

Global Trends In Composite Resins

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Presentation Outline

- Introduction to DSM Composite Resin
- Good Manufacturing Practice
- Cobalt Free Resin
- Styrene Free Resin

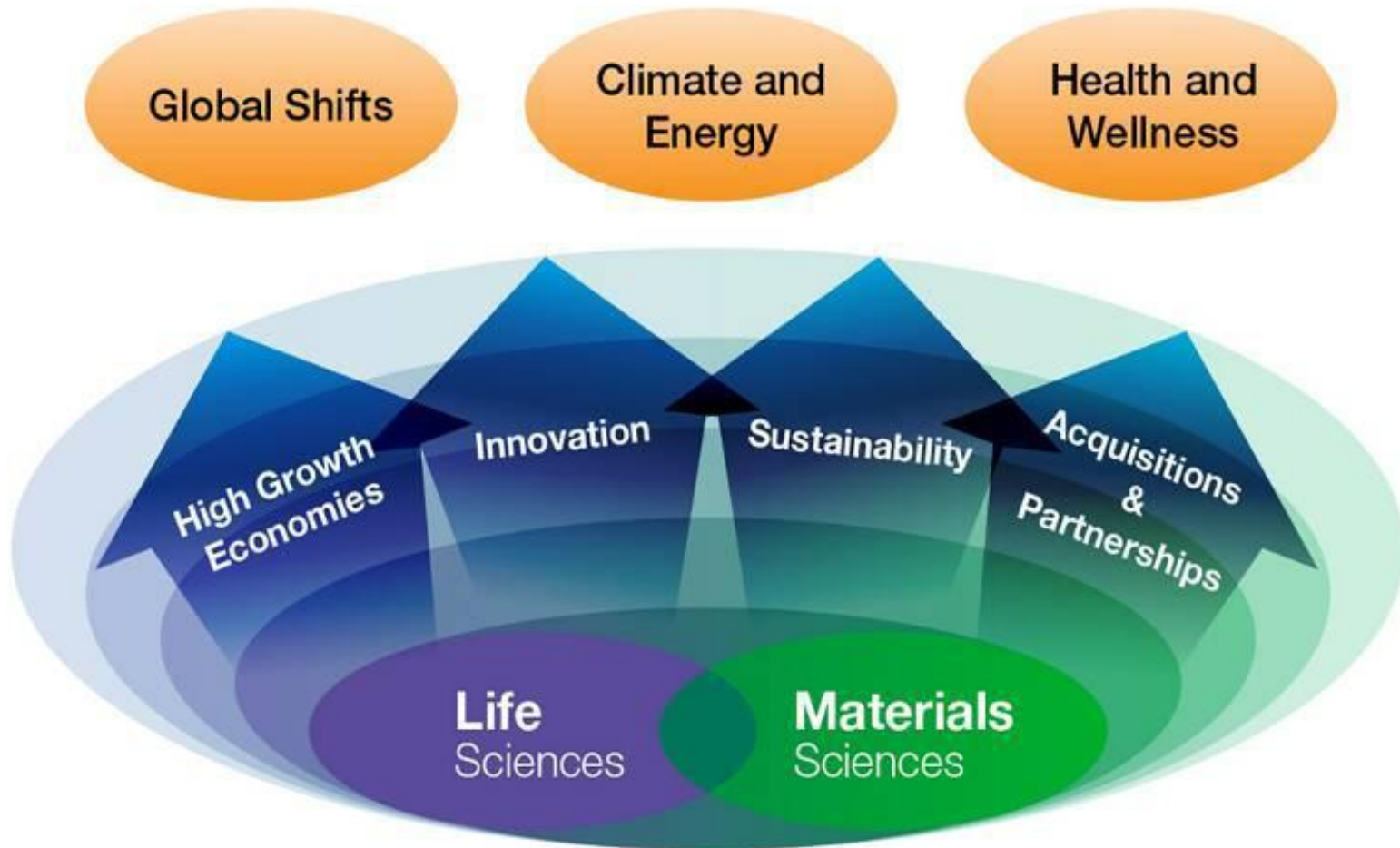
DSM Mission

Our purpose is to create brighter lives for people today and generations to come.

We connect our unique competences in Life Sciences and Materials Sciences to create solutions that nourish, protect and improve performance.



DSM Strategy



DSM Composite Resins Locations



● Headquarter
● R&D centres

● Manufacturing sites
● Joint cooperations with local manufacturers

● Sales Offices

Facts & Figures

- **Key Products lines:**
Unsaturated Polyester Resins, Sizings & Binders, Vinyl Ester Resins,
- **Manufacturing sites & co-operations:**
Europe, Turkey, India, China
- **Sales Offices:**
Worldwide
- **R&D centers:**
Zwolle (NL) and Shanghai (CN)
- **Key Industries:**
Building & Infrastructure, Automotive/Transportation, Tanks/Pipes/Relining, Other
- **Awards for Innovations, Sustainability & Best Practices:**
Frost & Sullivan, AVK, China Composites, SAE International

Good Manufacturing Practice - Definition

- Good manufacturing practice (GMP)' means those aspects of quality assurance which ensure that materials and articles are consistently produced and controlled to ensure conformity with the rules applicable to them and with the quality standards appropriate to their intended use by *not endangering human health* or causing an *unacceptable change in the composition* or causing a *deterioration in the organoleptic characteristics*.
- GMP guidelines are not prescriptive. A good manufacturing practice is a production and testing practice that helps to ensure a quality product.



Main Concepts of GMP

Three main concepts for GMP for production of materials and articles for food contact are of primary importance :

- Create awareness at all levels involved.
- Maintaining compliance of the composition and possible migrants through effective contamination prevention.
- Maintaining compliance of the composition and possible migrants through effective management of change procedures indicating potential changes in composition or contamination risk.



Key Stages of GMP

- “Design for compliance” during which a safe and organoleptically acceptable material or article is developed with the intent to produce a final article compliant with the regulatory requirements for food contact.
- Commercial production during which regulatory compliance of the composition and possible migrants of materials and articles needs to be consistently ensured.



GMP - Few Guiding principles

- Manufacturing processes are clearly defined and controlled. All critical processes are validated to ensure consistency and compliance with specifications. Any changes are evaluated and validated.
- Clear written Instructions and procedures.
- Operators are trained to carry out and document procedures.
- Records are made, manually or by instruments. Deviations are investigated and documented.
- Records of manufacture (including distribution) that enable the complete history of a batch to be traced are retained in a comprehensible and accessible form.
- A system is available for recalling any batch from sale or supply.
- Complaints handling system to ensure investigation of defects and appropriate measures are taken to prevent reoccurrence and also with respect to the defective lot.

Why GMP when we have ISO certification ?

ISO

- The quality systems help to ensure that products are produced according to documented procedures and specifications.

GMP

- Framework of additional precautionary measures to facilitate meeting the regulatory requirements.
- Acknowledge that typical specifications cannot comprise the full set of legal requirements for the intended use.
- Aims to ensure that products are consistently suitable for the intended use.

Scope of GMP

Article 2 of Regulation 2023/2006 defines the scope as follows:

“This Regulation shall apply to all sectors and all stages of manufacture, processing and distribution of materials and articles, up to but excluding the production of starting substances”

- **Quality assurance system and quality policy**
- **Management leadership and personnel**
- **Hygiene policy**
- **Documentation, labeling, document retention and traceability**
- **Production**
- **Quality control and specifications**
- **Work contracted out**
- **Complaint handling, product recall and incident management**
- **Regular internal and supplier audits**

Cobalt free Curing

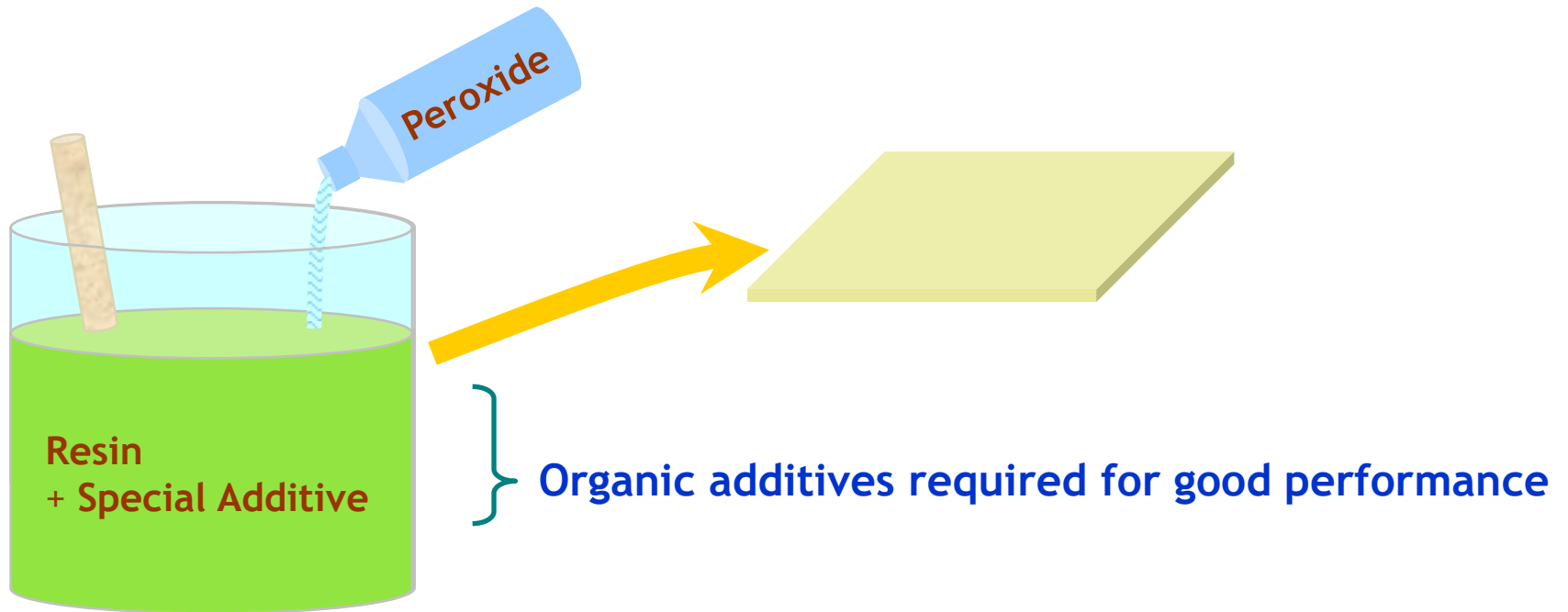


Cobalt in the Spotlight

- Cobalt Chloride/ Cobalt Diacetate classified as CMR 1B
 - Moved to the candidate list for use discontinuation in Europe
- Cobalt Octoate may be reclassified CMR 1B short term in Europe
- Cobalt-containing alternatives are available
 - But future reclassification of these is not clear

Uncertainty about immediate future

Development of Cobalt-free Resins: Get the Alternative Accelerators Working



Pre-Accelerated vs. Post-Accelerated

Pre-accelerated resins

Ready-to-use
Manufacturing robustness
Increased process
consistency

Non-accelerated resin & Separate Accelerator

More process flexibility
Easier sourcing
But more variables in
manufacturing process

Targets of Cobalt Free Pre-accelerated resins

- Cobalt-free
- No CMR/ SVHC listed ingredients
- Cure with standard peroxides
- Handling like conventional systems
- No compromise on performance for cured products

You Want Peace-of-Mind

- No worries about environmental permits
- Your operations and products friendly for the environment
- Creating value and being a differentiator
- Be a good employer



And Your Customers Want to Feel Good about the Products They Buy

- Often composite solutions are more sustainable than solutions based on traditional materials like steel, concrete
- Made without the use of potentially harmful ingredients
- And obviously bringing brighter lives through great functional performance



Get Ready Now, No Worries Later

- DSM is first to launch cobalt-free pre-accelerated resins
- Staying ahead of potential changes in legislation
- Peace-of-mind on business continuity for you





Styrene Free Resin

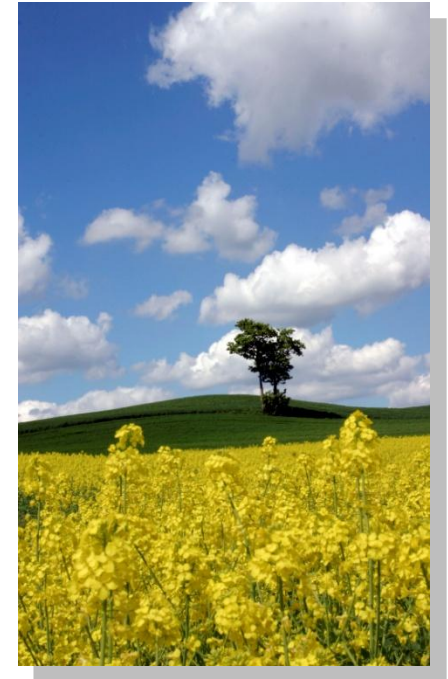
Styrene in the Spotlight

- Presently Styrene is not CMR classified in the EU
 - EU regulatory authorities concluded in 2007 that Styrene does not pose a concern for human carcinogenicity
- However, following recent actions from the Danish Competent Authorities, a new CMR 1b classification is being proposed
- US National Toxicology Program (NTP) listing as “reasonably anticipated to be human carcinogenic” (June 2011)
- Changes may be expected in legislation, styrene exposure limits
 - Influencing your factory layout and operational permits

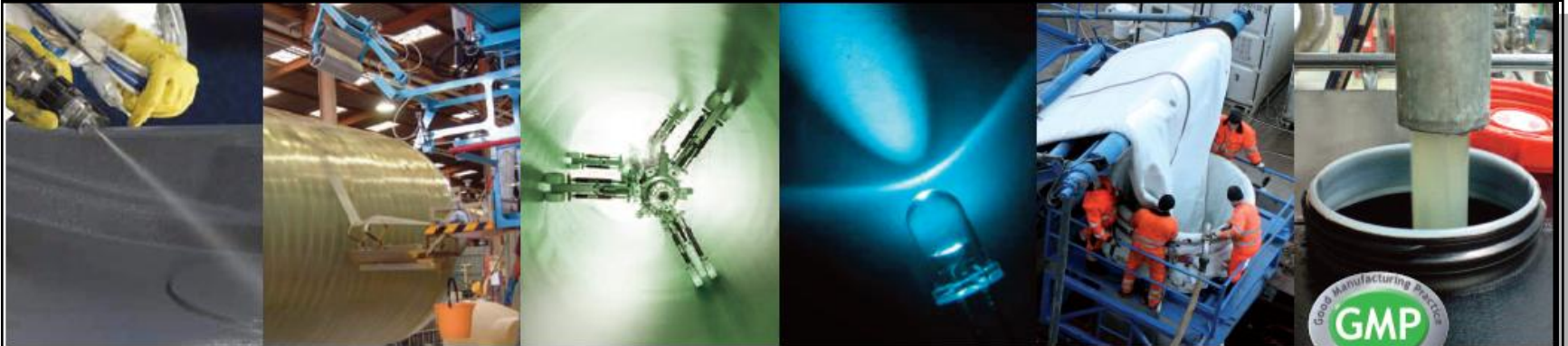
Uncertainty about medium term future

Sustainable Alternatives

- Styrene is safe to use
 - Provided worker exposure level is below the limits accepted in the industry
- Continued resins based on styrene
- Development of sustainable alternatives.
- Global OEMs/ end customers for styrene-free



Introducing: Styrene Free A la Carte



Atlac® Premium

100 series

Product

Hand lay up
Spray up

Benefits

Zero emission
High flashpoint
Smell friendly
Solvent resistance
Cold curing

Applications

Ship lamination
Industrial construction
Tank lining

Atlac® Premium

200 series

Product

Filament winding
Continuous winding

Benefits

Zero emission
Smell friendly
UV curing
High temperature
resistance
Fast curing

Applications

Protective lining
GRP pipes
Storage tanks

Atlac® Premium

300 series

Product

Liner impregnation
On spot impregnation

Benefits

Zero emission
Hot & cold curing
Smell friendly
UV curing
Fast processing
High flashpoint

Applications

Small diameter relining
Lateral relining
Vertical relining

Atlac® Premium

400 series

Product

Liner impregnation
On spot impregnation

Benefits

Zero Emission
No smell
Blue LED curing
Fast & economical
processing
High flashpoint

Applications

Small diameter relining
Lateral relining
Vertical relining

Atlac® Premium

600 series

Product

Liner impregnation
Hand lamination

Benefits

Zero emission
Hot & cold curing
Smell friendly
Chemical resistance
Hygiene certification
10.000 hrs tested
High flashpoint

Applications

Main sewer relining
Large diameter relining
Manhole repair
Partliners

Atlac® Premium

700 series

Product

Liner impregnation
GMP production

Benefits

Drinking water approved
Food contact approved
Hot & cold curing
Corrosion resistance
Low odor
Low shrinkage

Applications

Drinkwater relining
Food contact application

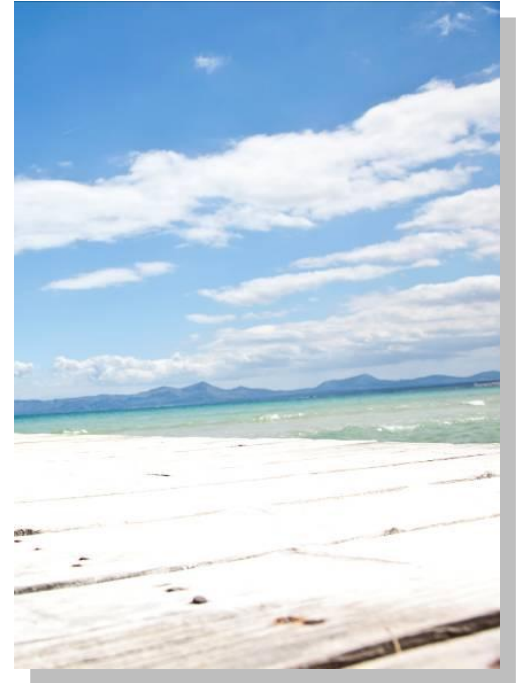
Zero Styrene Premium Resins

- Styrene-free solutions for main applications with proven end-use performance
- Better working environment for your workers
 - Reduced need for Personal Protective Equipment
 - Healthier workshop with less smell
- Simplification of operational permit process
 - More efficient management of increasingly stricter regulations
- Lower investments for newly built workshops
 - No need for costly ventilation equipment
- Avoiding styrene odour and associated public concerns

Combining End-Use Performance and Sustainability

Premium Resins Provide Great Performance

- High flash point creating a safe working/ processing environment
- Atlac® Premium resins are Smell Friendly
- Good mechanical performance at elevated temperatures
- Good level of chemical resistance



[Styrene Free Video](#)

Q & A



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