

Global Rotomo(u)lding

Paul Nugent
The World at Large
2018



Orla's World Tour 2018



- 10 Rotomolding Events Attended
- 14 Events Held in Total – All Six Continents
- Approximately 2000 Attendees in Total

Mumbai, India

- StAR Conference New Delhi Very Well Attended
 - 132 People 55-45% Molders-Suppliers
- Rapid Growth in OEM Business
 - Fuel Tanks & Agricultural Products
- Infrastructure Development Strong for the Whole Country
 - Sewer, Septic, Water Treatment, etc.
- Promotion of Rotomolding to Broader Audiences



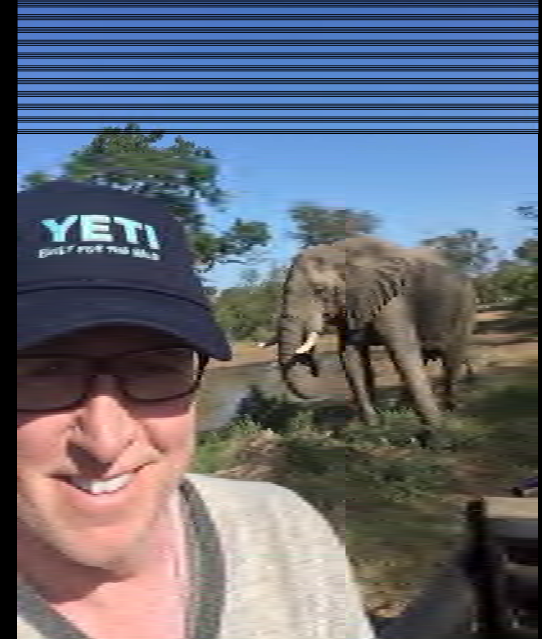
Oslo, Norway

- ARM Nordic Event in Oslo
 - Bloody Cold!
 - 120+ a Record Number of Attendees
- Centralized Recycling Efforts Started
- OEM Markets Slightly Slower
- Multi-Layer Foamed Boat Market Strong
- Fish Tubs, Recycling Systems & Water Treatment Markets also Strong



Jo'burg, South Africa

- ARMSA Event in Johannesburg
 - 87 Attendees
- 3-Year Drought in Cape Town
- Many New Water Tank Molders
 - Blow Molded Water Tanks Introduced
- Relatively Small Market
 - 55,000 tons in Sub-Sahara Africa



Xiamen, China

- RPC-CPPIA Event in Xiamen
 - 120+ Attendees
- 1000 Molders & 20-30 Machine Makers!!
- Improving Quality & Highly Competitive
- ‘One-Belt One-Road’ Opportunity for Molders



Olandia, Poland

- ROTOPOL Event in EcOlandia
 - 90+ Attendees
- Strong Growth in Molder Numbers
 - 84 Companies
 - 50% Local / 50% Subsidiaries
- University Research Support
 - Hemp & Flax Reinforcement



Belfast (UK or Ireland?)

- British Plastics Federation (BPF) Event
 - 90+ Attendees
- Queen's University
 - Multi-Process Backdrop
 - Rotomolding, Extrusion Injection, Blow Molding
- Automation
 - Robotic Molding
- Simulation Development



Pennsylvania, USA

- Pennsylvania College of Technology Hands-On Event



- Just Celebrated 10th Anniversary
- New Machine & New Presenter
- Shell Polymers Grant for Center
- ARM Foundation Support



Fiji & Australia

- ARMA Event
 - 150 Attendees
- Tropical Island Molding



- Australian Market Steady After the 00s Tank Boom
- Drought Conditions Across Much of Country



Hamburg, Germany



- ARMO Event – 550 Attendees
- Extensive Supplier Display
- Automation to the Fore
- European High-Tech Focus
- High-Quality Demands from Consumers
- Strong OEM Base
- Roto Markets Generally Strong

World's Largest
Rotomolded Part?

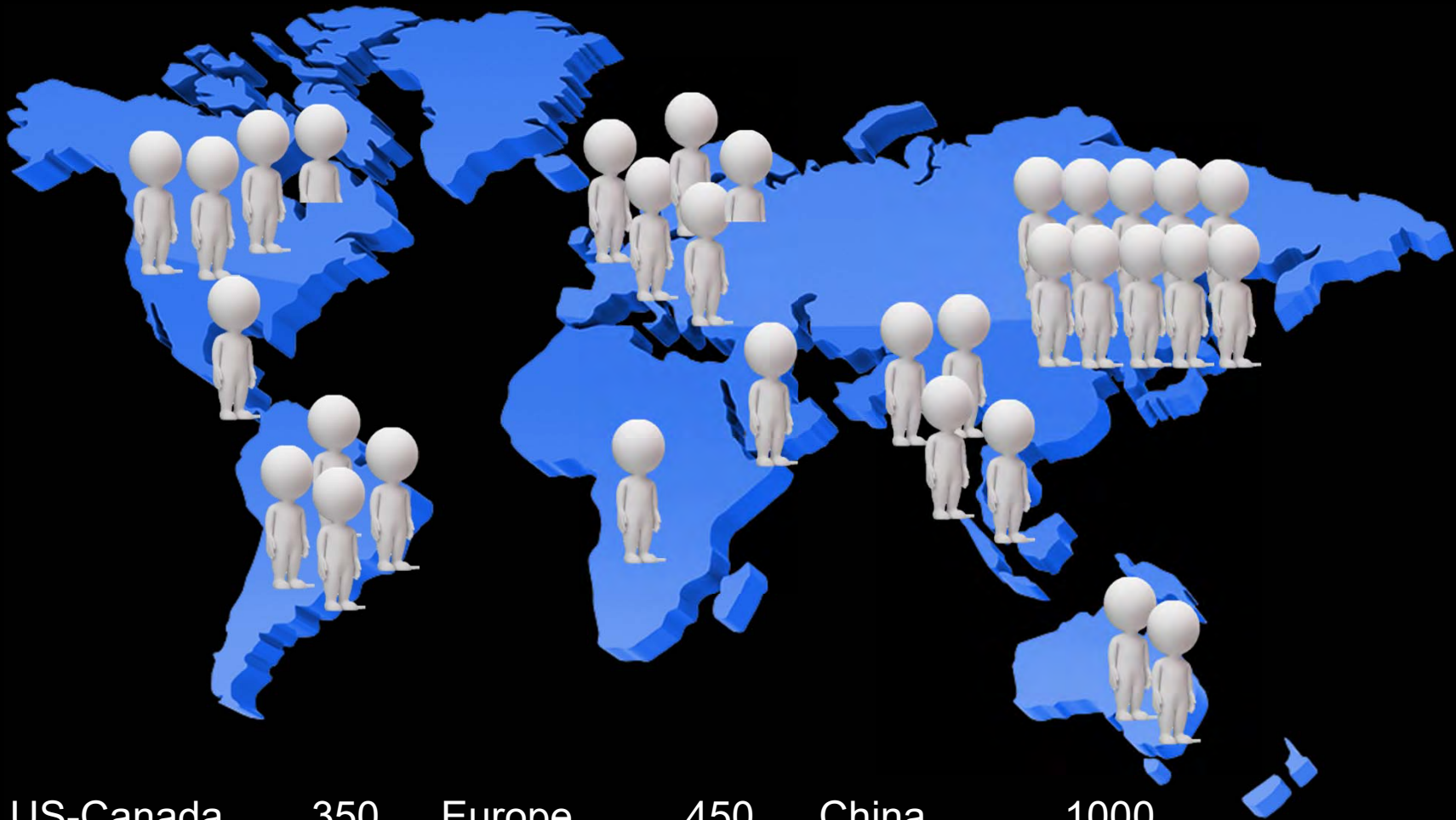


Global Rotomolding

A Few Facts & Figures



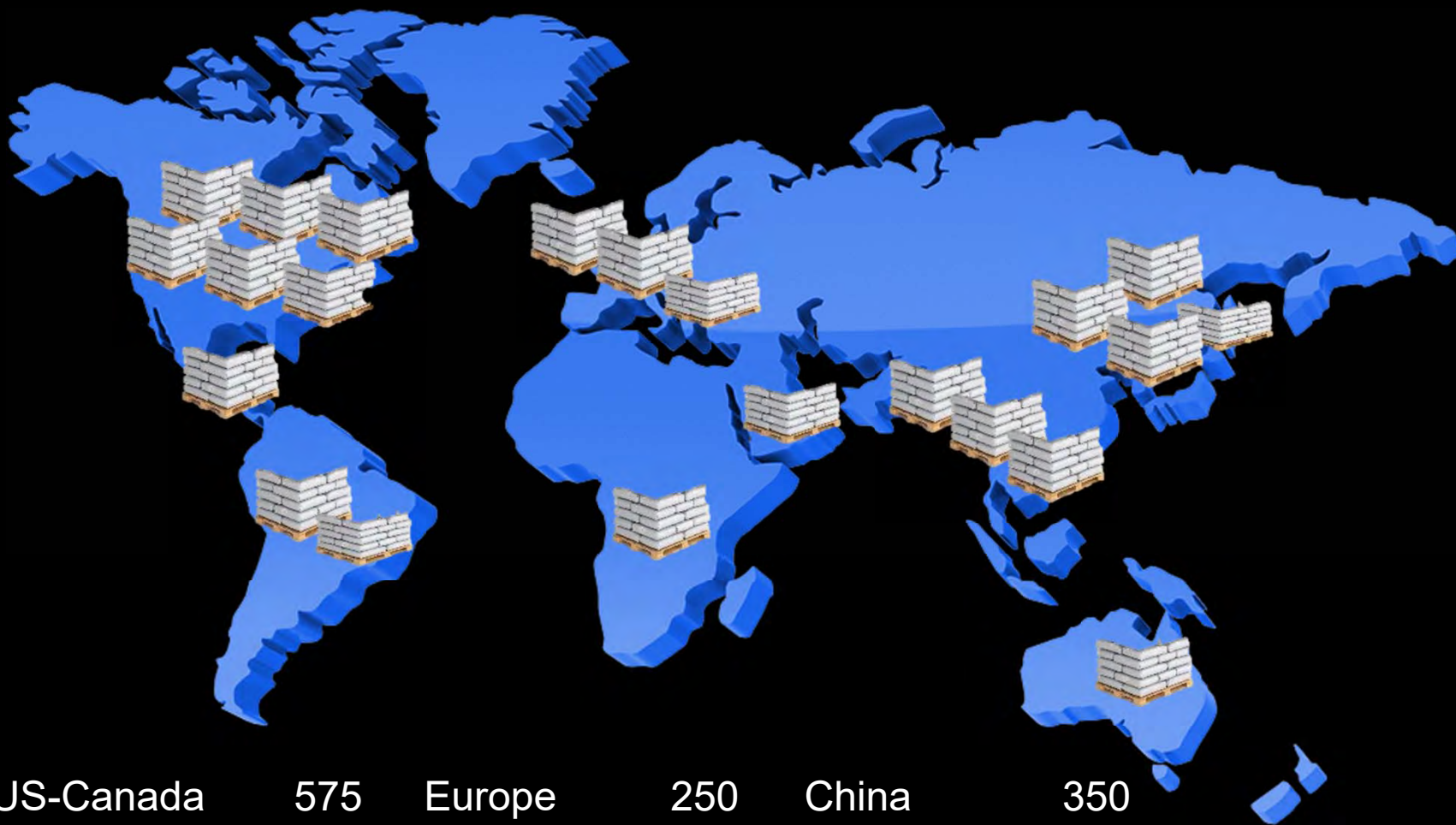
Global Molders



US-Canada	350	Europe	450	China	1000
Mexico	80	Africa	80	India/SE Asia	400
South America	400	Middle East	60	Australasia	200

Total Number of Molders \approx 3000

Global Consumption (000s Tons)



US-Canada	575	Europe	250	China	350
Mexico	90	Africa	100	India / SE Asia	270
South America	150	Middle East	75	Australasia	65

Total \approx 1.9MM Tons – Approx. 2% of Global PE Production

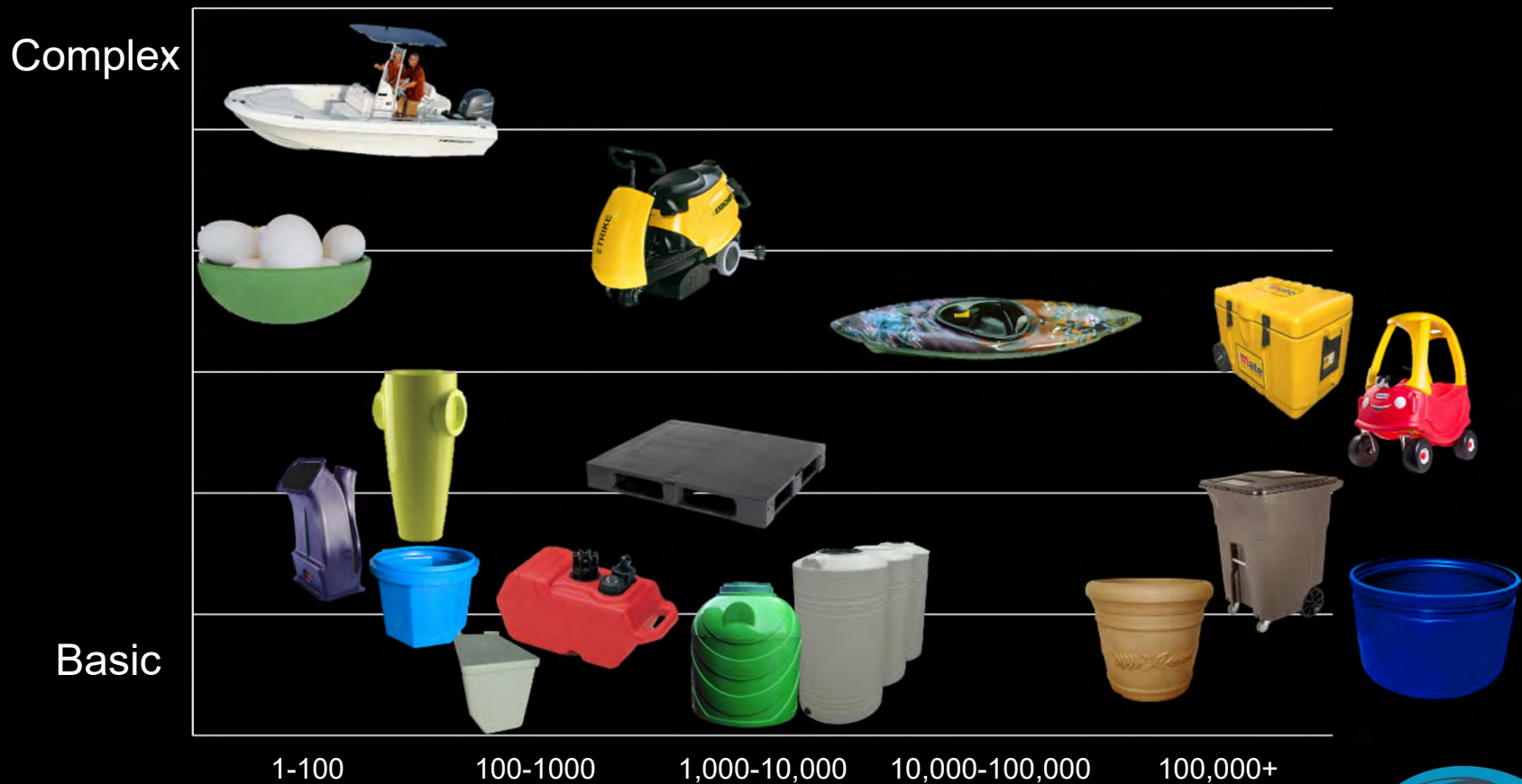
New Products



Courtesy: ARMO



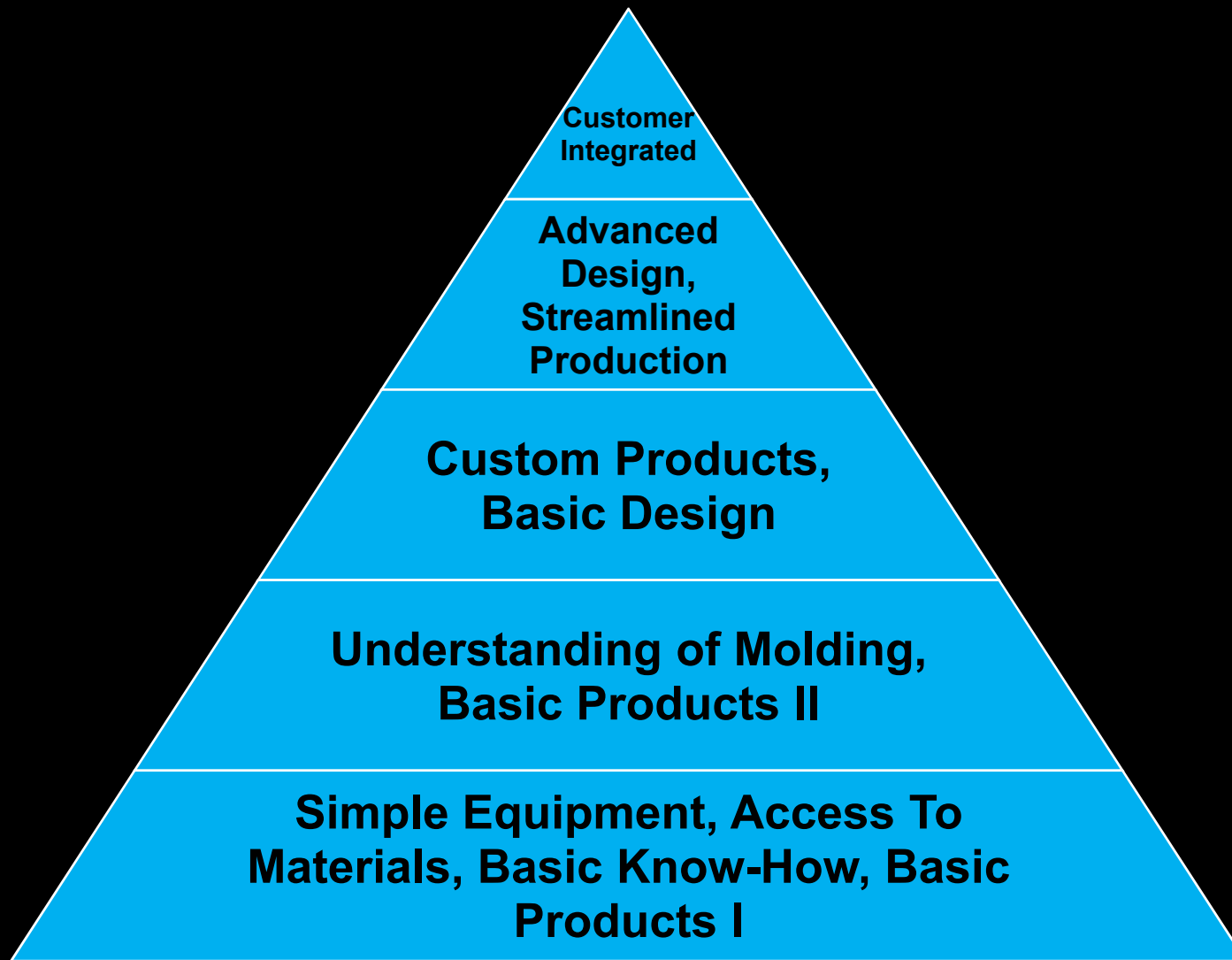
Production vs. Skill vs. Volume



- Incredible Range of Parts Made by Rotomolders
- Many High-End Molders are Product Specialists



Progression of Molders – 2003



Reality (1987-2017)



Typical Molders

Small-Medium Batches, Typical Parts, Standard Equipment, High Competition, Low-Cost Attitude



A⁺ Molders

Small or Large Batches, Specialty Parts, Advanced Equipment, Quality Attitude

- Basically Unchanged in 30+ Years...
- Typical Molders Happy to Make a Good Living
- Where Will we Be in Another 30 Years?

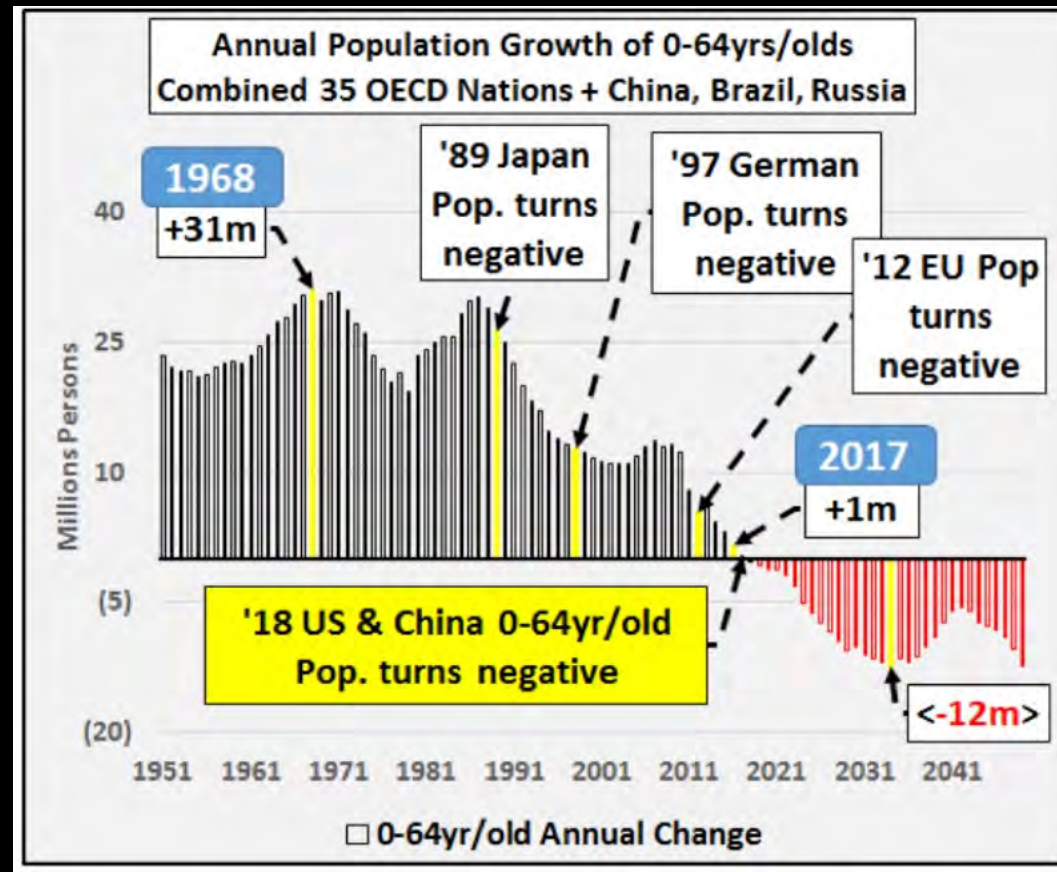


Global Rotomolding

Changing Demographics



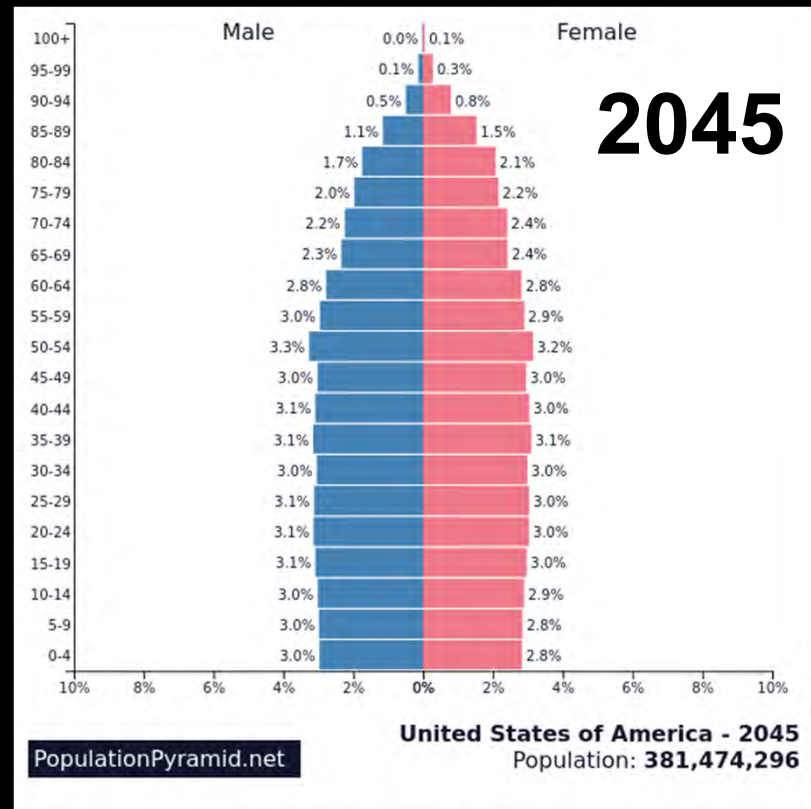
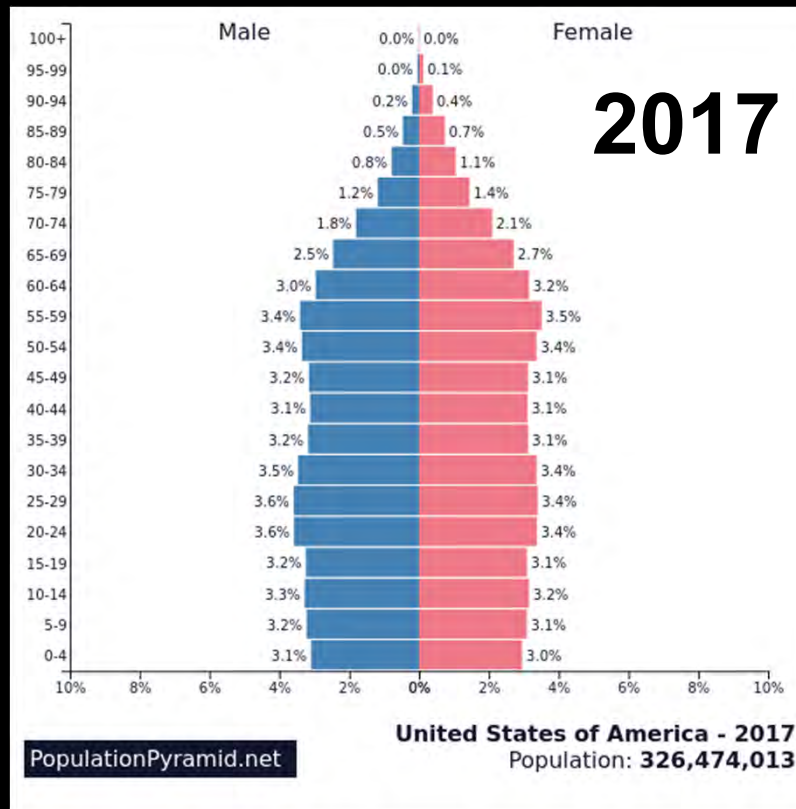
People – Working Age



- Fewer People of Working Age (<64)
- Labor Intensive Industries Will be Most Affected



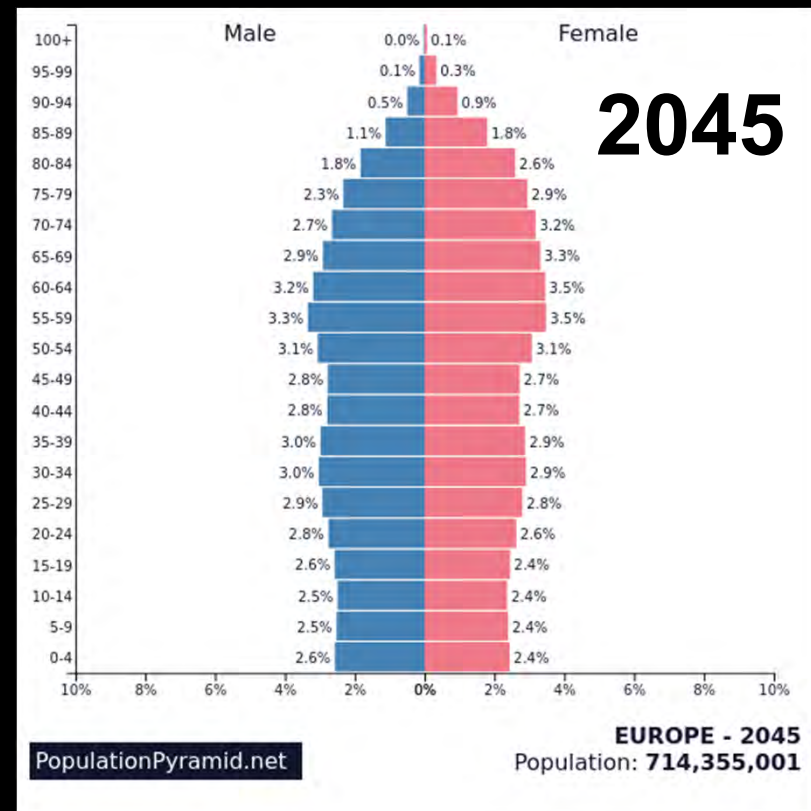
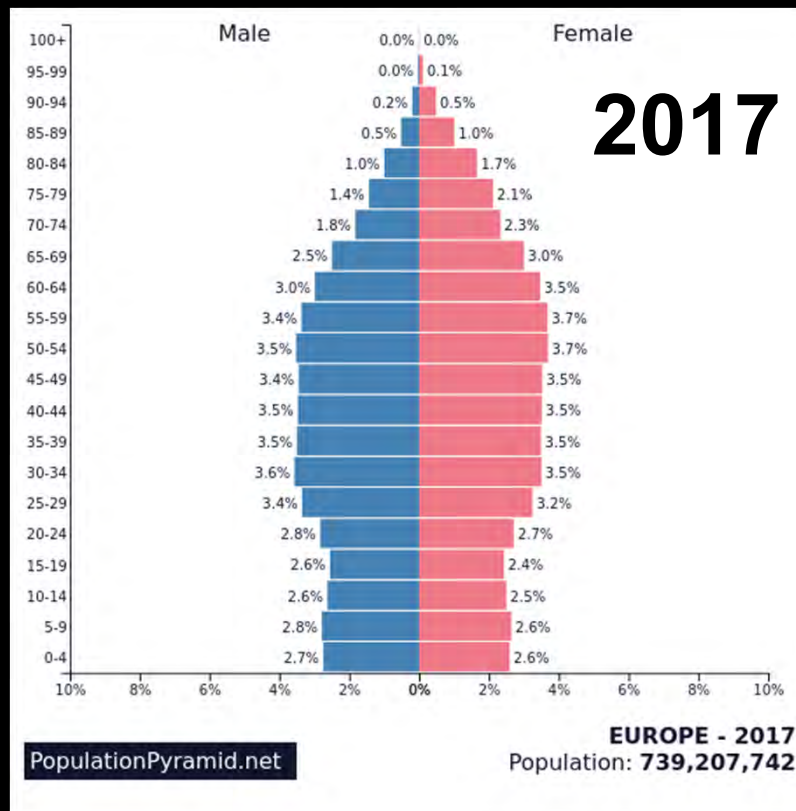
People - USA



- More Stable Birth Rates – Stable Pattern
- Expansion of Population Requires Immigration



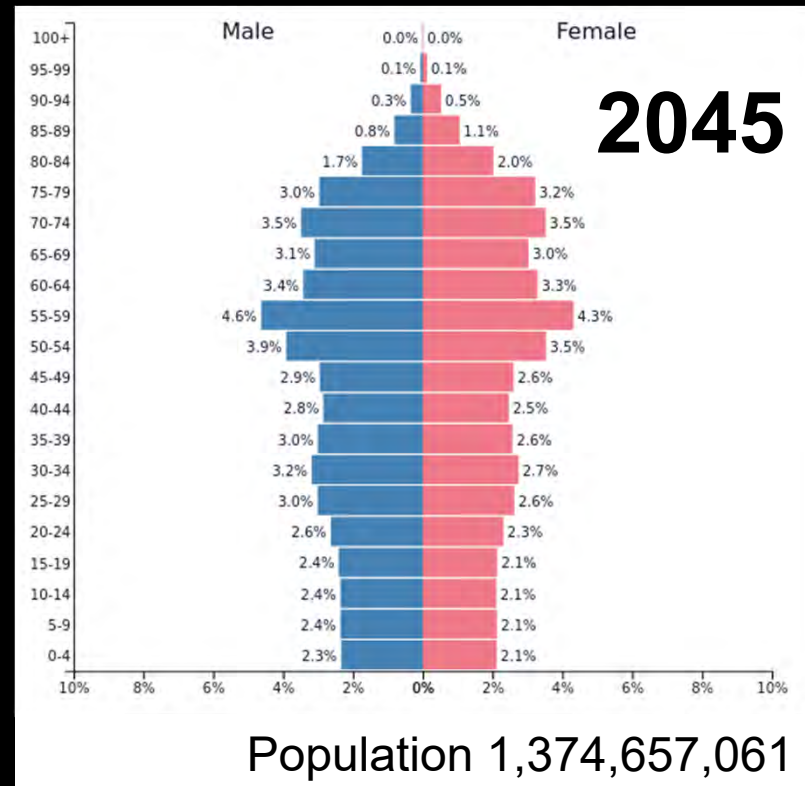
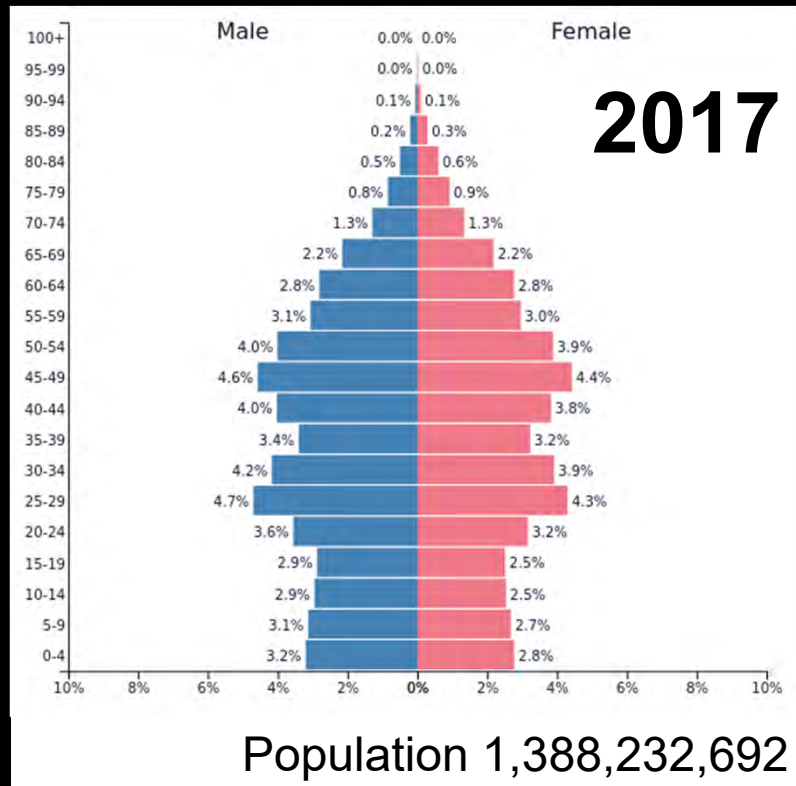
People – Europe



- Older Post-War Generation Retiring
- Reducing Population Overall – Lower Birthrates



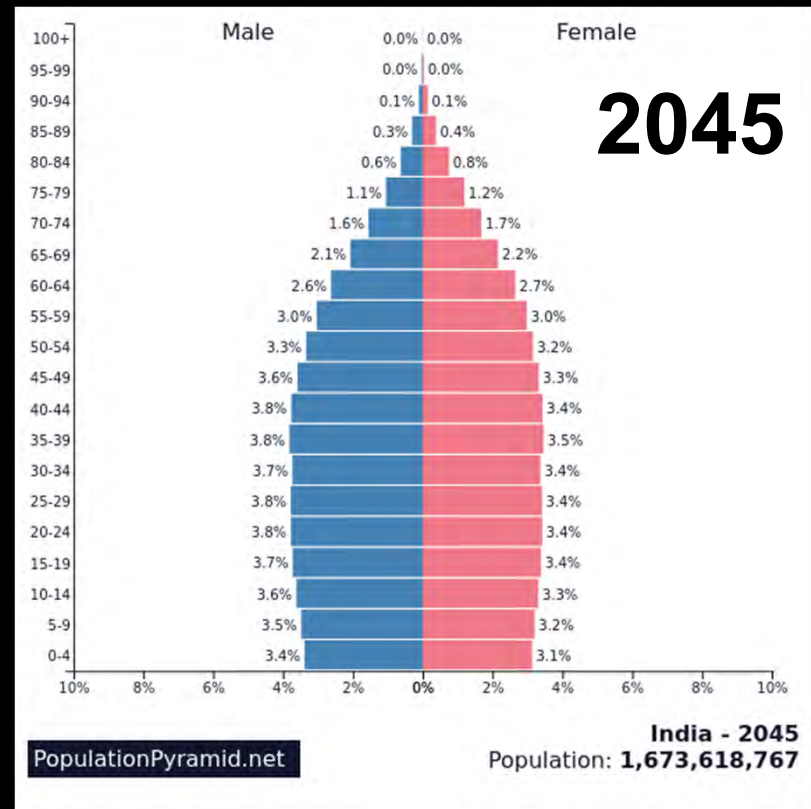
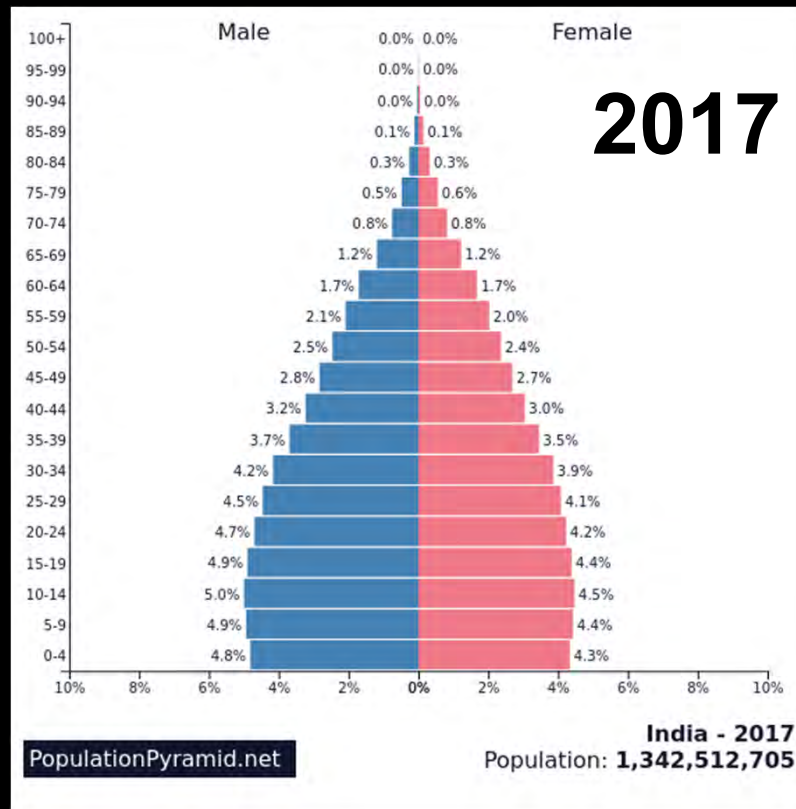
People - China



- One-Child Policy Has Created Major Problems
- Aspirations + Aging = Major Challenge



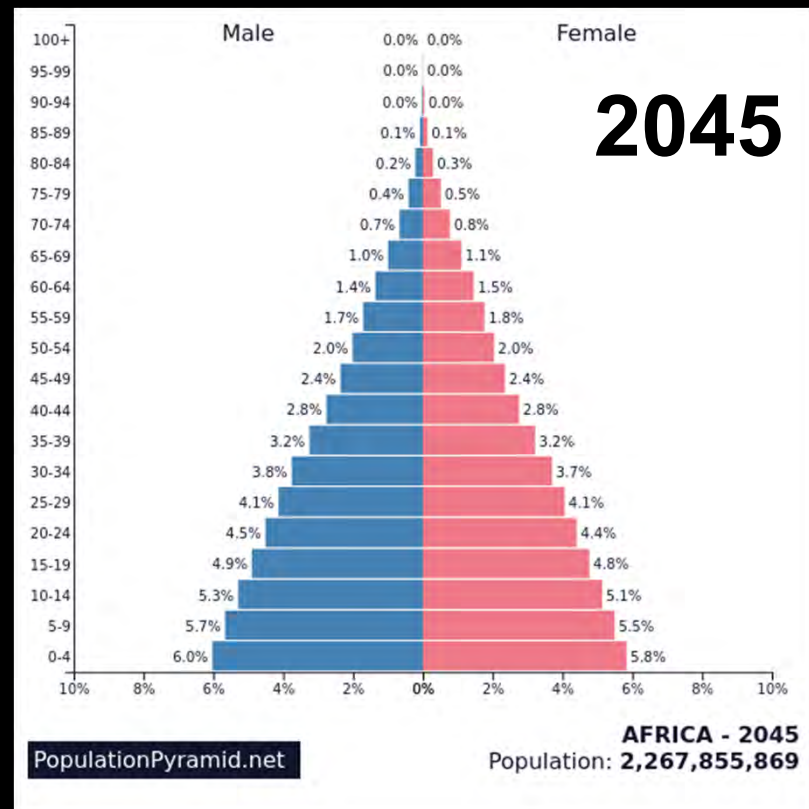
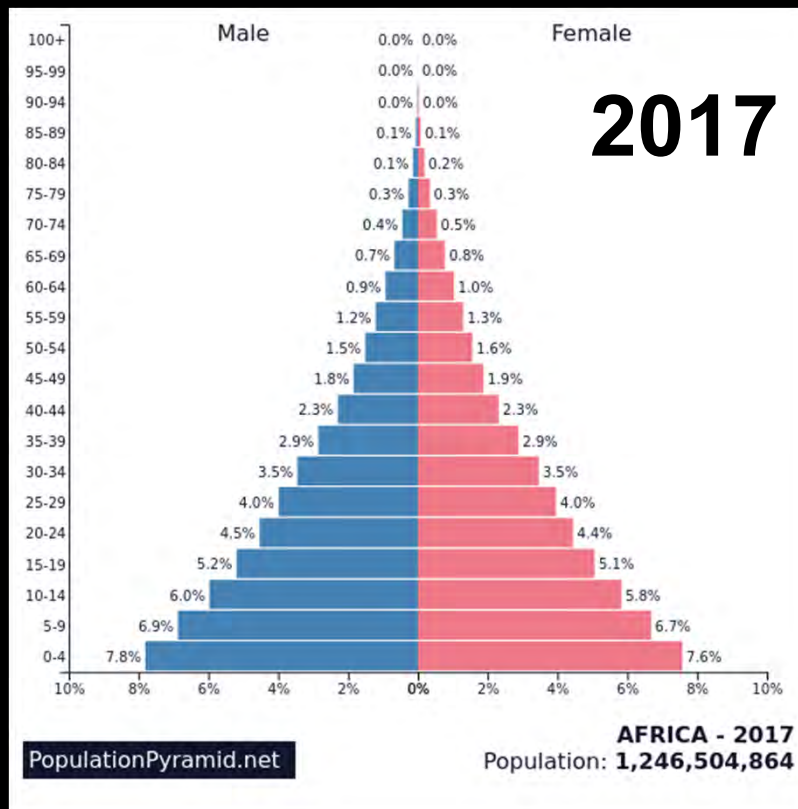
People - India



- India Retains A Youthful Character
- Pool of Labor will Decline (Birth Rates/Health)



People - Africa



- Disproportionate Level of Young People
- Women's Rights, Healthcare, Political Instability



Effect of Population Changes

- Millennials – **Inspire Them**
 - Increased Involvement
 - Seek Inspiration Rather than Simply a Pay-Check
- Baby Boomers – **Re-Hire Them**
 - Second Careers Needed
 - Retain Experience & Intellectual Capacity
 - Reduced Physical Ability – Simplified Work Needed
- **Typical Moulders**
 - High Turnover Most Difficult in Small Operations
 - Need to Improve Work Conditions & Relationships
- **A⁺ Moulders**
 - Greatest Challenge in Europe & US Initially
 - Fewer People Needed but More Expensive



Global Rotomolding

Automation



Rotomolding Automation



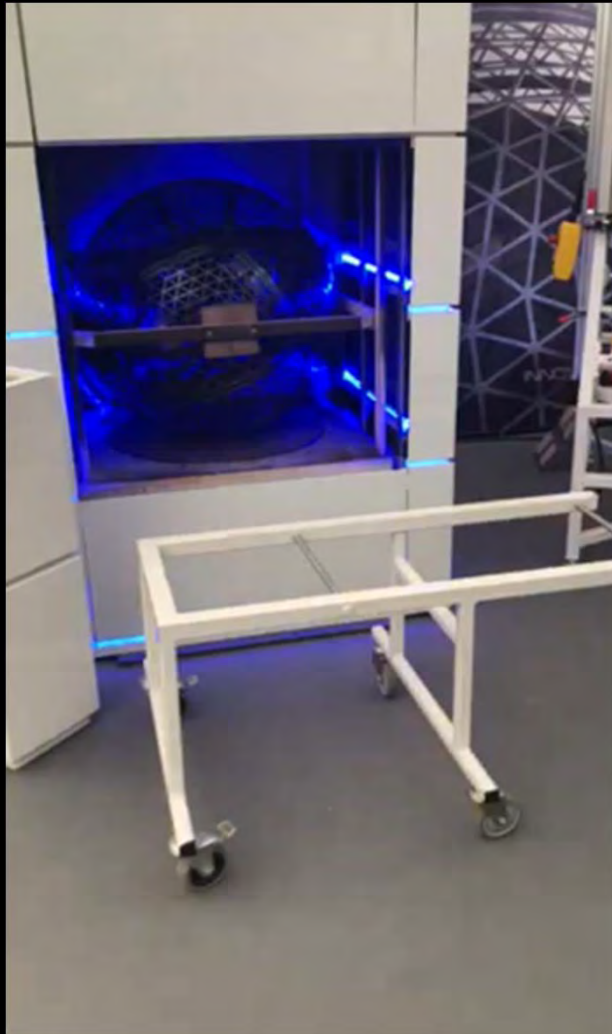
Persico SpA: Smart



Rotoline: Multi-Layer Automated



Rotomolding Automation



Roto Evolution



Robotic Arm AMS Robotics



Automation: Threat & Opportunity

- How Much is Desired, Needed or Possible?
- Blow Molding Direct Threat
- 3D-Printing Possible Threat

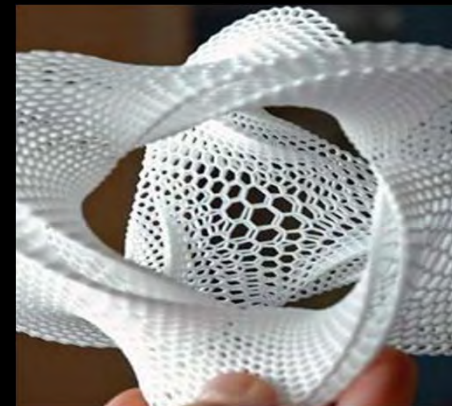


- Typical Molders

- Automation of Anything Possible but is it Justifiable for Typical Molding?
- Human Robot is Best – *If Affordable*

- A+ Molders

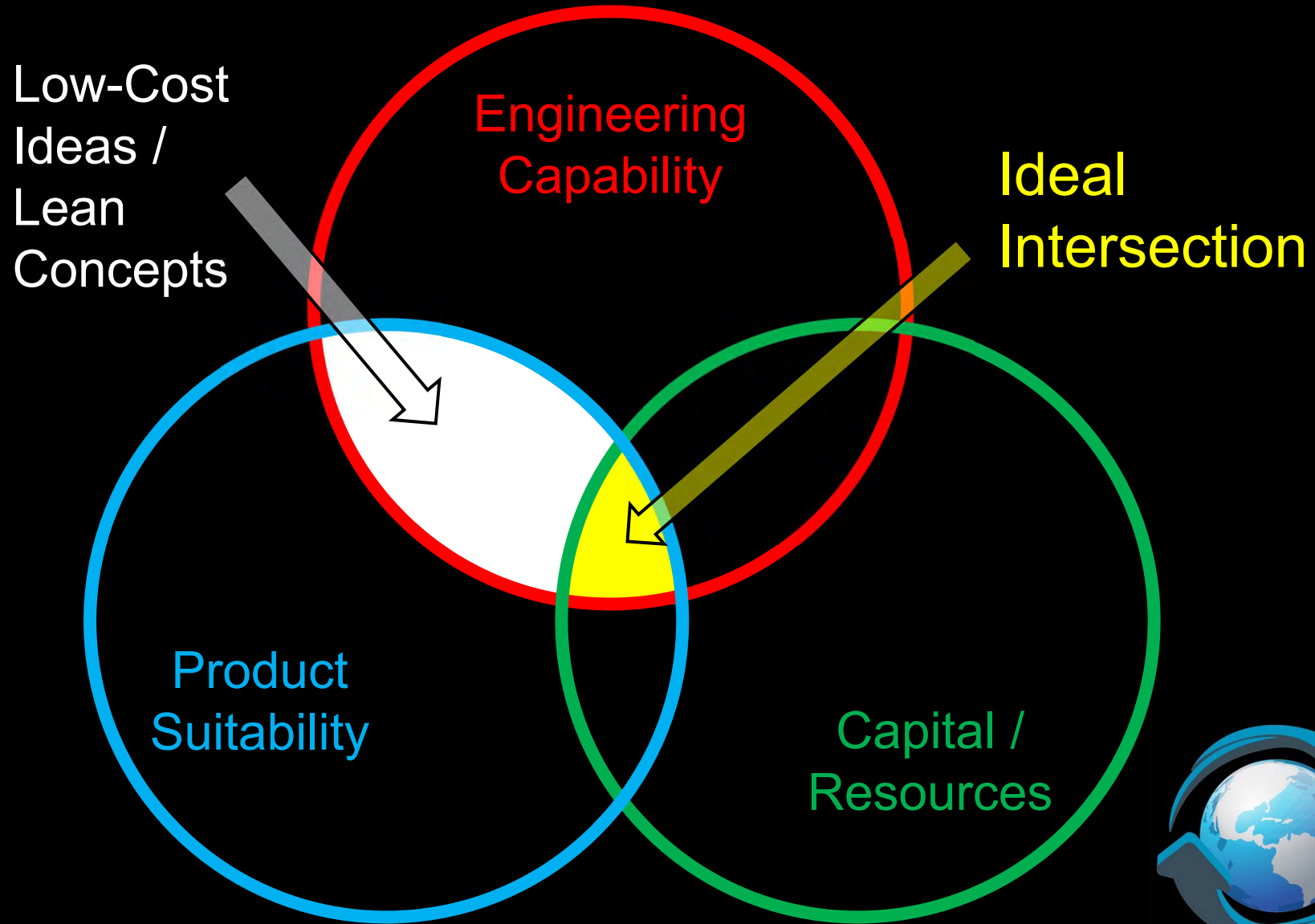
- High-Volume, High-Price Parts Ideal
- Complex Parts May Still Require a Human Touch



NARoto



The Automation Intersection



Mid-Level Automation

Typical Molders

- Focus on Operators
- Safety & Access
- Mold Open / Close
- Powder Loading



Safety Rails – Ferry Industries



Mold Jacks – Paladin Sales



Automatic Spiders – Maus GmbH



Powder Dispensing
– Wittman / Paladin



Global Rotomolding

Public Perception



Climate Reality Check

- Climate Change is Real (by Definition)
 - The Reason is not Singular nor Linear
 - Natural Cycles Actually Dominate
- Political Reality is More Dangerous
- Lobbying On-Going to Label Plastics as Bad and Polluting – ‘War on Plastic’
- Rotomolding Likely Considered a ‘Dirty Process’ at some Point



Light
Manufacturing



Climate Change & Energy

- Rotomoulding May be Forced to Adjust to New Regulations
 - Costs of Energy Recovery & Pollution Controls Expensive
- Moulders/Associations Need to Stress Positives of Plastic
 - Durability and End-of-Life Recycling vs. One-Time Use
- Move to Bio-Sourced Materials
 - Possible but Can be Expensive – Environmentally Damaging?
- Typical Moulders
 - Audit Operations for Energy Savings
 - Reduce Pollution & Scrap, Recycle Waste & Products
- A+ Moulders
 - Advanced Processes = Reduced Energy Use
 - Promotion of Positive Environmental Approach



Global Rotomolding

The Growth of China



One-Belt One-Road



- Seeking to Revive China's Glory Days
- Breaking the Western Hegemony on the Seas



One-Belt One-Road

- Regional Effects Potentially Dramatic
 - 60 Countries
 - 1/3 of World's Economy
 - 1/2 of World's Population
 - \$1 trillion Infrastructure Investment / Year – **Good for Rotomoulding!**
- Will Europe See More Chinese Rotomoulded Goods?
 - Will Europe Have Access to New Markets?
- Initiative is Not Without Challenges
 - Financing Requirements Huge & Opposition Already Developing
 - US / Western Interference Possible



Global Rotomolding

Materials & Markets



60s & 70s 'Cambrian Explosion'



Flame Retardant



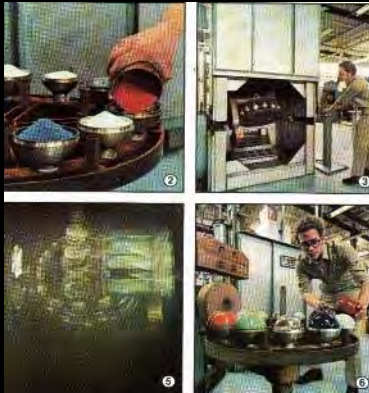
Polystyrene



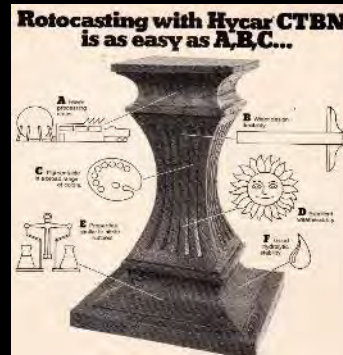
PVC Powder



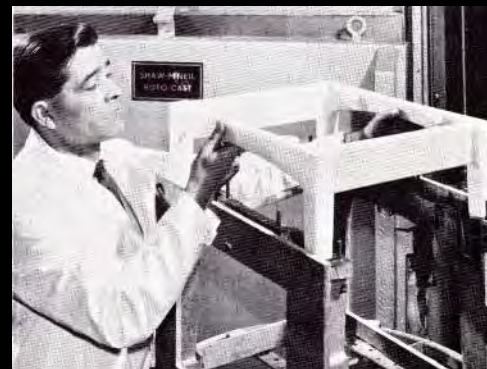
Caprolactam



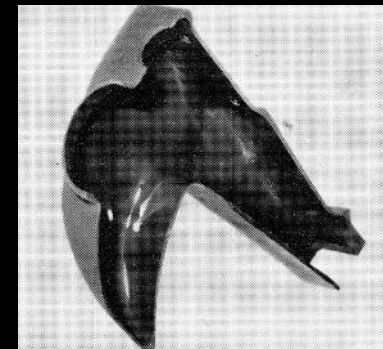
Polycarbonate



CTBN



Polypropylene



Liquid PU

- Fluoropolymers
- Ionomers
- ABS and more...



Materials

- Molecular Design could Change the Future
 - Design Algae or Plants to 'Grow Plastics'?
- Low Energy Catalyst or Enzyme Processes
- Existing Technology Shows Possibilities
 - PP, Nylon, Flame Retardant, Bio-Polymers



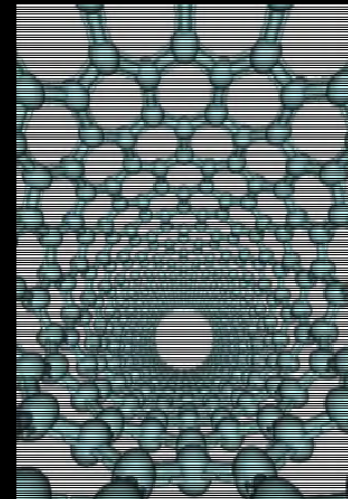
Pibiflex
Elastomeric
Co-Polyester
Resinex



Braskem
Bio-Polyethylene



Total – PLA
Amorphous/Crystalline



Markets

- Blow Moulding Lurks > 10,000 Parts/Year
 - Fuel Tanks (Multi-Layer)
 - Toys (Thin Walled)
 - Septic Tanks (Higher Rigidity)
 - Water Tanks (Faster – Thinner)
 - Kayaks (Lighter)
 - Road Barriers (Lighter)
- Underground Tanks to Injection

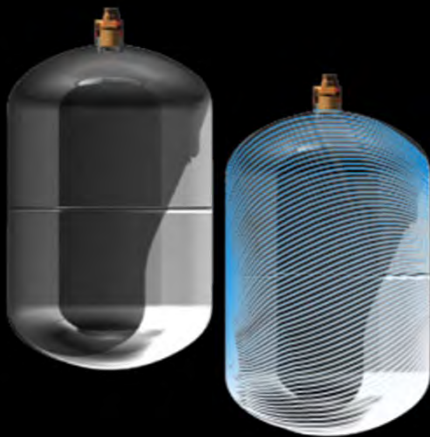


2000-5000 Litres

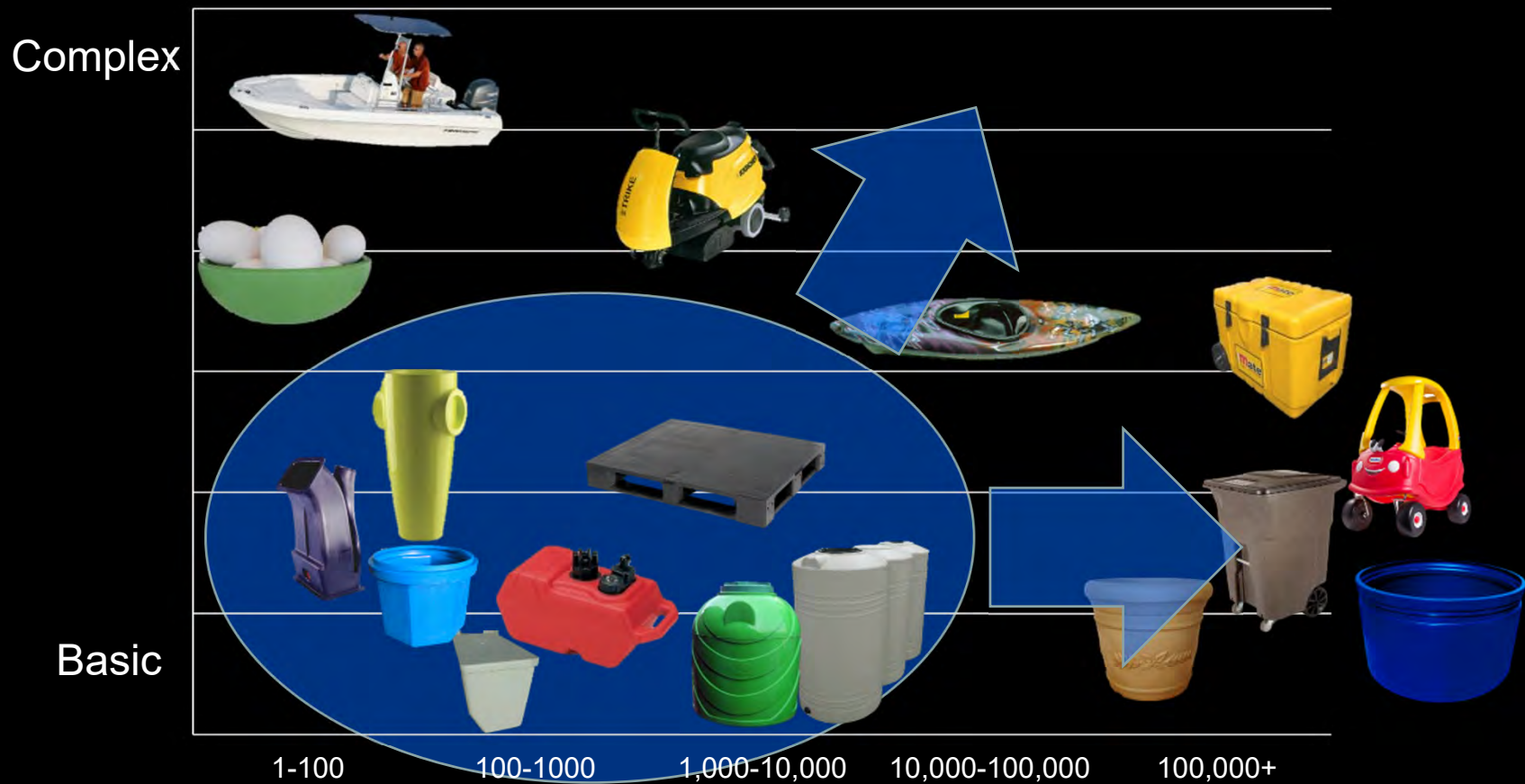


Markets

- Most High-Volume Consumer Markets are Inaccessible to Roto
 - Materials, Finish, Design, Quantities
- New Materials & Machines Can Perhaps Open New Opportunities
- Need Promotion of Rotomoulding
 - Rotoplas 2017 Best Ever Show
 - K-Show & Chinaplas Ideal Platforms



Market Boundaries



- 'Safe Range' <10,000 Parts, Hollow & Complex
- New Materials Can Help Push the Boundaries
- New Materials & New Markets Need the **Right Attitude**



In Closing



Summary

- Globally, Rotomolding is **Strong**
- People Issues are **Fundamentally** Changing
- Automation is a Major Initiative
 - Not Easily Accessible to **Average** Molders
- Be Prepared for **Environmental** Policies
- Material Development is Key
 - Producers and Compounders **Central** to Rotomolding Development

