THE MAGAZINE WITH INSIGHT
BUSINESSFOCUS

INEOS STYROLUTION
STYRENIC SOLUTIONS

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WE LEARN HOW INEOS STYROLUTION IS GROWING AND DEVELOPING FOR THE FUTURE.

STYRENIC SOLUTIONS

PROJECT MANAGED BY: NEIL STOWE

INEOS is a relatively young company, but thanks to the way in which the company has been constructed to include a number of independent divisions, each of them have gone a long way.

INEOS is a very young chemical company, about 21 years old. But in those 21 years, it has already become a top-four, world-wide chemical company. It's a very entrepreneurial group that has developed and grown via acquisition and organic growth. INEOS is privately-owned, privately-held and their primary owner, Jim Ratcliffe, has constructed it as a federation of different companies. It doesn't have the typical large overhead structure. Each division runs on its own within this federation style.

Warren works within INEOS Styrolution, the leading, global styrenics supplier with a focus on styrene monomer, polystyrene, ABS standard and styrenic specialities.

"I work within INEOS Styrolution, it's a global styrenic company. We produce a large portfolio of styrenic polymers," Warren explains. " We're the largest styrenics producer in the world with production in all three major regions of the planet, with the same products available in each region."

The company runs world-class production facilities and has built itself a world-class reputation by helping its customers succeed through solutions designed to give them a competitive edge across a range of markets. INEOS Styrolution provides styrenic applications for products in every facet of life, from cars to electronics, to household goods, even construction and healthcare.

Indeed. Warren puts the company's success down to a combination of their unique business structure and the wide array of markets that they serve, >>

<< **The INEOS Styrolution Bayport, Texas site currently houses the world's largest styrene monomer plant.**

SIEBTECHNIK TEMA

One Solution. Worldwide.

SIEBTECHNIK TEMA is part of a globally operating group of companies with around 3,500 employees in more than 50 countries with a clear focus on the solid-liquid separation as well as processing of bulk solids in the mineral, chemical and food industries.

A company policy of controlled, self-financed growth, consistently implemented in almost 100 years of company history, not only ensures a healthy economic base and an exceptionally good strategic position, but also an impressive worldwide presence.

We have just the right centrifuge for your scope of work...

Our centrifuges and dryers offer you cutting-edge centrifuge technology for your process, application-specific optional extras, individual consultation and reliable support.

...and the right thermal dryer!

Static and dynamic fluid bed dryers (FBT) are used in many applications.
FBT are not only used for drying, but also for cooling, calcining, roasting, texturing or sterilizing and pasteurizing.
Gentle and uniform drying / cooling ensures the quality of the products to be processed.

SIEBTECHNIK TEMA

One Solution. Worldwide.

SIEBTECHNIK TEMA's dewatering and drying solution for INEOS Styrolution's new ASA plant in Bayport, Texas:
A line mainly consists of a SHS pusher centrifuge, a solid bunker and a two-stage dynamic fluid bed dryer.
The process is designed for minimal energy consumption and exhaust air emissions. Furthermore, it includes a comprehensive explosion protection system.

Our Experience - Your Benefits!

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SIEBTECHNIK TEMA

THINGS THAT CHANGE THE WORLD - POLYMERS - INEOS STYROLUTION - THE NEW ASA PLANT IN TEXAS

ONE SOLUTION. WORLDWIDE.

In close collaboration with its sister company **TEMA PROCESS**, **SIEBTECHNIK TEMA** supplies a highly sophisticated dewatering and drying solution for **INEOS** Styrolution's new **ASA** plant in Bayport, Texas:

Grafted rubber particles are mechanically dewatered with a pusher centrifuge and subsequently thermally dried using a two-stage continuous fluid bed dryer which is provided by **TEMA PROCESS**.

SIEBTECHNIK TEMA'S SOLID - LIQUID SEPARATION CENTRIFUGE SOLUTIONS FOR POLYMERS

Polymers have a broad use in everyday life. Each polymer exhibits a unique set of properties qualifying it for certain applications. These different sets of properties are accompanied by diverse solid - liquid separation challenges within the production processes. This creates a demand for highly efficient specially designed separation solutions.

With a big range of filtrating, sedimenting and combination centrifuges **SIEBTECHNIK TEMA** has been able to provide ideal centrifuges to worldwide plants for the continuous solid - liquid separation of a broad range of polymers such as:

Acrylonitrile Butadiene Styrene (ABS), Acrylonitrile Styrene Acrylate (ASA), Expanded Polystyrene (EPS), High Density Polyethylene (HDPE), Methacrylate Butadiene Styrene (MBS), Polycaprolactam (PA6), Polycarbonate (PC), Polyhydroxybutyrate (PHB), Polymethyl Methacrylate (PMMA), Polyoxymethylene (POM), Polystyrene (PS), Polyvinyl Alcohol (PVAL, PVOH), Polyvinyl Butyral (PVB), Polyvinyl Chloride (PVC), Styrene Butadiene Copolymer (SBC), Ultra High Molecular Weight Polyethylene (UHMWPE), and many more.

The requirements for a successful solid - liquid separation are not just met by selecting the right type of centrifuge. For this purpose, **SIEBTECHNIK TEMA** is also specialized to deliver all the centrifuges with customized design features upon request, in order to fulfill the specific needs of the solid - liquid separation process. Optional features include the following:

- Gas tight design with inertisation
- Special surface treatment
- Custom designs of rotating parts
- Special materials and linings
- Sophisticated wear protection
- Housing insulation and / or heating
- Custom control solutions

The following centrifuge models in the delivery scope of **SIEBTECHNIK TEMA** are already successfully established in the continuous solid - liquid separation of the above-mentioned polymers:

- Filtrating centrifuges:
  - **CONTURBEX** screen worm centrifuge
  - **SHS** pusher centrifuge
  - **TURBOCASCADE** sliding centrifuge
- Sedimenting centrifuges:
  - **SHORTBOWL** decanter
  - **DZ & TS** decanter
- Combination centrifuges:
  - **TWINCONE** decanter
  - **TURBOSCREEN** decanter

As the market demands the development of polymers with enhanced characteristics, **SIEBTECHNIK TEMA** is able to provide laboratory evaluations and trials in pilot scale, often at the customer facilities in order to help the customer to find the optimal centrifuge equipment for the solid - liquid separation, early in product development.

CONTINUOUS FLUID BED DRYERS BY TEMA PROCESS

A fluidized bed is a physical phenomenon occurring when a quantity of a solid particulate substance is placed under appropriate conditions to cause a solid/fluid mixture to behave as a fluid. A continuous fluid bed dryer/cooler is a machine in which a continuous flow of damp solid particles is conveyed over a perforated plate, through which air is blown to bring about fluidization.

The product is dried in the first section of the machine and cooled down in the second part. Drying occurs because of the direct contact between the "wet" material and the hot air blown through the material. The drying and cooling sections of the machine form a single conveyor in which the hot and cool air flows are segregated. Conveying of the product is achieved by means of a low-frequency, high amplitude shaker mechanism. The air which is used in the fluid bed performs two functions. First, the air flows through the layer of solids at a velocity sufficient to support the weight of the particles, which creates a fluidized state enabling the particles to flow. Second, the air in the fluid bed serves to cool, heat or dry the particles as it comes into direct contact with the solids material within the fluid bed chamber.

The rapid heat and mass transfer rates between the product and the drying medium and rapid mixing of solids which leads to nearly isothermal conditions throughout the fluidized layer, makes the fluid bed dryer an ideal system to dry polymers. The product is never heated or dried more than necessary and is always processed for the right length of time and at the right temperature. This results in predictable and consistent product quality. The "Shaking" motion plug flow of the **TEMA PROCESS** fluid bed dryer, allows a first-in, first-out drying of products and well mixed fluidization, which covers the entire spectrum and enables a control of the residence time.

Fluid bed dryers are specially preferred in the chemical industry in combination with after cooling and heat recovery, resulting in better end product quality and very low energy consumptions.

The temperature of the product must be carefully controlled. Often the particles tend to stick together, so the product needs continuous and gentle agitation. The drying system has to meet the design rate on throughput and all product quality specifications: purity, dryness, temperature and uniformity. The design of the drying processing equipment must include an explosion protection strategy. An ignition source is all that is required to initiate an explosion. **TEMA PROCESS** can implement a full line of explosion protection solutions including ATEX certified explosion vents, flameless explosion venting, explosion suppression systems, explosion isolation systems and explosion detectors but also fire suppression and fire extinguishers.

ADVANTAGES OF CONTINUOUS FLUID BED DRYERS BY TEMA PROCESS

Advantages of the fluid bed dryers by **TEMA PROCESS** include:
Low energy consumption compared to other type of dryers, accurate control of the residence time, product is dried uniformly, gentle on sensitive materials (no friction), low operating costs, cooling section integrated in dryer, handling of sticky products, small footprint, process flexibility, reliable system, less downtime.

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Management board members (from left to right): Rob Buntinx, Pierre Minguet, Kevin McQuade, Markus Fieseler, Alexander Glück and Steve Harrington

especially in an increasingly international marketplace.

"Our global structure, coordination and quick decision-making process make us an effective partner for customers across the world as globalisation increases and the world becomes smaller," he says. "If you produce something in one region, you can also produce it in another region. Our customers can buy identical materials globally, but produced locally. We have a broad portfolio of styrenic polymers. If one product doesn't work, our customers can choose from a broad portfolio in our toolbox. We have everything from general products like polystyrene, to very specialised products like the weatherable ASA polymers and many different transparent polymers. We have the products to meet our customers' needs, whether it be packaging, healthcare or automotive."

The company is also constantly growing and developing. As we speak with Warren, we discover INEOS Styrolution is beginning a whole new chapter of their history - one that brings opportunities and new challenges. ››

"OUR GLOBAL STRUCTURE, COORDINATION AND QUICK DECISION-MAKING PROCESS MAKE US **AN EFFECTIVE PARTNER FOR CUSTOMERS ACROSS THE WORLD** AS GLOBALISATION INCREASES AND THE WORLD BECOMES SMALLER"

Tom Warren, Vice President Specialties Americas, INEOS Styrolution

Aerial view of the INEOS Styrolution Bayport, Texas plant. The new facility will be constructed within the Bayport, Texas site.

"ONE OF OUR CHALLENGES IS CONSUMING ALL THIS HERITAGE CAPACITY WE'VE HAD, AND NOW **WE'RE LOOKING TO BUILD A NEW PLANT**"

"One of our challenges is consuming all this heritage capacity we've had, and now we're looking to build a new plant," Warren says. "We're building our very first plant as a company - an ASA plant in Texas. There's a lot of excitement surrounding this project!"

CLOSING THE CIRCLE

It's an exciting time to be in the styrenics sector as well, with the industry undergoing big changes to show how the materials can be part of a sustainable materials solution. This includes demonstrating how ASA can provide lighter car components, allowing cars to use less fuel, as well as showing how styrenics can be part of a circular economy.

"All the while we'll be keeping this focus on styrenics as a sustainable solution," Warren says. "We have numerous activities in sustainability, heading towards circularity in plastics. We want to close the loop for plastics, not just for growth, but also as a key strategic pillar in sustainability. For example, we invest heavily in recycling solutions for styrenics. As a matter of fact, as we speak, we are making the first ABS materials available to our customers that contain up to 70 per cent of recycled post-consumer waste. And – even better – the new materials match the property profile of its non-recycled counterpart."

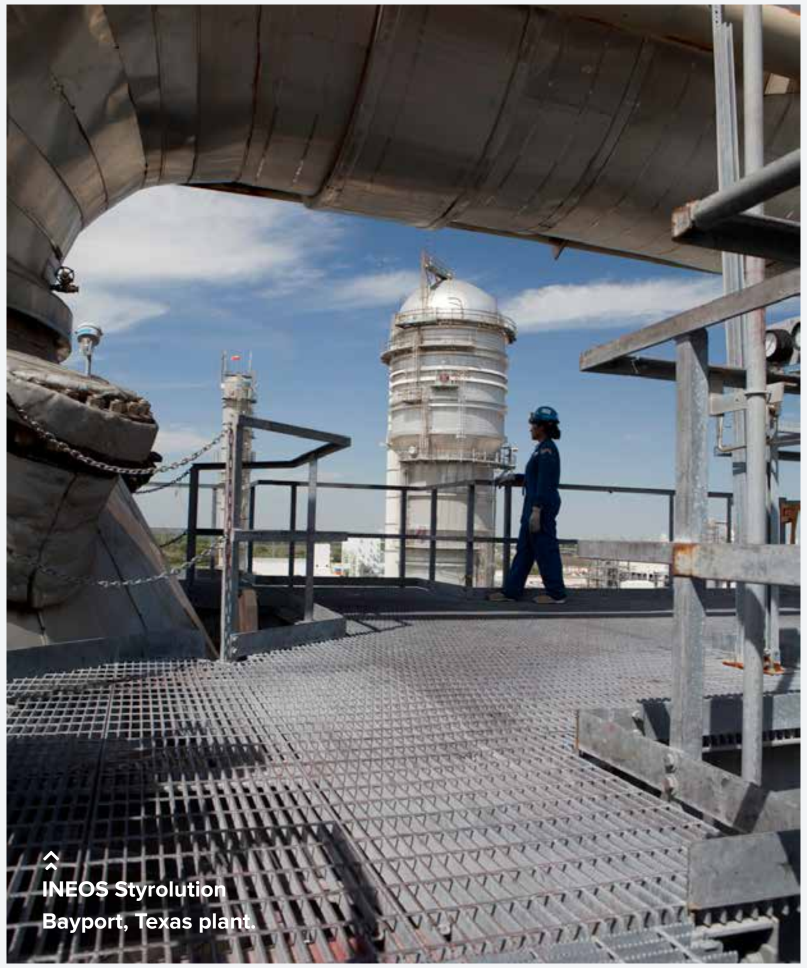
"AS WE SPEAK, WE ARE MAKING THE FIRST ABS MATERIALS AVAILABLE TO OUR CUSTOMERS THAT **CONTAIN UP TO 70 PER CENT OF RECYCLED POST-CONSUMER WASTE**"

INEOS Styrolution views sustainability as a major factor in the future success of the company. Warren shows that sustainability and environmental factors are firmly integrated into all of INEOS Styrolution's decision-making processes. The company strongly believes that sustainable business management and practices will contribute to its leading position in the market.

TEAM BUILDING

To complete a project of this scale and ambition you need the right resources, the right technology and the right people. Fortunately, these are all resources INEOS has in abundance.

"To build the new ASA plant, we've created a very focused team," Warren says. "We're hiring the best and brightest people to tackle the project and make it happen. This plant uses our own technology, not technology we're licencing from someone else, so we're building up our own expertise and technology, taking features from around the world and adding them into the facility. »



INEOS Styrolution Bayport, Texas plant.

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“FOR A STYRENICS COMPANY LIKE OURS **IT’S AN EXCITING TIME**, WE’RE EXPANDING OUR OWN CAPACITY WHILE INVESTING IN ACQUISITIONS AS WELL”

And now we begin the phase of construction.”

It’s a thorough process, but also a long one, and Warren emphasises the importance of being patient with the process.

When searching for the people to make up this team, Warren says recruitment efforts start at home.

“We look internally first to the best people we have and utilise our internal talents from a longer perspective on the project itself,” he says. “If we need to, we bring in subject matter experts from around the world to bring their knowledge into our design process. We also need real people in the Texas area to build this plant. So, we’ve leaned on our internal network as well to help us recruit and retain people, and leaned on our internal culture to retain those people.”

“Our culture is a key advantage,” Warren says, “It is one of entrepreneurial spirit with a flat management structure, and speedy decision making. This helps people feel empowered and valued and really creates that sense of ownership of the project.”

The team and their facilities are growing, and for Warren, the new Texas plant is merely emblematic of the large-scale growth and development he foresees for the company.

“For a styrenics company like ours it’s an exciting time, we’re expanding our own capacity while investing in acquisitions as well,” he says. “In 2017, we acquired the K-resin business from Chevron Philips Chemicals. Just recently, we acquired two polystyrene plants in China. In addition, we have the ASA plant that we’re building in Texas and we’re planning on building a new styrene plant in the US. I see us continuing to expand on our leadership position.”

Granules of INEOS Styrolution’s Luran® S acrylonitrile styrene acrylate (ASA). These polymers feature high surface quality and good impact strength including enhanced color fastness and deliver superior long-term performance when exposed to UV irradiation and heat.

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