



MAXIMISING PRODUCT APPEAL

Styrenic solutions for the packaging industry

INEOS
STYROLUTION

Driving Success. Together.

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APPLYING THE CHEMISTRY OF ATTRACTION



STYRENICS' PROPERTIES THAT MAKE THE DIFFERENCE

ELASTICITY RECYCLABILITY
EASE OF PROCESSING **DECORABILITY** EXCELLENT FLOWABILITY
CHEMICAL RESISTANCE
LIGHTWEIGHT SUPERB SURFACE
THERMOFORMABILITY HIGH TRANSPARENCY
LOT TO LOT CONSISTENCY COLOUR STABILITY **HIGH GLOSS**
EXCELLENT MECHANICAL PROPERTIES

GOING BEYOND APPEARANCES

REQUIREMENTS OF THE PACKAGING INDUSTRY

Companies are increasingly aware that they can make their products stand out through packaging. Packaging is no longer simply functional; it is a promotional tool.

The packaging industry is confronted with a number of important issues. These include demands for less weight, greater stability, optimised energy consumption along the value chain, selective barrier properties, shelf-life management and sustainability. At the same time, there is an evolving need for new combinations of specific qualities covering haptics, acoustics, permeability, resistance and regulatory compliance.

To make things even more challenging, consumers add to these demands. Consumers want to own an attractive product, something trendy, something they are emotionally attached to, something that is functional, easy to use, something unique and maybe even a status symbol.

The appropriate packaging solution significantly contributes to the consumer's experience.

Packaging is no longer a simply functional; it is a promotional tool influencing sales, product value and customer appreciation.

STYRENICS ARE THE ANSWER

Styrenics are a family of unique organic polymers with a broad range of applications – from bike helmets, rear view mirrors and household appliances, to inhalers, toys and packaging – making styrenics one of the world's most important thermoplastics. The balanced performance of properties such as excellent aesthetics, high colour consistency, and lower density make styrenics attractive to designers and manufacturers at every level. Their superior processing abilities also make changes in design more cost-effective – a main reason why styrenic solutions are being used in an increasing number of packaging applications.

INEOS Styrolution is the worldwide leader in specialty packaging 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.

INEOS Styrolution dedicates significant resources to the development of packaging solutions for tomorrow to meet new performance requirements and to drive sustainability aspects forward. For example, INEOS Styrolution invests significantly into new recycling solutions and a circular economy for the materials it brings to the market.

STYRENIC APPLICATIONS

COMBINING PERFORMANCE & AESTHETICS

RIGID FOOD PACKAGING

Food contact compliant and
with properties that protect
its content



SHRINK SLEEVES

Branded solutions for bottle
& cup labels



COSMETIC PACKAGING

Premium aesthetic
solutions for eye-catching
elegant surfaces and
visual effects



STRETCH HOOD

The solution for handling and
stabilising pallet packaging



FLEXIBLE FILM PACKAGING

Thin, high-quality packaging
which increases product shelf
life and attractiveness



RIGID FOOD PACKAGING

APPLICATION

The market for rigid food packaging is driven by its easy-to-handle, durable, transparent and lightweight characteristics, always combined with the necessity for cost-effectiveness. Packaging items made with clear and impact resistant polystyrene resins meet these requirements and at the same time adapt to various functional needs, mainly the physical protection of the content.

Whether they are extruded and thermoformed rigid films for containers and lids or injection moulded cups and beakers, transparent rigid packaging surrounds our daily life.



INEOS Styrolution's products are not only convenient and functional, they are also food contact compliant and extend the shelf life of packaged food products.



OUR SOLUTION

INEOS Styrolution's styrenic resins offer a wide range of properties that protect the food, enhance its shelf life and make products stand out to consumers.

Styrolution® PS is a range of transparent GPPS and robust HIPS grades. PS is widely used for dairy packaging. It is the optimum material for such high volume applications because of its high conversion speed in extrusion and thermoforming, its wide processing window and the option to tailor its mechanical property via a proper adjustment of the GPPS/ HIPS ratio used for the PS sheet.

Thanks to foaming, XPS allows the combination of lightweight, thermoformability and very good thermal insulation properties.

Styrolux® is a range of styrene-butadiene copolymers (SBC) which combines high clarity with tremendous toughness and easy processing.

SBC is typically used in combination with polystyrene and can be mixed at different ratios to achieve different properties whilst maintaining a good level of transparency.

This allows balancing stiffness-toughness and heat resistance required for the specific application – while at the same time optimising material costs.

STYROLUTION® PS (GPPS) & (HIPS)

GRADE

Styrolution® PS 124 N, Styrolution® PS 158 N/L, Styrolution® PS 165 N/L, Styrolution® PS 168 N, Styrolution® PS 485N, Styrolution® PS 486N

KEY PROPERTIES



STYROLUX®

GRADE

Styrolux® 684D, Styrolux® 693D, Styrolux® 3G55, Styrolux® 3G46

KEY PROPERTIES



SHRINK SLEEVES

APPLICATION

Heat-shrinkable sleeves are a noticeably growing and attractive solution for branded bottles and a huge variety of plastic packaging, making a product stand out to consumers. This labelling technique, which involves applying heat to an unidirectional, pre-stretched film in order to shrink it to conform to the contours of a container, offers a number of inherent advantages in brand awareness, product presentation, protection, recyclability and more.

The flexibility of shrink film facilitates the labelling of products with even demanding, unconventional shapes and full body shrink sleeves provide extra space for colourful and eye-catching designs as well as providing larger canvas for printed information.

Properties such as high gloss, high clarity, impressive printability, soft haptics and controlled shrink behaviour play a major role in the material selection.



OUR SOLUTION

Outstanding characteristics of our Styrolux® grades are their combination of high transparency, brilliance, toughness and low density.

Most importantly, INEOS Styrolution's SBC (styrene-butadiene block copolymers) solutions are made for recycling. They require neither ink nor glue and they can easily be separated from a bottle after use.

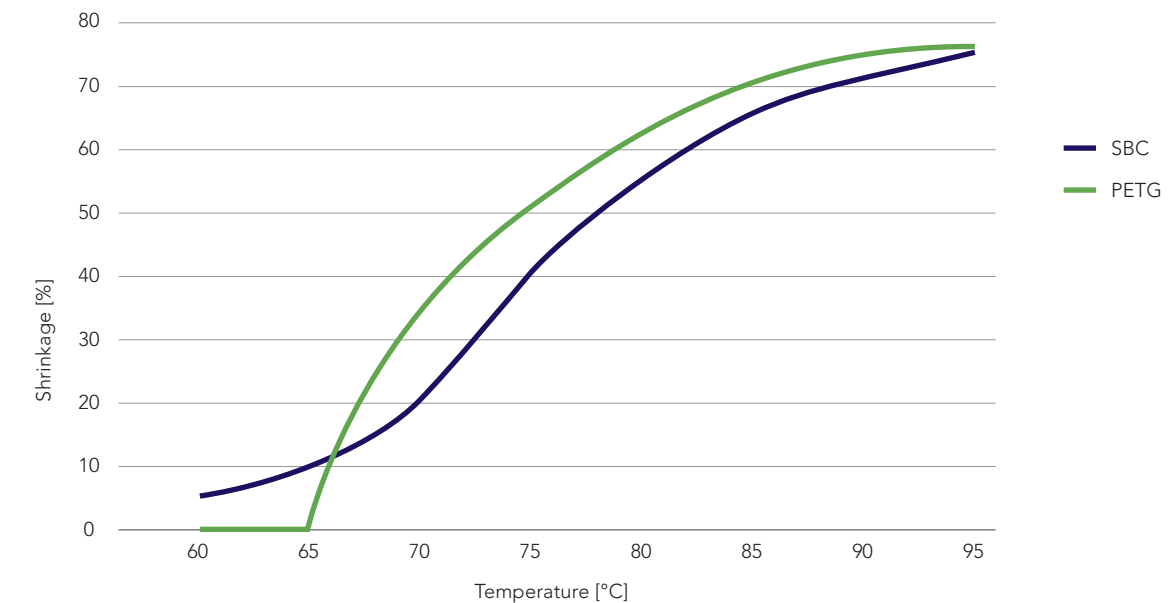
With Styrolux® T (T1), S and M, INEOS Styrolution offers a range of dedicated shrink sleeve grades which, in elaborated

blend formulations, provide tailor-made solutions for high ultimate shrink and medium shrink film with superior surface quality and storage stability (low natural shrinkage).

Blend recipes using Styrolux® T1 proved to offer in addition an economically attractive solution because of their high acceptance for GPPS in the final shrink film formulation.

With INEOS Styrolution's shrink sleeve grades based on Styrolux® your containers are perfectly dressed to suit every occasion.

SHRINK FILM PERFORMANCE



STYROLUX® (SBC)

GRADE

Styrolux® S, Styrolux® T1, Styrolux® M

KEY PROPERTIES



COSMETIC PACKAGING

APPLICATION

Innovative packaging design is on the rise. When it comes to technological innovation in the field of cosmetic packaging, companies continuously seek innovative ways to make their products stand out through packaging. Packaging of today and the future is no longer just functional, it is a promotional tool for brand owners to differentiate and market their product effectively.

INEOS Styrolution is the world's leading supplier of styrenic plastics for cosmetics packaging with a deep understanding of the industry, its applications and value chains.



In an industry where elegance and beauty must be reflected in every aspect of a product's design and surface quality, INEOS Styrolution offers a wide product portfolio of premium aesthetic solutions for the creation of eye-catching elegant surfaces and visual effects.



OUR SOLUTION

Transparent Specialties

Luran® is easily customisable for cosmetic packaging. Whether an application calls for brilliant transparency or chemical resistance, Luran® is a proven and versatile material that offers innovative solutions. It allows the moulding of thick walls to provide a glass-like effect whilst reducing weight and cost.

NAS® transparent styrene acrylic copolymers are a premium choice for applications demanding a highly transparent and glass-like neutral colour plastic.

NAS® provides excellent thermal stability, better alcohol resistance, and less molded-in stress than acrylic.

Terlux® is a line of MABS (transparent ABS) polymers. Terlux® can be used to create particularly brilliant visual effects such as very deep colours, pearly or sparkle effects and can also be printed on easily.

Zylar® offers superb transparency, impact resistance, superior processing flow, good detergent resistance and competitive cost.

Enhanced Specialties

Novodur® is INEOS Styrolution's brand of specialty acrylonitrile butadiene styrene (ABS) copolymers. Novodur® is easy to process and gives a high aesthetic colourful surface appearance. This versatile product line is available pre-coloured and certain grades can even be electroplated.

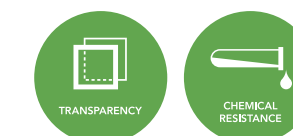
TRANSPARENT SPECIALTIES

LURAN® (SAN)

GRADE

Luran® 338L, Luran® 348 Q,

KEY PROPERTIES



TERLUX® (MABS)

GRADE

Terlux® 2802, Terlux® 2812

KEY PROPERTIES

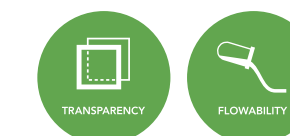


NAS® (SMMA)

GRADE

NAS® 30

KEY PROPERTIES



ZYLAR® (MBS)

GRADE

Zylar® 550

KEY PROPERTIES



ENHANCED SPECIALTIES

NOVODUR® (ABS)

GRADE

Novodur® P2H-AT, Novodur® P2MC

KEY PROPERTIES



STRETCH HOOD

APPLICATION

Stretch hoods are the solution for excellent load stability and protecting goods against environmental stress in pallet packaging. It consists of a film tube which is stretched over the pallet load for maximum load integrity. Stretch hoods are one of the fastest growing applications in pallet packaging.

Typical applications include beverages, food and bottled goods, household appliances, products packed in bags such as sand and cement, packaging materials, and paper and building products.

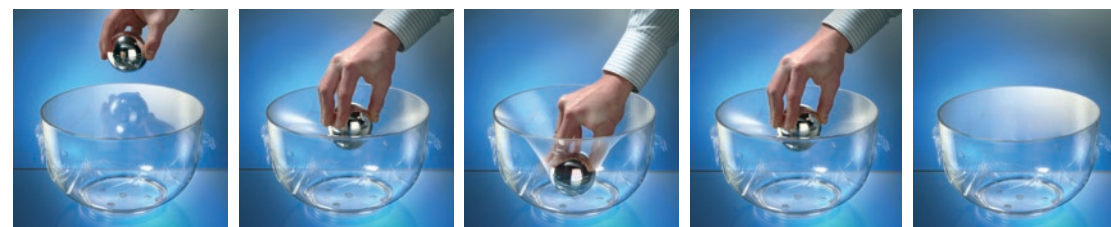
Properties such as elasticity and resilience play a major role in the material selection.



OUR SOLUTION

INEOS Styrolution's Styroflex® PG77 is perfectly suited for stretch hood applications due to its great elasticity and puncture resistance. In addition, high vertical and horizontal forces offer high pallet stability.

Due to versatile characteristics, Styroflex® PG77 allows you to customise the stretch hood film depending on the individual requirements of the technology. Good mechanical properties, such as high elasticity, make the film suitable for standard as well as more demanding requirements of the packaging industry.



The highly elastic INEOS Styrolution Styroflex®, used for the inner foil layer of the stretch hood, meets the requirements of this technology, ideal for palletising a wide range of products.



STYROFLEX® (SBC)

GRADE

Styroflex® PG77

KEY PROPERTIES



The film produced with Styroflex® PG77 is fully recyclable and due to downsizing and downgauging the required amount of material can significantly be reduced. The film is easy to deploy and process and a single stretch hood film is suitable for any palette size. A Styroflex® PG77 based stretch hood film can be produced using the same machinery as a standard PE film.

FLEXIBLE FILM PACKAGING

APPLICATION

Thin and tough flexible film packaging offers an extensive range of different applications from large scale industrial films, to fresh food packaging and candy wraps. Selecting the right material for your packaging solution helps increase the shelf life and attractiveness of foods.

In certain cases, e.g. for fresh food, selective barrier properties are an important requirement when selecting the best packaging material. Barrier properties include permeability of gases (such as O₂, CO₂, and N₂), water vapour, aroma compounds and light. These are vital factors for maintaining the quality of packaged foods.



OUR SOLUTION

Styreflex® is used to provide elasticity and toughness for high quality stretch films for the packaging of fresh food products. Styreflex based films protect food in the most natural way, while maintaining both transparency and glossiness. The optimal anti-fog effect keeps the film free of condensation and allows perfect product view.

Styrolux® grades combine high transparency and gloss, elasticity, puncture resistance and toughness, as well as printability and are the perfect material for thin, high-quality twist films for packaging and wrapping.

With INEOS Styrolution's flexible film packaging grades, the content is preserved in the most natural way and the containers are easily decorated.



STYROFLEX® (SBC)

GRADE
Styreflex® PG77

KEY PROPERTIES



STYROLUX®

GRADE
Styrolux® 684D

KEY PROPERTIES



INEOS STYROLUTION PRODUCTS FOR PACKAGING

			Flexible	SBC extrusion (rigid film packaging)				SBC for shrink sleeves			Cosmetic packaging							Enhanced specialties			General purpose polystyrene					Antistatic PS	High impact polystyrene		
Typical values for uncolored products at 23 °C	Test method	Unit	STYROFLEX® PG77	STYROLUX® 3G46	STYROLUX® 3G55	STYROLUX® 684D	STYROLUX® 693D	STYROLUX® S	STYROLUX® T1	STYROLUX® M	LURAN® 338L	LURAN® 358N	LURAN® 348Q	LURAN® 368R	NAS® 30	TERLUX® 2802	TERLUX® 2812	ZYLAR® 550	NOVODUR® M210TF	NOVODUR® P2H-AT	NOVODUR® P2MC	STYROLUTION® PS 158 N/L	STYROLUTION® PS 165 N/L	STYROLUTION® PS 124 N/L	STYROLUTION® PS 168 N/L	STYROLUTION® PS 153A	STYROLUTION® PS 485 N	STYROLUTION® PS 486 N	
PROPERTIES																													
Polymer abbreviations	-		SBC	SBC	SBC	SBC	SBC	SBC	SBC	SBC	SAN	SAN	SAN	SAN	SMMA	MABS	MABS	MBS	ABS	ABS	ABS	GPPS	GPPS	GPPS	GPPS	GPPS	HIPS	HIPS	
Density	ISO 1183	kg/m³	998	1010	1010	1010	1010	1020	1020	1020	1080	1080	1080	1080	1090	1080	1080	1050	1050	1050	1030	1040	1040	1040	1040	1040	1040	1040	
Moisture absorption, equilibrium 23°C/50% r.H.	ISO 62	%	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.2	0.2	0.2	0.2	0.15	0.7	0.7	0.05	0.2-0.3	0.2-0.3	0.2-0.3	-	-	-	-	-	-	-	
PROCESSING																													
Melt volume rate MVR 220°C/10 kg	ISO 1133	cm3/10 min	-	-	-	-	-	-	75	-	40	22	19	10	30	2	8	55	32	37	25	-	-	-	-	-	-	-	-
Melt volume rate MVR 200°C/5 kg	ISO 1133	cm3/10 min	13	12	14	11	12	12	12	12								5											
Melt flow rate MFR 200°C/5 kg	ISO 1133	g/10 min	-		-	-	-	-	-	-						-	-			-	-	3	3,4	12	1,5	17	4	4	
Melt temperature range	ISO 294	°C	170-240	180-250	180-250	180-250	180-250	180-250	180-250	180-250	200-250	220-260	200-250	220-260	200-240	230-260	230-260	200-240	230-260	230-260	230-260	180-280	180-280	180-280	180-280	180-280	180-260	180-260	
Mold temperature range	ISO 294	°C	30-50	30-50	30-50	30-50	30-50	30-50	30-50	30-50	40-80	40-80	40-80	40-80	30-50	50-75	50-75	30-55	60-80	60-80	60-80	-	-	-	-	-	-	-	
Mold shrinkage	ISO 294-4	%	0.3-1.0	0.3-1.0	0.3-1.0	0.3-1.0	0.3-1.0	0.3-1.0	0.3-1.0	0.3-1.0	0.3-0.7	0.3-0.7	0.3-0.7	0.3-0.7	0.2-0.6	0.4-0.7	0.4-0.7	0.2-0.6	0.4-0.7	0.4-0.7	0.2-0.7	0.4-0.7	0.4-0.7	0.4-0.7	0.4-0.7	-	0.4-0.7	0.4-0.7	
MECHANICAL PROPERTIES																													
Tensile modulus	SO 527-1/-2	MPa	120	1550	900	1500	1300	2900	1100	1700	3500	3700	3600	3700	3300	2000	1900	2100	2450	2500	2200	3300	3300	3200	3300	3200	1650	1800	
Stress at yield *(stress at break)	ISO 527-1/-2	MPa	4	27	15	26	22	-	25	30	65	72	70	75	60	48	42	28	46	44	40	55	52	50	59	35	23	24	
Strain at yield *(stress at yield)	ISO 527-1/-2	%	5	-	2	2.3	2.20	2	-	2					-	4	4	-	2,6	2.1	2.4	-	-	-	-	-	1.6	1.50	
Strain at break	ISO 527-1/-2	%	500	180	300	160	260	2.5	250	-	2	3	2.50	3	2.5	12	20	50	15	15	15	3	2	2	3	1,50	35	-	
Flexural strength	ISO 178	MPa	4	-	18	40	32	75	-	40		120	115	125	100	70	60	50	65	70	62	103	86	80	106	55	32	-	
Charpy unnotched impact strength (23°C)	ISO 180	kJ/m²	n.b.	n.b.	n.b.	n.b.	n.b.	20	n.b.	25	14.50	16	14	18	12	120	110	n.b.	120	100	-	-	-	23	-	8	-	-	
Charpy notched impact strength (23°C)	ISO 179/1eA	kJ/m²	n.b.	3	85	4	5	2	-	3	1.70	2	1.5	2	1.5	5	5	4	16	18	25	-	-	-	-	-	10	12	
Izod notched impact strength (23°C)	ASTM D 256	kJ/m²	-	-	5	4	3.5	3.5	-	3	2	2	1.5	2	2.5	7	7	6	16	18	25	-	-	-	53	-	-	-	
THERMAL PROPERTIES																													
Heat deflection temperature; HDT A (1.80 MPa)	ISO 75-1/-2	°C	-	58	51	65	59	-	50	62	86	86	86	88	80	90	87	70	94	93	94	86	76	78	86	-	-	74	
Heat deflection temperature; HDT B (0.45 MPa)	ISO 75-1/-2	°C	-	75	62	75	72	-	55	76	98	99	99	100	90	94	93	81	98	97	96	98	84	-	98	-	-	83	
Vicat softening temperature VST A 120	ISO 306	°C	35	-	-	-	-	-	-	-								-											
Vicat softening temperature VST B 50	ISO 306	°C	-	51	35	59	48	64	48	60	105	106	105	106	98	93	87	73	99	98	95	101	89	87	101	85	90	90	
OPTICAL PROPERTIES																													
Light transmission (4 mm thick) *	ASTM D 1003	%	80	90	89	89	89	90	91	90	89	89	89	89	91.40	89	89	90	-	-	-	89	89	91.40	89	91	-	-	
Haze (4 mm thick) **	ASTM D 1003	%	5	2	3	2	2	2	1.5	1.5	1	1	1	1	0.3	<3	<3	2	-	-	-	1.5	2	0.3	2	0.3	-	-	
Refractive index (ND)	ISO 489	-	1.56	1.57	1.57	1.58	1.57	1.58	1.57	1.57	1.57	1.57	1.57	1.57	1.56	1.54	1.54	1.57		-	-	1.56	1.56	1.56	1.57	1.56	-	-	
REGULATORY																													
EU food contact statement available	-		yes	yes	yes	yes	yes	yes	yes	yes	yes***	yes***	yes***	yes***	yes***	yes	yes	yes	yes	no	no	yes	yes	yes	yes	yes	yes	yes	yes
FDA food contact statement available	-		yes	yes	yes	yes	yes	yes	yes	yes	yes***	yes***	yes***	yes***	yes***	no	no	yes	yes	no	no	yes	yes	yes	yes	yes	yes	yes	yes



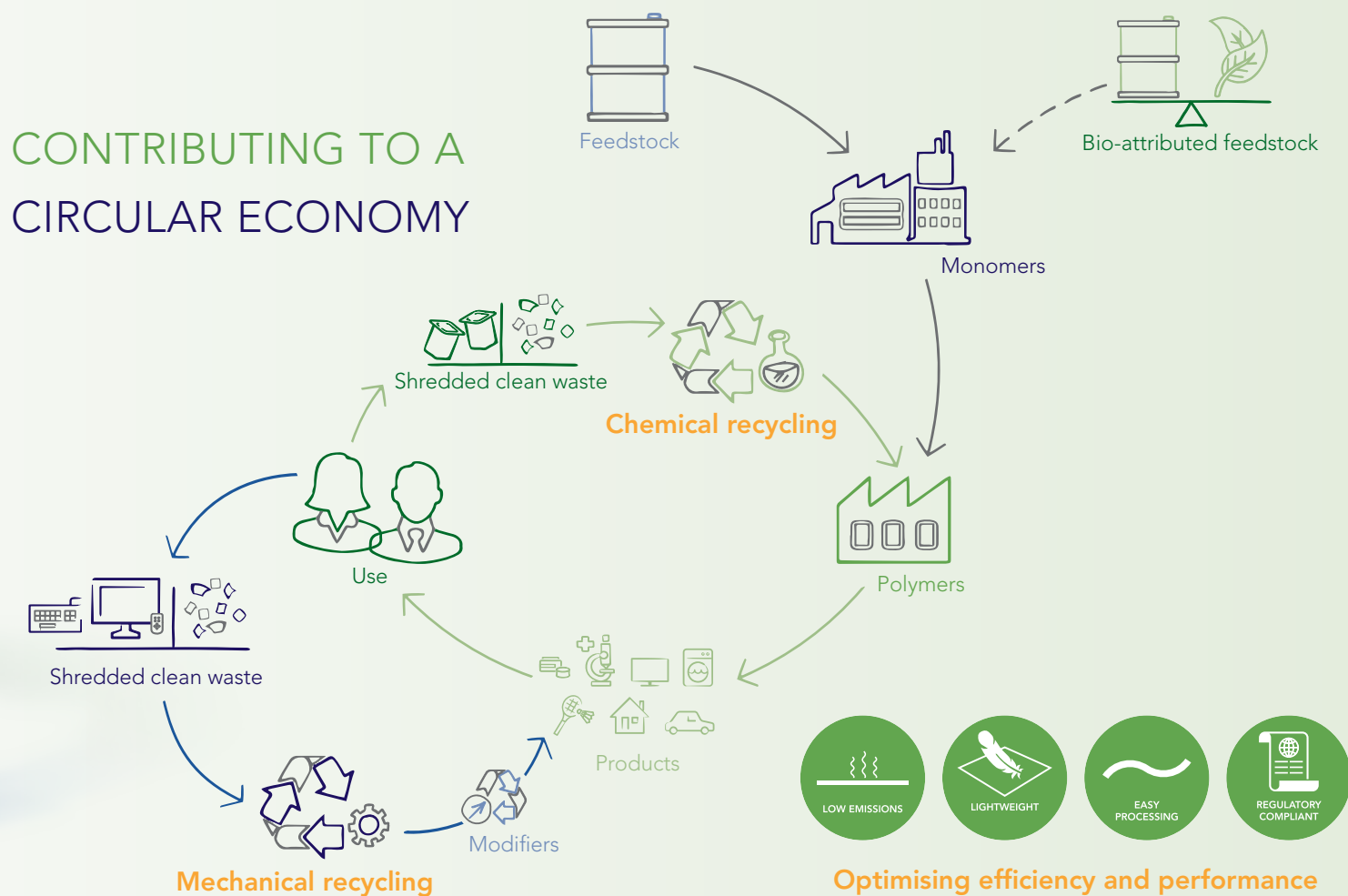
STYRENICS. MADE FOR RECYCLING.

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.

The 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.

CONTRIBUTING TO A CIRCULAR ECONOMY



INEOS
STYROLUTION
ECO

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

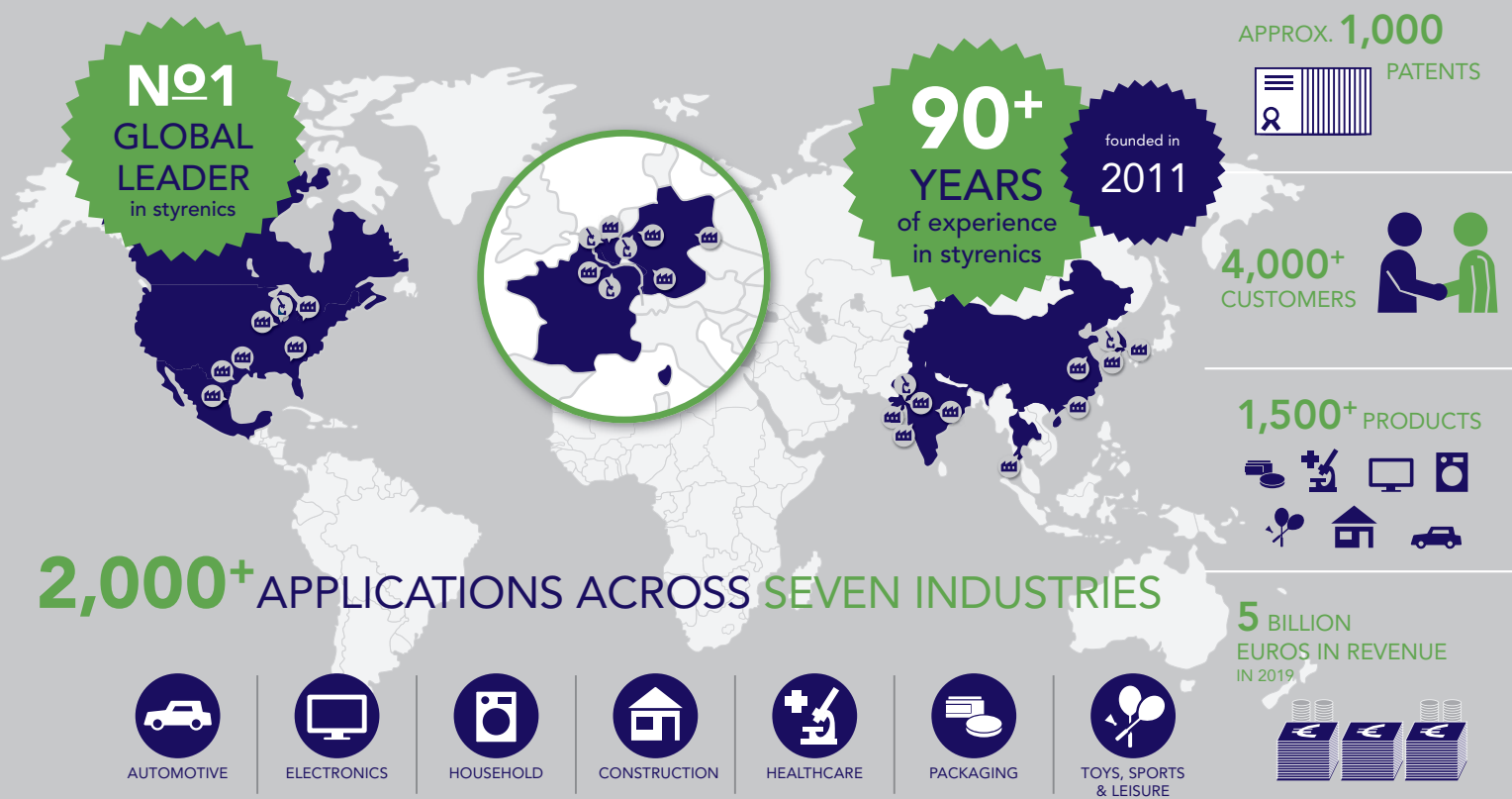
To read more about our ECO family of solutions, please visit:
www.styrolution-eco.com.

To read more about our actions and performance on sustainability visit:
www.ineos-styrolution.com/sustainability

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 healthcare.

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



INEOS STYROLUTION HAS A LEGACY OF SUCCESSFULLY SERVING THE PACKAGING INDUSTRY FOR OVER 85 YEARS.

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/packaging.html

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PLEASE NOTE

The data contained in this publication are based on our current knowledge and experience. In view of the many factors that may affect processing and application of our product, these data do not relieve processors from carrying out own investigations and tests; neither do these data imply any guarantee of certain properties, nor the suitability of the product for a specific purpose. Any descriptions, drawings, photographs, data, proportions, weights etc. given herein may change without prior information and do not constitute the agreed contractual quality of the product. It is the responsibility of the recipient of our products to ensure that any proprietary rights and existing laws and legislation are observed. (March 2020)

INEOS
STYROLUTION

Driving Success. **Together.**