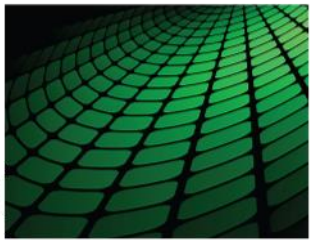
Era Polymers

Excellence in Polyurethane Chemistry

Integrated Chemicals



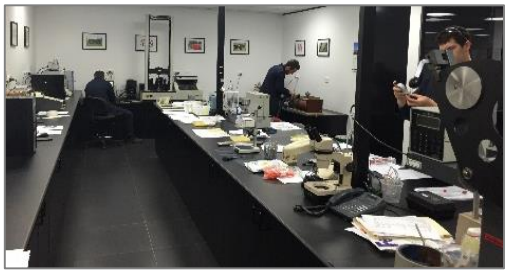
Expanding Chemistry Seminar
8-9 November 2017

NATA
WORLD RECOGNISED ACCREDITATION

bsi. ISO 9001 Quality Management

Era Polymers
Global Reach with Family Values

- Who is Era Polymers?
- High Dynamic Performance Range (HDP)
- Low Free TDI Range (XLE & XLS)
- Future of MOCA use in Europe.



Stefano Tappari

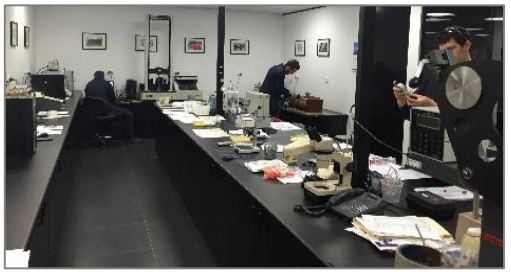
European Business Development Manager
stefano@erapol.com.au

- 25 years in hot cast elastomers (PU) sales (23 spent in same US Company)
- Prepolymers, Curatives, Additives
- Machinery
- Italy, France, Germany, Austria, Spain, Portugal, Switzerland, Slovakia, Greece, Turkey, Saudi Arabia, Israel, Bahrain, UAE

Who is Era Polymers?

A Specialist Polyurethane Company Owned & Operated by Industrial Chemists

- Australia's Largest Independent Polyurethane Systems House
- Largest supplier of high performance prepolymers in Asia
- Five state-of-the-art manufacturing facilities with production capacity > 190,000MT per year
- **Production partners in USA and Europe**
- Total Production Capacity of more than 260,000MT per year
- ISO 9001 Accredited
- NATA Accredited Testing Laboratory
- Personnel ~ 130 employees



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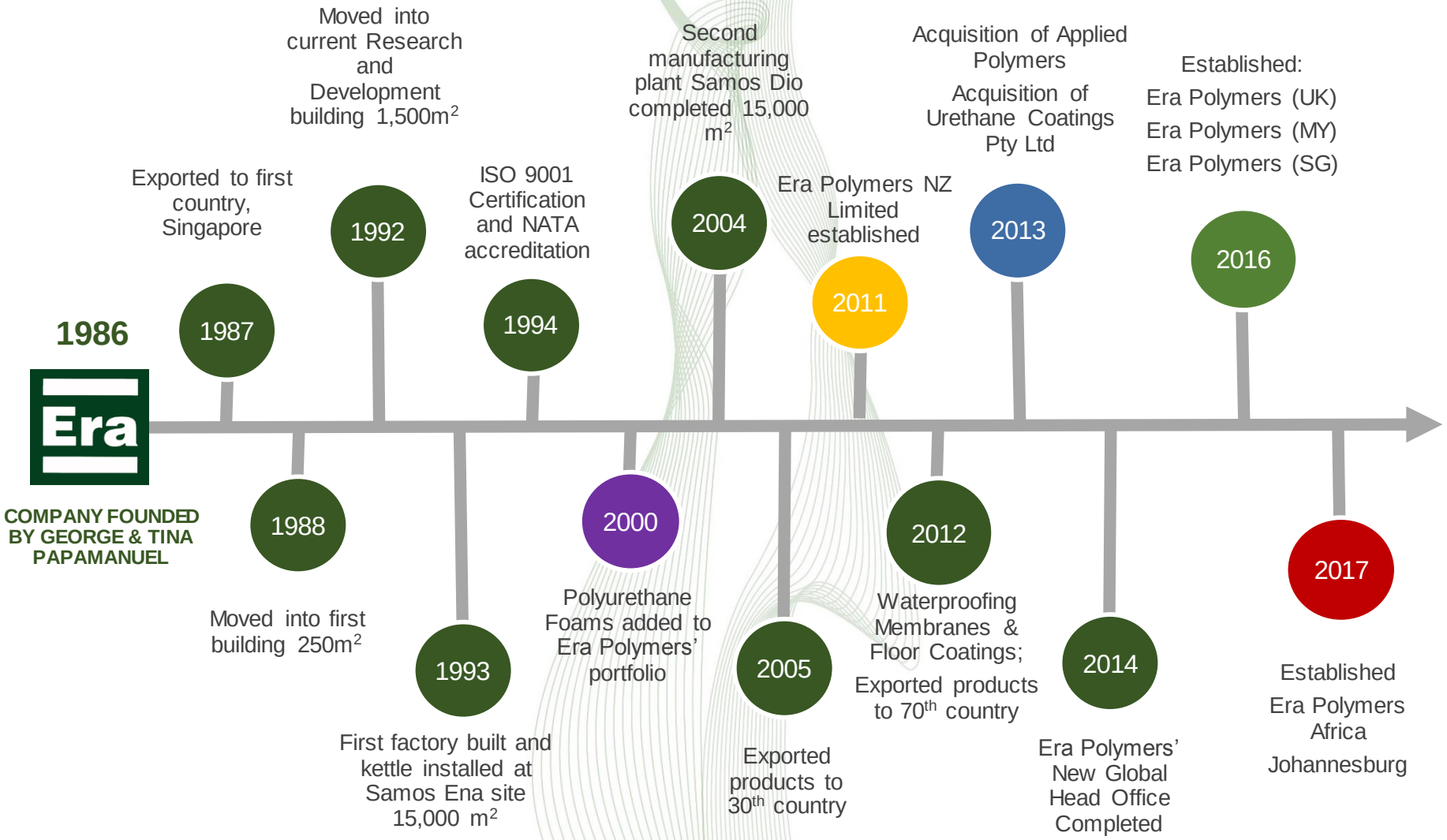
Era Polymers - TIMELINE



Era Polymers – GLOBAL REACH

Strategy

FLEXIBILITY

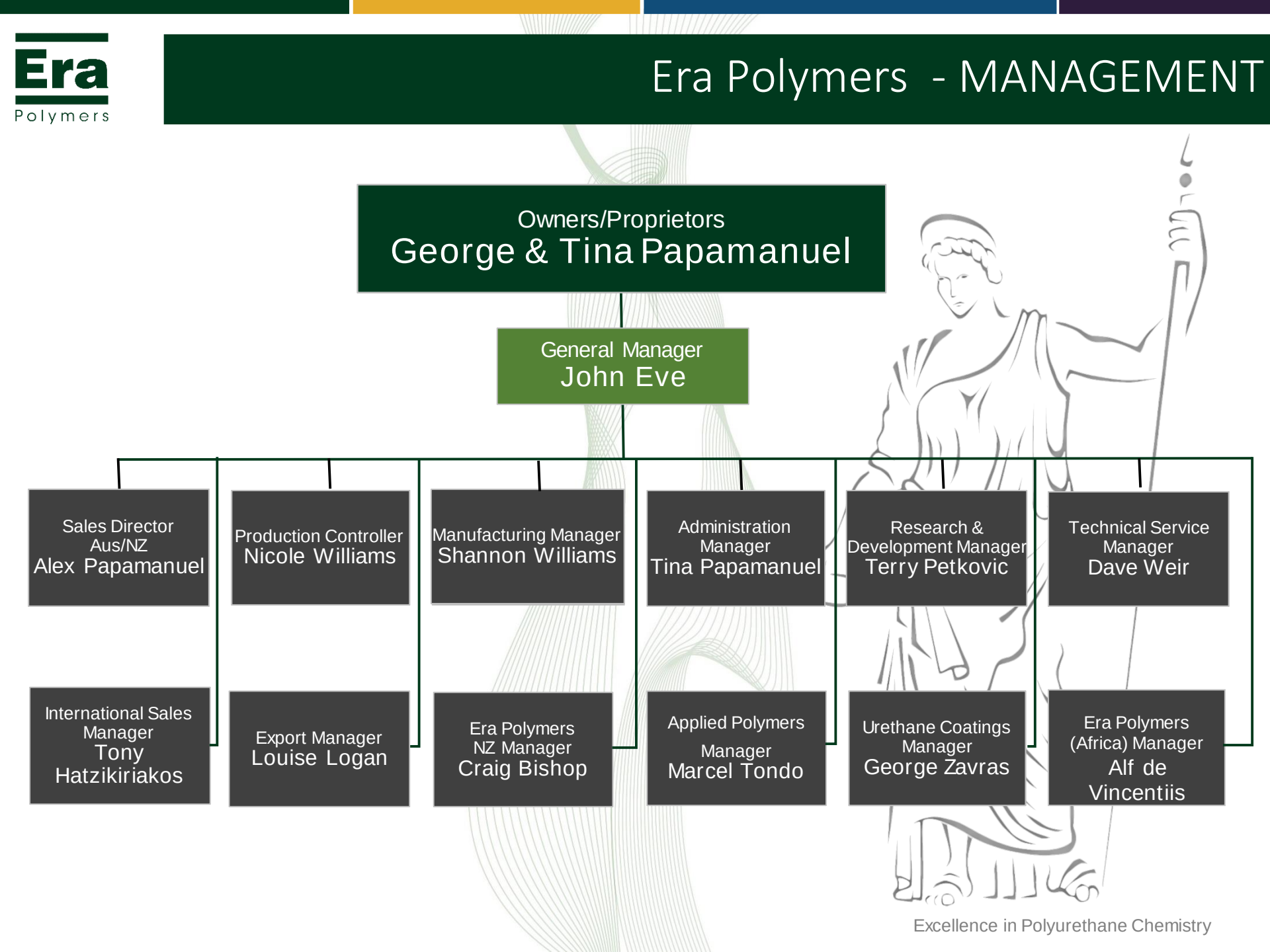
- Conditions
- Services
- Consistency
- Quality

= CUSTOMER SATISFACTION

Era Polymers - HEAD OFFICE

Excellence in Polyurethane Chemistry

Era Polymers - MANAGEMENT



Era Polymers - RESEARCH & DEVELOPMENT TEAM

Research & Development Manager

ELASTOMERS

- **Emilie Degoue** — Chief Chemist & Sales
- **David Pu** — Analytical & Development
- **Peter Woodfield** — Development
- **Cassandre Perron** — Development
- **Josip Salopek** — Technical Service Chemist

FOAMS

- **Marcel Tondo** — Technical Manager & Sales
- **Marica Gubenko** — Development
- **Linda Liu** — Development Chemist
- **Eamon McGuire** — Development
- **Simon Lavis** — Development Chemist

TESTING LABORAT

- **Jose Diaz** — Section Leader Physical Testing
- **Jimmy Kostouros** — Physical Testing

QUALITY CONTROL

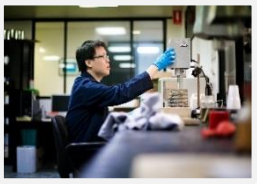
- **Farukh Jamil** — QC Chemist
- **Liana De Francesco** — QC Chemist
- **Varunita Samli** — QC Chemist
- **Narain Reddy** — QC Chemist

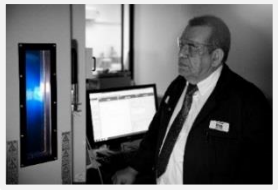
MEMBRANES

- **Rhys Waldron** — Technical Service Manager & Sales
- **Arlingga Sutinah** — Development

COATINGS

- **Lakshmi Krishnan** — Development





Era Polymers - TECHNICAL SERVICE

Dave Weir
Technical Service Manager

Josip Salopek
Technical Service Chemist

David Pu
Analytical Chemist

Era Polymers - EQUIPMENT DEPARTMENT

Vortex Mix

Thomas Butt
Equipment Manager

RAMA

Josip Salopek
Technical Service Chemist

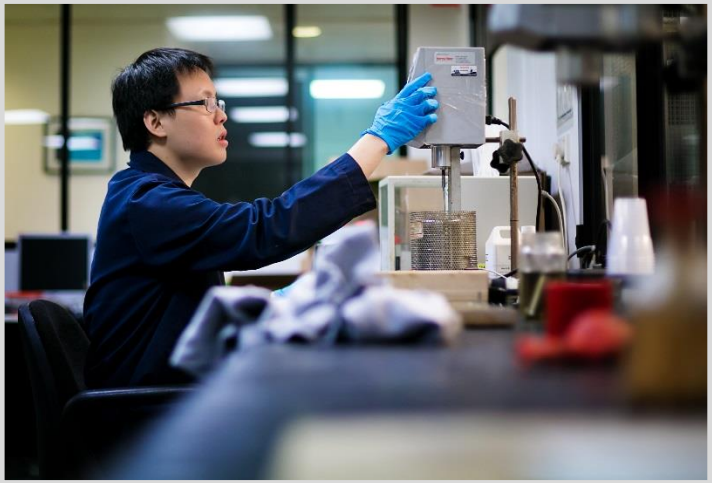
POLYTEC EMC

FECKEN FK KIRFEL

cannon

Era Polymers - R & D CENTRE

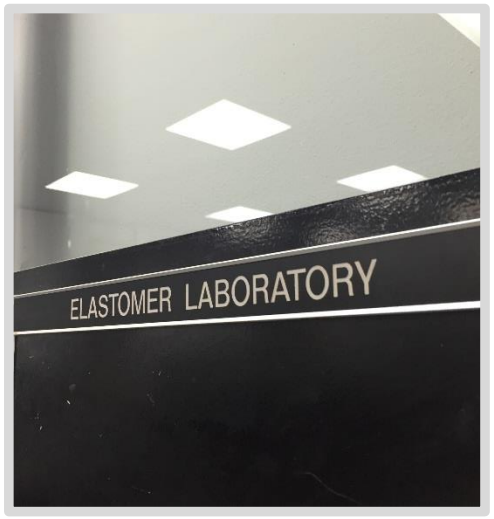
Era Polymers - LABORATORIES

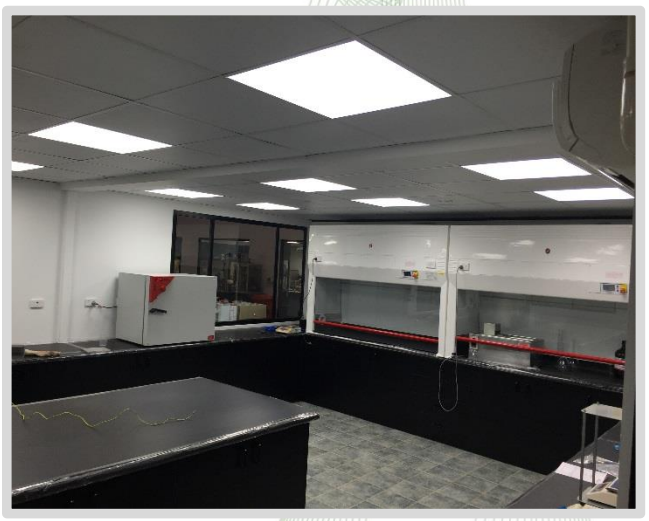


PRODUCT DEVELOPMENT & TESTING LABORATORIES

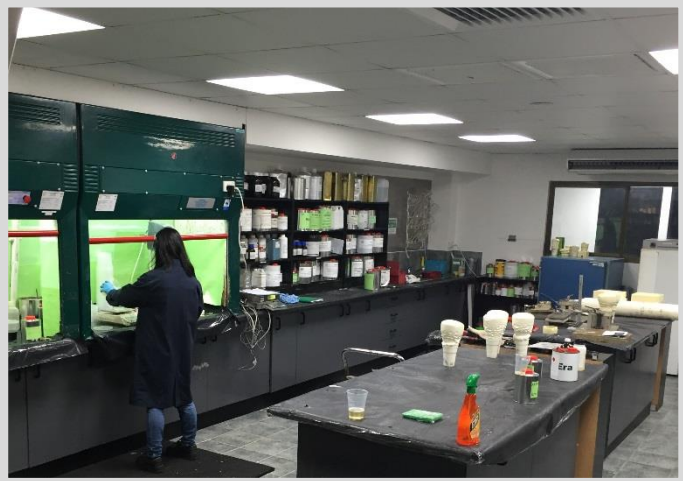
- Elastomer Laboratory
- Technical Service Laboratory
- Foam Laboratory
- Coatings and Membranes Laboratory
- Physical Testing Laboratory
- Analytical Testing Laboratory
- Cryogenic Testing Laboratory
- Demonstration Laboratory
- Specialised Fire Testing Laboratory

ELASTOMER LABORATORY - SYDNEY



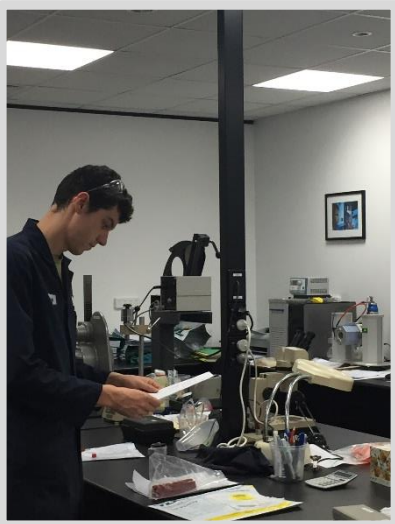


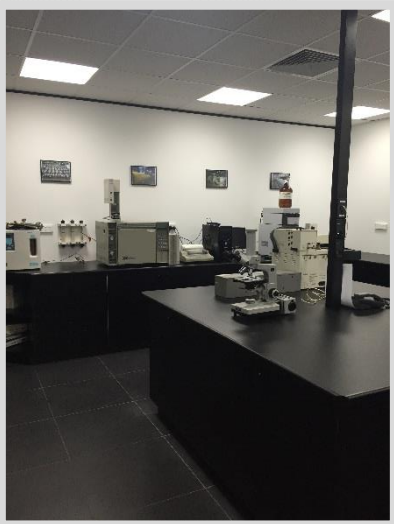
FOAM LABORATORY- SYDNEY



COATINGS & MEMBRANES LABORATORIES SYDNEY

PHYSICAL & ANALYTICAL TESTING LABORATORY - SYDNEY



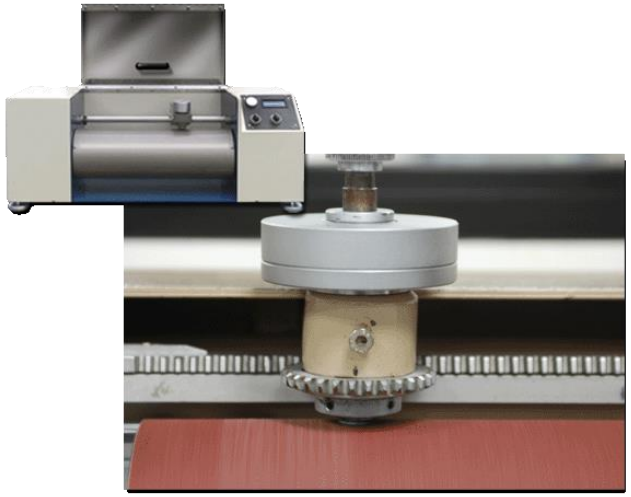


Era Polymers

TESTS & TEST METHODS

Test	Method
Abrasion resistance (DIN)	AS1683.21
Abrasion resistance (Taber)	AS/NZS 1580.403.2
Adhesion to metal	AS1683.14.1
Adhesion to rigid substrates	ASTM D429-99
Compressive properties of rigid cellular plastics – Ambient and Cryogenic (-165°C – +25°C)	ASTM D1621-04
Compression set	AS1683.13
Compression set	ASTM D395-02
Coefficient of friction - Static & Kinetic	ASTM D1894-78
Density – Specific Gravity	AS1683.4
Density (sandwich core materials)	ASTM C271/C271M
Density of rigid cellular plastics	ASTM D1622
Elongation at break	AS 1683.11
Elongation at break	ASTM D 412
Flammability	BS EN ISO 3582 (previously BS 4735)
Flexural Strength (stress, modulus)	AS2132,1978
Friability of foam (tumbling method)	ASTM C421-05
Hardness (Shore A & D)	AS 1683.15

TESTING EQUIPMENT

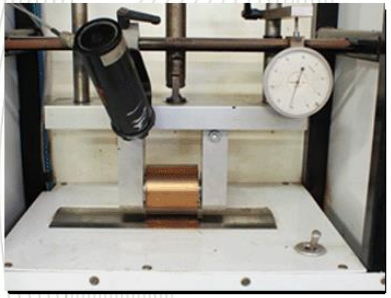


D.I.N Abrasion Machine

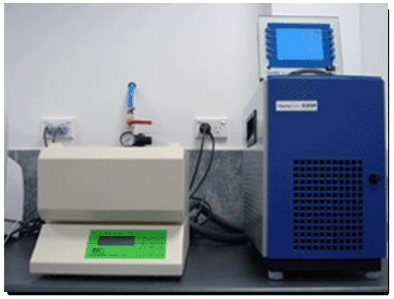
Taber Abrasion Machine

XRF Machine

Weatherometer



Dinamometer

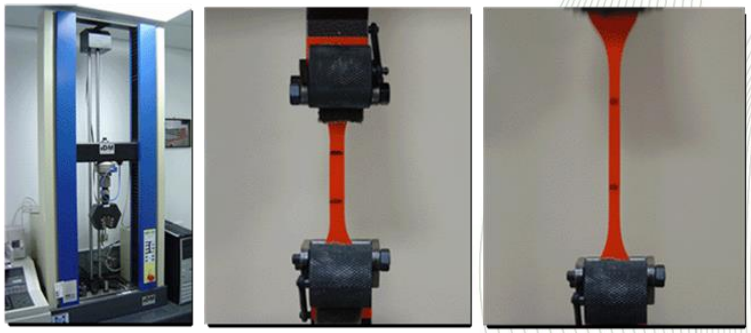


K factor Machine

TESTING EQUIPMENT

DSC Machine

FTIR Machine



Tensile Testing Machine

Era Polymers

TESTS & TEST METHODS

Test	Method
Hardness (Shore A & D)	AS 1683.15
Izod Impact	AS 1146.1
Modulus (100%,200% & 300% strain)	AS1683.11
Open Cell / Closed Cell content of rigid cellular plastics	ASTM D 6226-05 (previously ASTM D2856)
Rebound resilience	DIN53512
Shear properties (stress, modulus)	ASTM C273
Tear strength (Die C)	AS1683.12
Tear strength (Die C)	ASTM D624
Tear strength (trouser) split	AS1683.12
Tear strength (trouser) split	ASTM D470
Tensile strength	AS 1683.11
Tensile strength	ASTM D 412
Tensile strength	ASTM C297/C297M
Tensile & Tensile adhesion – Ambient and Cryogenic (-165°C – +25°C)	ASTM D1623-03
Thermal conductivity/resistivity – Ambient and Cryogenic (-165°C – +25°C)	ASTM C518-04
Water absorption	ASTM D2842
Water vapour transmission of materials	ASTM E96.95

TESTING EQUIPMENT

Analog and Digital Hardness Testing Machine

Resilience Testing Machine

Flashpoint Machine

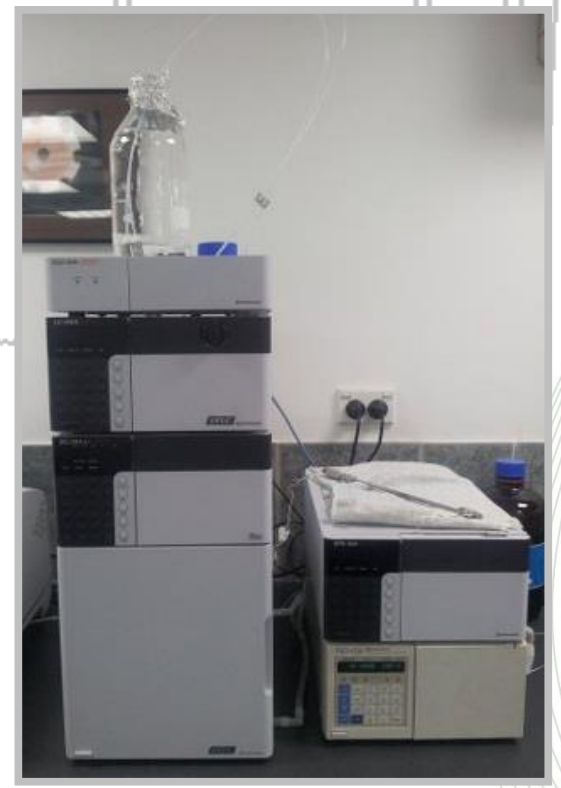
Foam Rebound

Karl Fischer Titrator

TESTING EQUIPMENT

Coefficient of Friction

Oxygen Index Module



HPLC

GC

Era Polymers – ACCREDITATION & TEST FACILITIES

Era Polymers is an ISO9001 Quality Certified Company

NATA World Recognised Testing Laboratories

Era Polymers

MANUFACTURING & WAREHOUSING SITES

Samos Polymers

TWO PRODUCTION SITES IN SYDNEY

Samos Ena

Samos Dio

26 Links Road,
St Marys
(15,000 m^2)

9-15 Kommer Place,
St Marys
(15,000 m^2)

Samos Polymers

Era Polymers

Samos Polymers

- 20 Reactors (Kettles) for Prepolymer Cooking
- 3 High Speed Dispersion Mixer
- 2 Quality Control Laboratories
- 21 Tanks for Polyol Blending
- 1,400 Drum Capacity Cold Storage Unit
- 1 R & D Product Development Laboratory
- In-house Polyester polyol production

MANUFACTURING SITES

Production Manager
Shannon Williams

Production Controller
Nicole Williams

Samos Ena
Sam Sultana

Samos Dio
Emmanuele Castro

Applied Polymers
Rob Stein

Era Polymers NZ
Mel Sadler

ERA POLYMERS AFRICA

- Based in Johannesburg, Gauteng – production & product development platform to supply Africa.
- Production of hot cast and cold cast polyurethane elastomers
- Recently upgraded production capability, further expansion plans in place, including Product Development Laboratory
- Experienced, dedicated personnel in place.

ERA POLYMERS NEW ZEALAND

Era New Zealand

- Five blending tanks for polyol blending ranging from 1-20 drums
- 800m^2 Office and Warehouse area
- Recently upgraded QC and Product Development Laboratory
- Rapid response to local product demands

Era Polymers – PRODUCT GROUPS

Era Polymers produces over 700 different polyurethane products

The Key Product Groups are:

ELASTOMERS	Castable, Spray able, Trowel able MDI, TDI, Aliphatic, Ether, Ester, Caprolacetone
FOAMS	Pour, Spray, Rigid, Flexible, PIR, Microcellular
FLOOR COATINGS	TDI, MDI & Aliphatic Bases
WATERPROOFING MEMBRANES	Single component, two component, spray applied
MACHINERY	Polytec EMC , Graco, Cannon & Fecken-Kirfel
TRADING / BRANDED PRODUCTS	Acmos, Fomo, Icynene, Dow Corning, Conap, Futura, Perstorp Caprolactones, Green Mountain
TOLL MANUFACTURE	Third party contract manufacturing

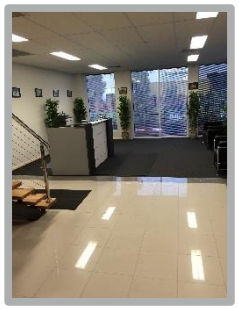
Era Polymers

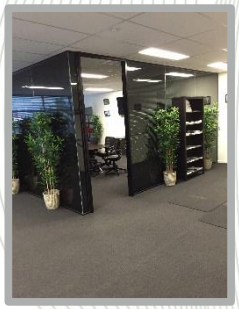
APPLIED POLYMERS

APTANE®

Specialising in manufacturing and supplying polyurethane cryogenic foams materials for LNG applications:

- More than 20 years experience in manufacturing and supplying compliant polyurethane foam materials
- Compliant with stringent specifications relating to the use of insulation materials in cryogenic applications
- Most testing requirements against specifications can be conducted in-house and independently validated as required





GLOBAL ALLIANCES

Era Polymers' strategic alliances enable our customers to get all of their polyurethane needs from one reliable source.

Stepan
Polyurethane Foams based on New Blowing Agents

ICYNENE
Spray Foam Insulation

Fomo Products
1 & 2 Component Disposable Polyurethane Foam Systems

CYTEC
Tooling/Prototyping Urethanes

GREEN MOUNTAIN INTERNATIONAL LLC.
Hydrophobic & Hydrophilic Polyurethane Water Stopping Grouts

irathanefutura
Spray/Polyurethane/Polyurea Elastomers & Primers

DOW CORNING
Mould Making Silicone Rubber

Perstorp
WINNING FORMULAS
CAPA Polycaprolactones for Superior Elastomers & Adhesives

POLYTEC EMC
Casting Equipment

GAMA
High Pressure Spray Equipment for Foams & Elastomers

Cannon
High & Low Pressure Equipment for Foams

GRACO
High Pressure Spray Equipment for Foams & Elastomers

FECKEN FK KIRFEL
Cutting Equipment

ACMOS
Release Agents & Lubricants

Vortex Mix
Dual Axis Centrifugal Mixers

FRICTION COATING
Grinding Products

Better Dynamic Performance

Era Polymers is constantly working on new and innovative elastomers for demanding dynamic applications. Pushing the limits of conventional systems using new and exciting raw materials.

- High Dynamic Performance (**HDP**) Range
- Eralan 90A NDI/PTMEG
- Eracure 229 High Performance Curative

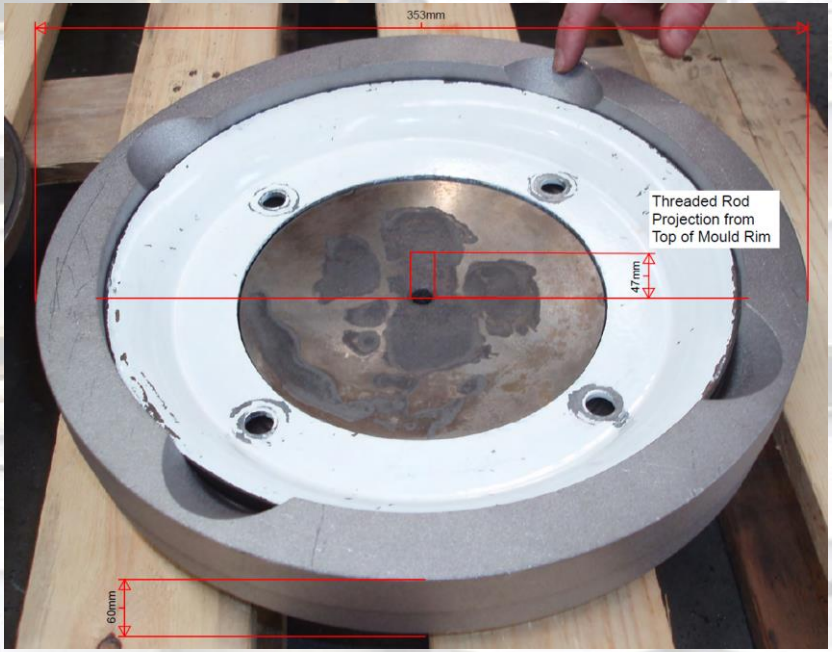
High Dynamic Performance Range

- The **HDP** range were developed in conjunction with a specialist manufacturing, engineering & maintenance company who specialise Cable Hauled Conveyor systems

- Cable Hauled Conveyor systems are the most cost effective option for moving bulk materials where the following criteria are met.
  - Long distance (> 5km)
  - High throughput (> 1500 tph)
  - High Lift (from loading point to discharge point)

High Dynamic Performance Range

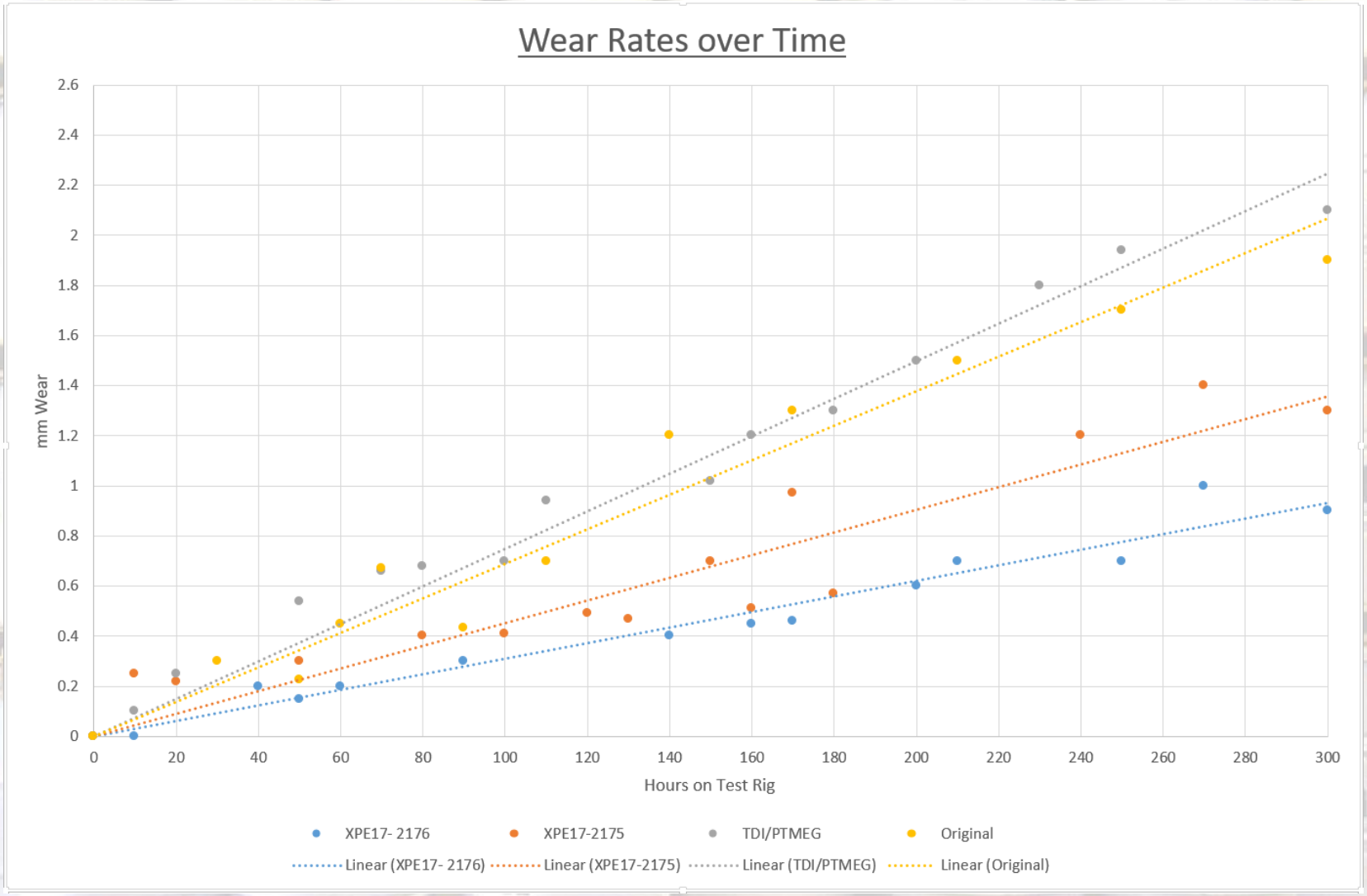
- After extensive laboratory testing, several grades proved promising based on Tensile, Compression Set and dynamic testing such as DMA and Flex Life.
- Samples were then cast for customer testing on a purpose built dynamic rig that simulates the service conditions for speed and load.



High Dynamic Performance Range

- The Test Rig can be seen below. The Machine runs with a fixed load and speed
- Periodically the machine is stopped and the hubs are inspected and measurements are taken to determine wear rate.

High Dynamic Performance Range



High Dynamic Performance Range

- The range than eventuated from this development project were give the name HDP.
- Currently there are 3 different Hardnesses.
  - HDP70A
  - HDP90A
  - HDP95A
- They are ideally suited to Pulleys, High Speed Wheels, High Load Wheels and many other applications where parts are susceptible to hysteresis in service.

Stable NDI Prepolymers

- NDI systems are well known for their superior Dynamic Performance
- For many years it was not possible to make NDI Prepolymers that were stable enough to make, transport and store for use by customer.
- After working on this we have come up with a stable NDI prepolymer with excellent Dynamic Properties
  - Eralan 90A NDI/PTMEG
- So far only the one grade but we are currently working on other grades in different hardness and different polyol backbones.

Stable NDI Prepolymers

The material was tested on a Cyclic Flex Tester as below.

Stable NDI Prepolymers

The samples were successfully tested for more than 2 million cycles without failure

DMA analysis has also shown the material to have excellent dynamic performance with low Tan Delta

Material is currently being trialling with several customers in Asia and Australia in various applications

Low Free TDI Prepolymers

- No Pictograms
- No Risk Phrases

Low Free TDI Prepolymers

- Customer driven demand for so called “Safer” Prepolymers led us to release a Low Free TDI range called the **Erapol XLE** and **Erapol XLS** Ranges
- The Range has been extensively tested to ensure the level of Free TDI is below the 0.1% requirement for true Low Free TDI Classification.
- We manufacture the XL grades in Europe because this is where we see the highest demand.
- They have been commercially available for more than 12 months.

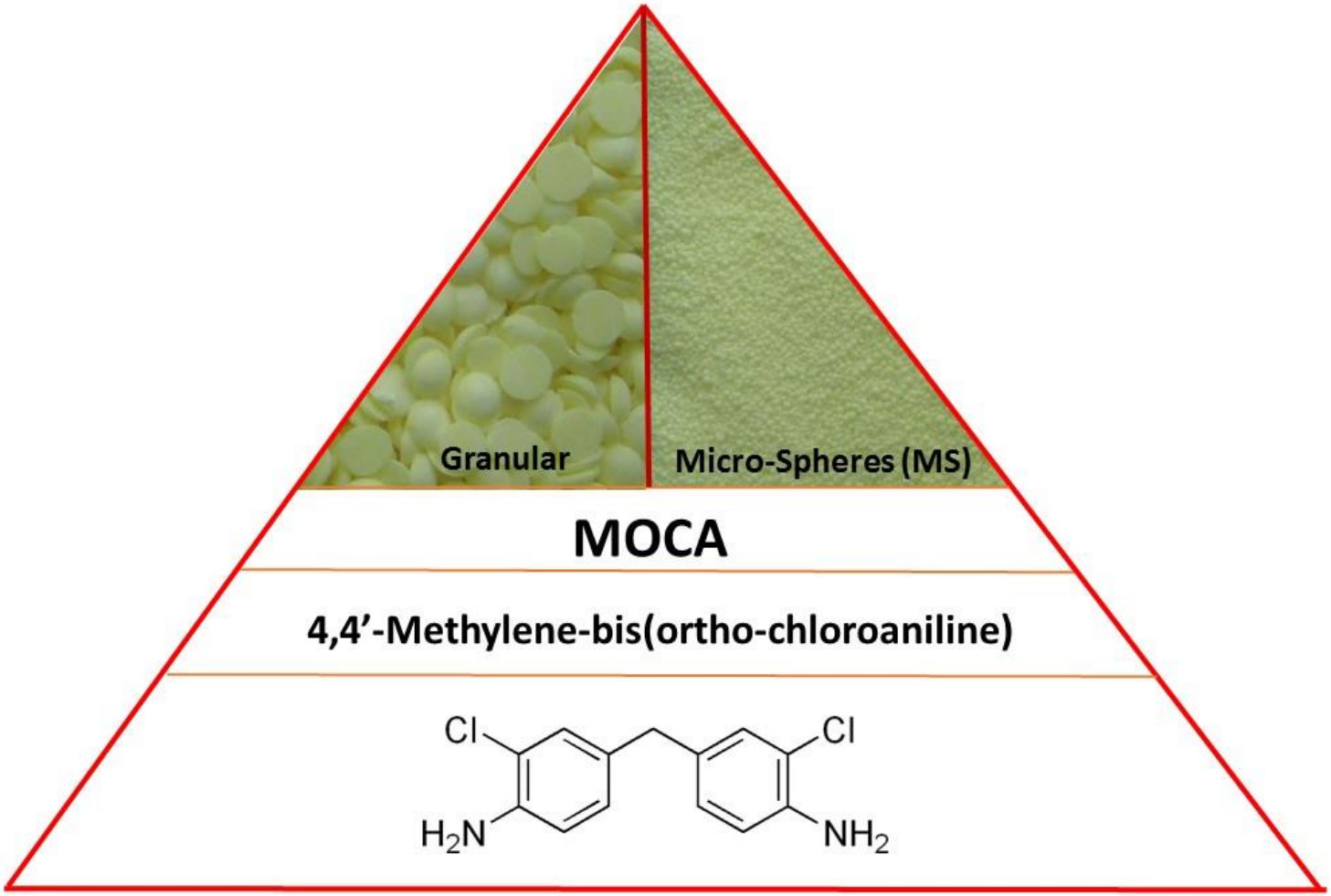
Low Free TDI Prepolymers

- Introducing **XLE** & **XLS** LOW FREE TDI Prepolymers

- XLE Range — Polyether — PTMEG
  - XLE90A
  - XLE93A
  - XLE95A
  - XLE70D
  - XLE75D

- XLS Range — Polyester — Adipates
  - XLS85A
  - XLS90A
  - XLS95A

MOCA use in Europe



MOCA use in Europe

The Sunset date for MOCA under Reach was set as 22nd November 2017

What is the Status of MOCA Authorisation?

ECHA has advised REACHLaw that *they will recommend a 4 years Review Period* in their Draft Opinion.

When does this 4 years start?

The 4 years Review Period will commence on the Sunset Date for MOCA, which is the 22nd of November 2017.

This will mean that MOCA can continue to be used until 22nd of November 2021 once any conditions of use and Risk Management Measures proposed in the Draft Opinion and subsequently in the EC Decision are followed by the supply chain.

MOCA use in Europe

So what does this mean for companies in Era Polymers supply chain?

ALL members in our supply chain can continue to use MOCA *until at least 22 of November 2021* once they conform to any conditions proposed by the ECHA committees in their Opinion and supported by the EC in their Decision.

So what happens next?

ECHA will send their Draft Opinion to REACHLaw.

REACHLaw will analyse the Draft Opinion & decide if there is any reason to comment because of some misunderstanding or inaccuracies in ECHA's interpretation of the application or the additional information submitted to ECHA

While not necessary to comment on the Draft opinion, REACHLaw will analyse the Draft Opinion carefully and it is highly likely that they will provide comments.

MOCA use in Europe

So what does this mean?

If there are any arguments/justification for a 4 years Review Period used by the ECHA committees that are incorrect or illogical then REACHLaw will challenge these through the comment.

What is the advantage of commenting on the Draft Opinion?

There are 2 main advantages of REACHLaw providing comments:

1. Any inaccuracies or misunderstandings used in coming to their conclusion can be challenged. These clarifications are then part of the official record of the application as it goes forward to the European Commission for the Decision.
2. The publication of ECHA's draft Opinion is delayed and the committees are forced to discuss the application again taking into account the additional comments received by the applicant. Though unlikely, there is the potential that the review period may be revised upwards.

REACHLaw will exhaust all possible avenues to secure fair and reasonable treatment of the MOCA Authorisation

MOCA use in Europe

What impact will the delay in publication of the ECHA Opinion have?

The delay will have no impact on the supply chain. There will be at least a 4 years Review Period in the Opinion of ECHA.

Do I need to do anything now?

Once the first version of the Draft Opinion is available we will communicate any “Conditions of Use” that ECHA want implemented by processors in order that they comply with the conditions of the Authorisation.

This will allow the supply chain to begin implementing any measures that are required to continue to use MOCA but that you might not currently have in place. It is important that you begin to implement any measures required as part of the Authorisation as these will be used as guidance by your country’s Authorities when they inspect your facilities for compliance.

MOCA use in Europe

When will the Final Opinion be published

It is estimated MOCA will be discussed in December 2017 by ECHA, so the final Opinion will be sent to EC for their decision early 2018 and will then be published on ECHA Website.

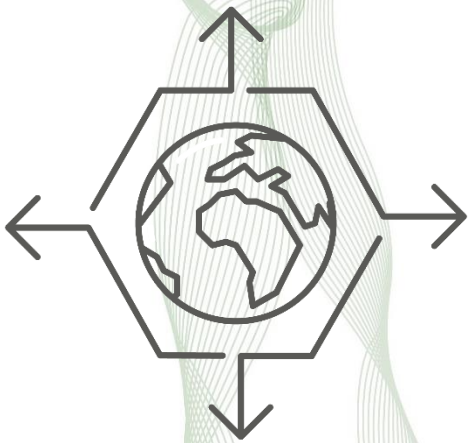
What happens after the EC Decision?

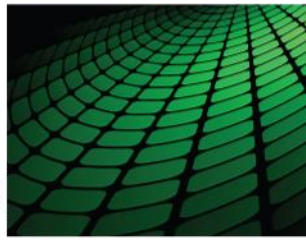
After the Decision, when Authorisation is granted, all users in our supply chain will need to be fully compliant with any additional conditions of use that ECHA and the EC have imposed to reduce exposure etc. for the duration of the Review Period.

In addition, you will be required to communicate to ECHA that you are using MOCA under Authorisation as part of the supply chain within 3 months after the EC finalise their Decision.

Era Polymers - *Excellence in Polyurethane Chemistry*

Integrated Chemicals





Thank you and any questions?

Era Polymers