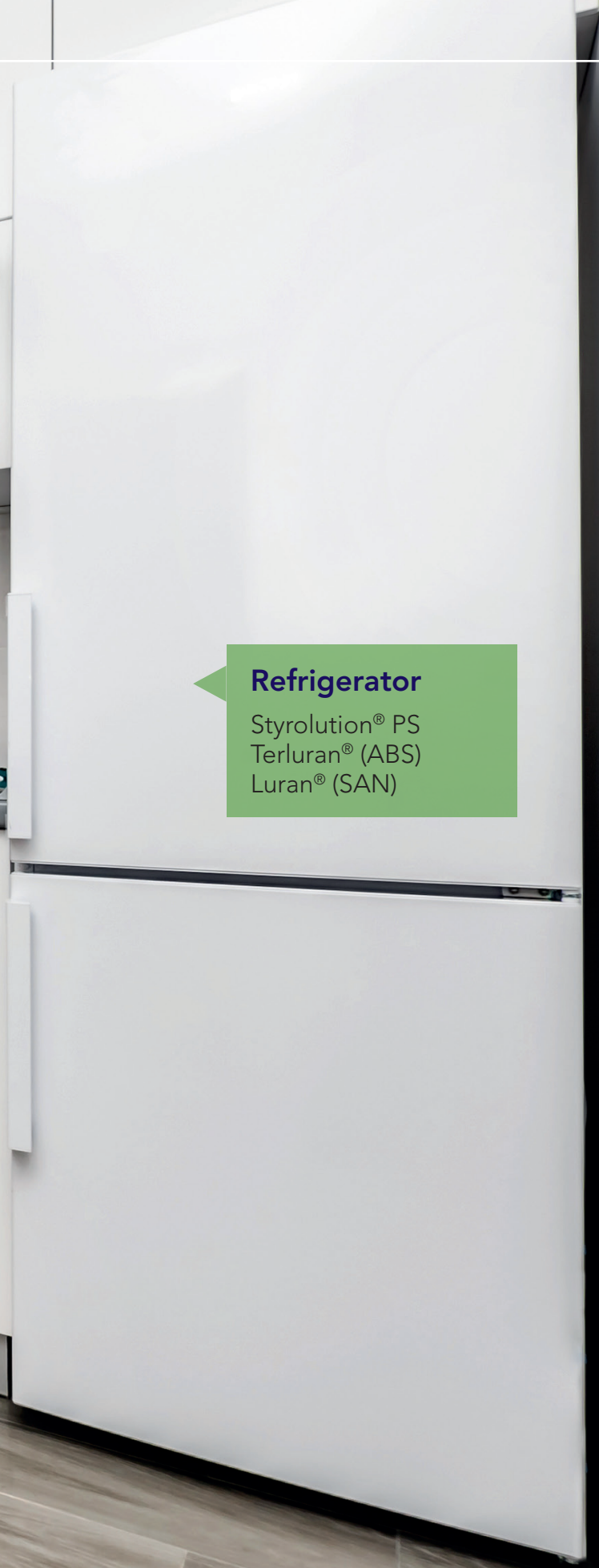
**Small Appliances**

Terluran® (ABS)  
Novodur® (ABS)  
Novodur® HH (ABS)  
Luran® (SAN)



**Refrigerator**

Styrolution® PS  
Terluran® (ABS)  
Luran® (SAN)



**Vacuum Cleaner**

Terluran® (ABS)  
Novodur® (ABS)  
Luran® (SAN)  
Luran® S (ASA)



**Washing Machine**

Terluran® (ABS)  
Novodur® (ABS)  
Novodur® HH (ABS)  
Luran® S (ASA)





PERFORM

TAKING  
PRODUCTS TO  
**THE NEXT LEVEL**

When an international large appliance producer decided to revitalize their footprint in Asia, Maya was hired to spearhead the expansion. She quickly concluded that the company would have to rethink everything from materials to design. INEOS Styrolution showed Maya how styrenic solutions could both lower the sticker price for consumers, and improve profit margins for her company. Now the large appliances are not only selling better than ever, Maya's also been able to up manufacturing capacity to meet the increased demand.

“HOW DOES INEOS STYROLUTION FACILITATE THE DEVELOPMENT AND IMPLEMENTATION OF INNOVATIVE HOUSEHOLD SOLUTIONS?”

# HOW INEOS STYROLUTION SERVES YOU

## SOLUTIONS THAT KEEP YOU ON TRACK – SERVICE THAT KEEPS YOU ON TIME

INEOS Styrolution invests its success in the success of its customers. To deliver that, we provide customers with the broadest styrenic product portfolio on the market, backed by the resources of INEOS Styrolution R&D, consistent reliability and sustainability.

To grow customer value, INEOS Styrolution not only offers exceptional global presence but innovative technology, as well. This ranges from cutting-edge competence in plastic design, color and new applications, to an expanding array of alternatives to keep customer costs low. Whether for premium branding or generic commodities, INEOS Styrolution offers the largest single steady supply of materials to fit the need and budget of its customers.

### AT YOUR SERVICE

Unprecedented service is another factor that sets INEOS Styrolution products apart:

### LONG-TERM GLOBAL SUPPLY SECURITY

### DEDICATED QUALITY & GLOBAL TECHNICAL TEAMS

### PROCESSING SUPPORT ON-SITE

### TECHNICAL DEVELOPMENTAL & DESIGN SUPPORT

### ENHANCED QUALITY CONTROL PROCESSES ISO 9001

### GLOBAL REGULATORY & COMPLIANCE SUPPORT

## INNOVATIVE PORTFOLIO

INEOS Styrolution solutions include:

**ABS** – acrylonitrile butadiene styrene copolymers

- **Terluran®** – sets worldwide standards for very high gloss, low density, easy processing, high color consistency with low yellow index and a superb balance between flowability and mechanical properties.
- **Novodur®** – grades offer superior performance in a well-balanced mix of properties, e.g. high impact strength, dimensional stability, creep resistance, good surface appearance, chemical resistance, heat resistance, thermal cycling performance and excellent thermoforming attributes.

**ASA** – acrylonitrile styrene acrylate copolymers

- **Luran® S** – is a benchmark styrenic copolymer for good weather resistance, excellent environmental stress cracking resistance (ESCR), good impact resistance, and superb color retention.

**SAN** – styrene acrylonitrile copolymers

- **Luran®** – injection grade provides an exceptional combination of high gloss, excellent transparency, good chemical resistance, high stiffness, extraordinary heat resistance and very good dimensional stability.

**SBC** – styrene butadiene block copolymers

- **Styrolux®** – transparent thermoplastic material consisting of styrene butadiene block copolymers, with very high transparency, impact resistance, and perfect miscibility with standard polystyrene (PS).
- **Styroflex®** – transparent elastomer based on styrene and butadiene, with high transparency, high elasticity and recovery, excellent thermal stability, easy to process in extrusion and injection molding, and good compatibility with other styrenic polymers and polyolefins.

### Other styrene-based copolymers

- **NAS® (SMMA)** – premium choice for ESCR strength, high stiffness, extreme transparency, superior processability, mechanical strength and resistance to alcohol.
- **Terlux® (MABS)** – excellent transparency, brilliant gloss, impact resistant, good ESCR, good chemical resistance, easy to process.
- **Zylar® (MBS)** – superb transparency, impact resistance, superior processing flow, good detergent resistance, competitive cost.

### Copolymer blends

- **Luran® SC (ASA/PC)** – superior heat resistance (one flame-retardant grade meets UL 94 test standards at V-0), great stiffness, excellent impact strength.
- **Terblend® N (ABS/PA)** – combines excellent impact strength and chemical resistance with high melt flow and good acoustic dampening.
- **Terblend® S (ASA/PA)** – combines the properties of Terblend N with additional properties such as higher UV resistance and better color fastness.

## COMPREHENSIVE RANGE

Styrolution PS is a family of general-purpose transparent polystyrene and impact modified polystyrene resins suitable for injection molding or extrusion applications:

**GPPS** – (general purpose polystyrene) offers color consistency, excellent transparency and easy processing.

**HIPS** – (high impact polystyrene) offers color consistency, good balance between flowability and mechanical properties such as impact and tensile strength, and easy processing.



COLLABORATE

COLLABORATING

# FOR LASTING INNOVATION

Cheung's manufacturing company faced two challenges. Urbanization in emerging Asian markets was driving up demand for basic household appliances faster than he expected. At the same time, his dream of building a new premium brand hinged on creating an exterior that did justice to the quality of the engineering while meeting high standards for safety and energy efficiency. INEOS Styrolution helped Cheung with both: steady supply for his standard products, and a customized specialty solution that made his brand a new household must.

"WHY DO MANUFACTURERS PREFER INEOS STYROLUTION TO OTHER STYRENIC PROVIDERS?"

## A PIONEER GOES FURTHER WITH A RELIABLE PARTNER

As the global leader in styrenic solutions, INEOS Styrolution offers global assistance with a personal touch. Whenever specialized innovation is required, INEOS Styrolution works hand-in-hand with its customers to help them gain a competitive advantage – through best-in-class service, reliable formulations, and customized solutions.

With first-rate technology, leading R&D skills and strong intellectual property and patent positions, INEOS Styrolution is uniquely equipped to ensure that new applications find the right formulation for success. To enable best possible quality and process efficiency, INEOS Styrolution provides testing and technical support in the processing, design and computer simulation phases, as well.

Thanks to its broad experience and processing expertise, INEOS Styrolution is an attractive partner for developing new products, technologies and solutions for household customers.

## TURNING IDEAS INTO PROFITS

Each new product or new application begins with an idea. Together with INEOS Styrolution, customers define how those ideas are transformed into real, innovative and practical items for use in the household sector.



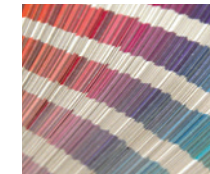
### TEXTURE

Styrenics are widely appreciated for their attractive aesthetics. From glossy to smooth to easy-grip/no-slip surfaces: INEOS Styrolution helps ensure the look, feel and safety are all premium.



### SHAPE

Tough, flexible, thin, robust: INEOS Styrolution helps customers find the right blend for the size and requirements of their application.



### COLOR

Customers can choose from over 2,500 existing pre-tested colors or use the INEOS Styrolution Color Excellence Center (CEC) to customize any color and confirm its performance.

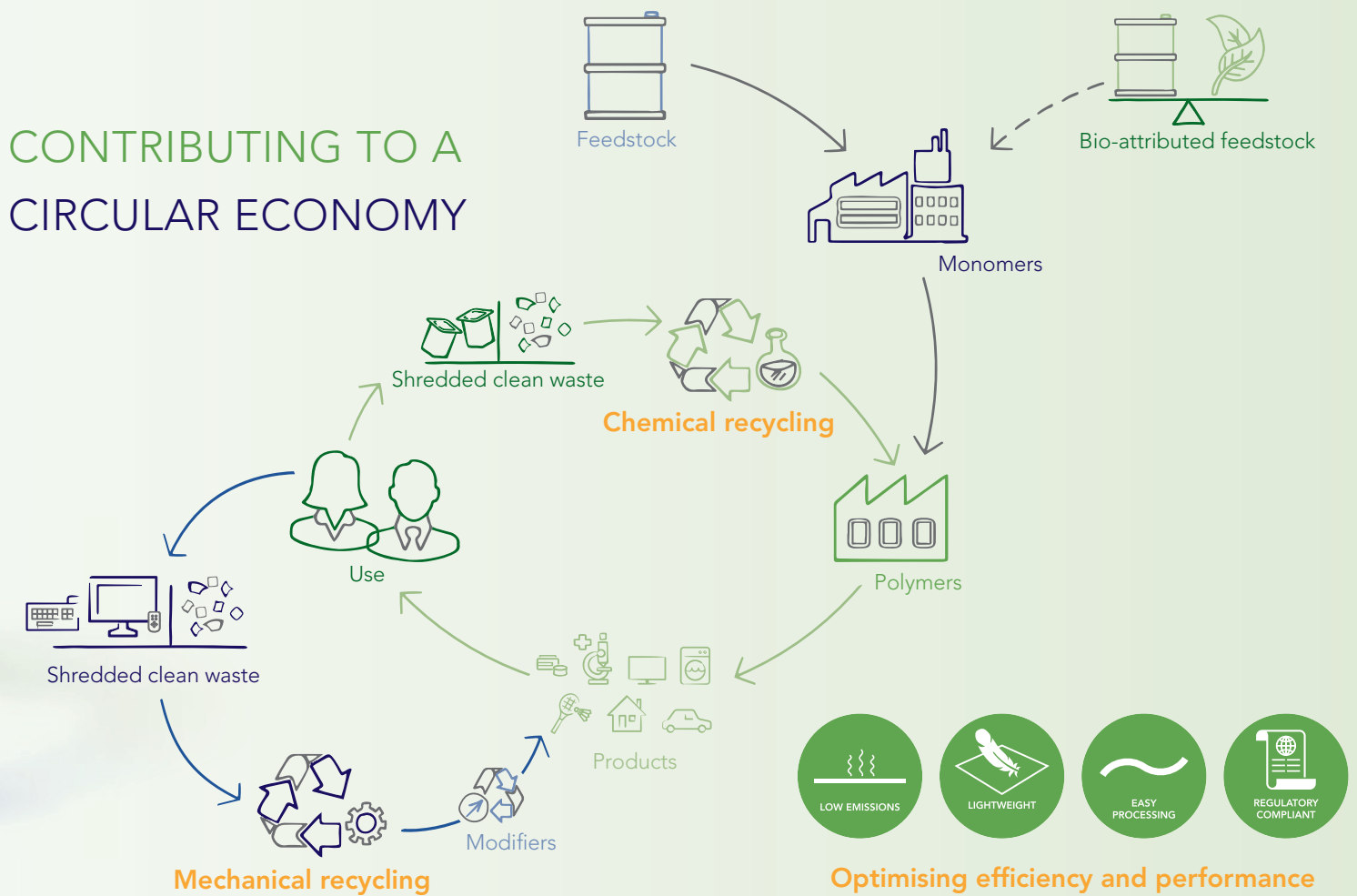
### WHY COLLABORATING WITH INEOS STYROLUTION IS DIFFERENT: STEP BY STEP

- 1** Household manufacturer has a need or faces a challenge that is communicated to INEOS Styrolution.
- 2** Our experienced team listens, reflects and asks questions to further clarify the requirements.
- 3** INEOS Styrolution draws on its wide expertise and global presence to present the customer with the optimal mix of existing formulations and promising fields of development.
- 4** INEOS Styrolution delivers the best suitable options for customer sampling and test evaluation according to specifications.
- 5** Customer and INEOS Styrolution finalize plans to co-develop the new product/application.
- 6** Commercial production of household product begins.



# STYRENICS. MADE FOR RECYCLING.

## CONTRIBUTING TO A CIRCULAR ECONOMY



Styrenics are one of the most versatile materials in the 21st century, and have revolutionised the way we live today. Our products have become an indispensable part of consumers' everyday lives and provide solutions to societal challenges such as climate change, resource scarcity, urbanisation, rising living standards and population growth.

The solutions styrenics products offer include extending food shelf life thereby reducing food waste, while also providing lightweight solutions for the automotive industry leading to lower fuel consumption.

This new ECO range not only complements INEOS Styrolution's existing strong portfolio of styrenics standard products and specialties, but also matches the performance of our existing portfolio.



By offering styrenics solutions that deliver strong, sustainable performance, we want to ensure that our customers' businesses and end consumers' choices become more sustainable.

To read more about our ECO family of solutions, please visit: [www.styrolution-eco.com](http://www.styrolution-eco.com).

To read more about our actions and performance on sustainability visit: [www.ineos-styrolution.com/sustainability](http://www.ineos-styrolution.com/sustainability)

**SM:** styrene monomer  
**PS:** polystyrene  
**ABS:** acrylonitrile butadiene styrene  
**Specialties:** ABS/ASA, ASA, SAN, AMSAN, SBC, SMMA



# GLOBAL REACH

# AND PROXIMITY TO CUSTOMER MARKETS

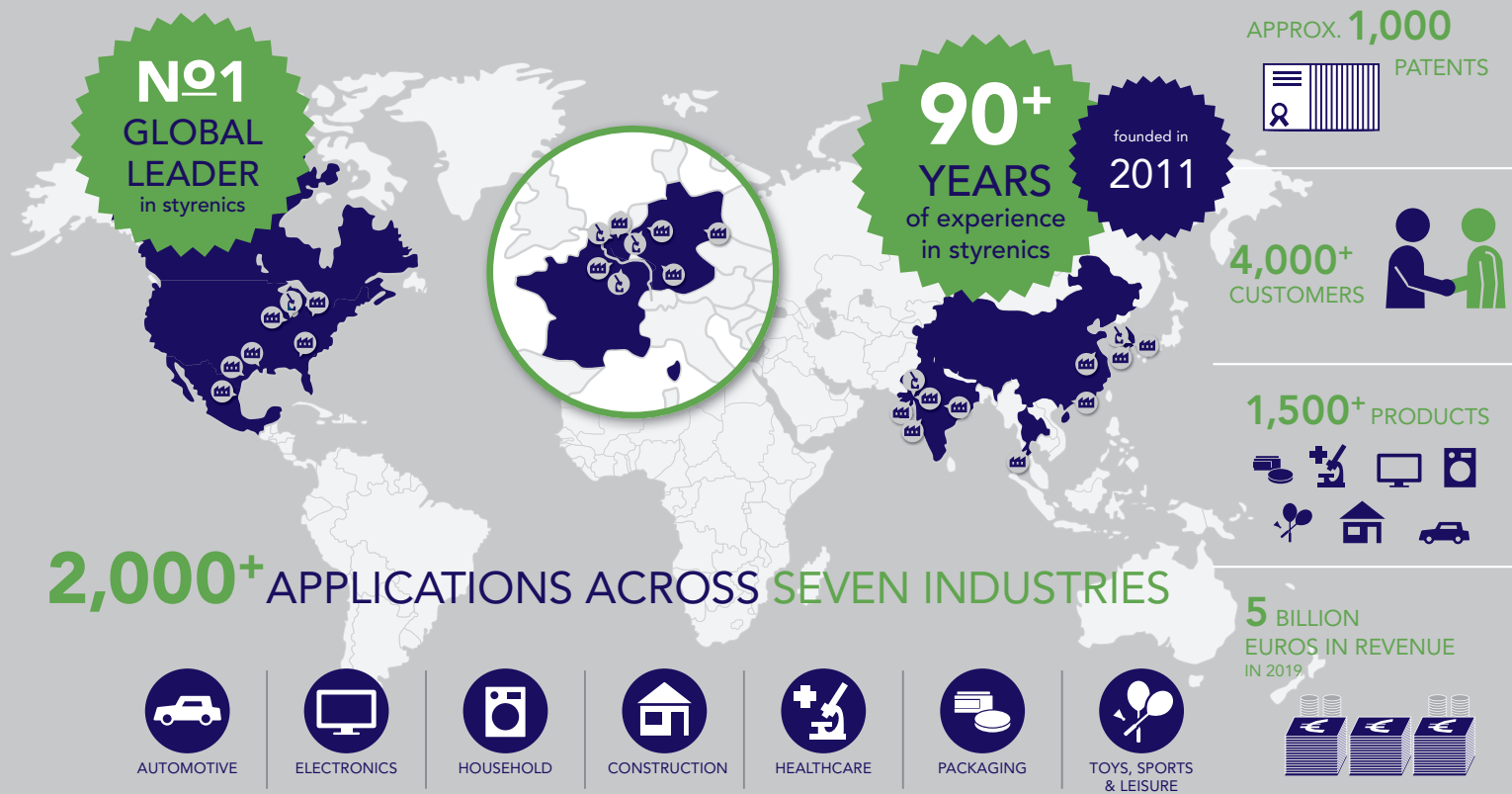
<sup>(1)</sup> INEOS Styrolution acts as exclusive distributor for the INEOS ABS plant in Addyston, Ohio.

INEOS Styrolution is the only global company focused solely on styrenics with a broad product portfolio and proven customized approach to co-development. INEOS Styrolution delivers innovation and professional support with an experienced, personal touch.

## INEOS STYROLUTION AT A GLANCE

INEOS Styrolution is the global leader in styrenics. The company provides products for many everyday applications across a broad range of industries, including healthcare, automotive, electronics, household, construction, toys/sports/leisure, and packaging.

**3,600** EMPLOYEES | **10** COUNTRIES | **20** PRODUCTION SITES | **6** R&D CENTERS | **24** SALES OFFICES



INEOS STYROLUTION HAS BEEN SERVING THE HOUSEHOLD INDUSTRY WITH THE LONGEST HISTORY IN STYRENICS POLYMERS.

## LET'S COLLABORATE

If you would like further details, need assistance in creating your applications, or are curious to explore new possibilities with styrenics, please contact us!

[www.ineos-styrolution.com/industry/household.html](http://www.ineos-styrolution.com/industry/household.html)

### LOCAL REPRESENTATIVES

#### EUROPE, MIDDLE EAST AND AFRICA

INEOS Styrolution Group GmbH  
Mainzer Landstrasse 50  
60325 Frankfurt am Main  
Germany

INSTY.info@ineos.com  
+49 2133 9309168

#### AMERICAS

INEOS Styrolution America LLC  
4245 Meridian Parkway, Suite 15  
Aurora, IL 60504  
USA

INSTY.americas@ineos.com  
+1 866 890 6354

#### ASIA-PACIFIC

INEOS Styrolution APAC Pte Ltd.  
111 Somerset Road, #14-16 to 21  
TripleOne Somerset  
Singapore 238164

INSTY.asia@ineos.com  
+82 2 6322 7775

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**INEOS Styrolution Group GmbH**

Global Headquarters  
Mainzer Landstrasse 50  
60325 Frankfurt am Main, Germany  
[ineos-styrolution.com](http://ineos-styrolution.com)

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