

Fabulous at Forty?

Glorious at 80?

ARM 40th Annual Fall Meeting

New Orleans, LA

26th September 2016

Paul Nugent

Roy Crawford – Vision 2020

- RotoWorld Article Looked at 20 Years Ahead from 2000
- Molds
 - Direct heating, Internal Pressure
 - Sacrificial Mold Material
- Machines
 - Faster Cycles, Automation
 - Programmed Rotation Cycles
- Materials
 - ‘Limits on Materials Inexcusable’
 - Improved Stability, Liquid Forms
- Molders
 - Work Together for a Greater Voice



Rotomolding – 4Ms

- Machines, Materials, Methods, Markets
- Global Trends and their Effects?
 - Population
 - Micro-Finance
 - Communication
 - Artificial Intelligence
 - Climate Change & Energy
 - The Microbiome & Microbiology

Rotomolding

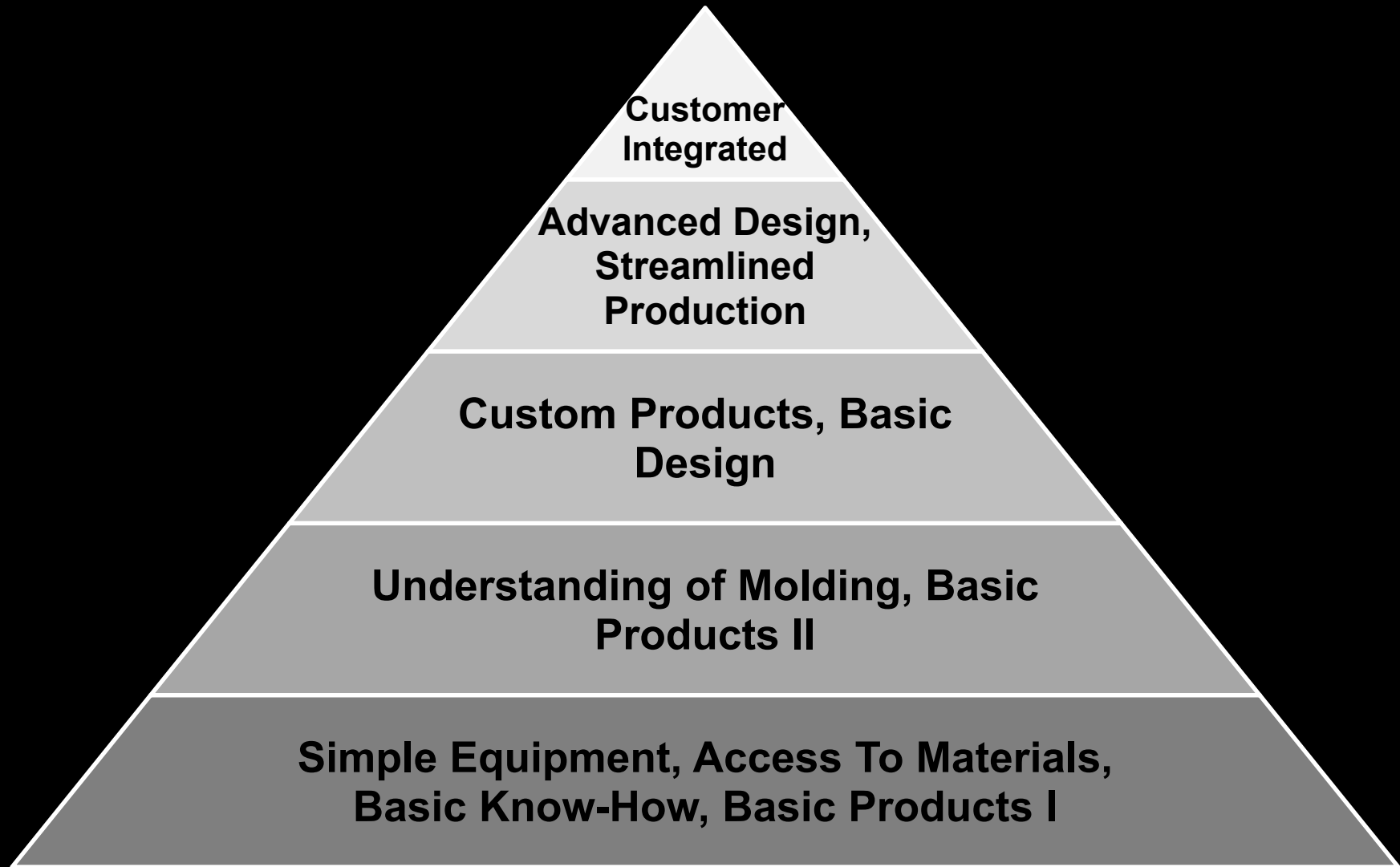
Fab

- Low Barrier-to-Entry
 - Entrepreneurial
 - Small Batch Production
 - Polyethylene
 - Small Industry
-
- Tanks & Containers
 - Complexity of Design

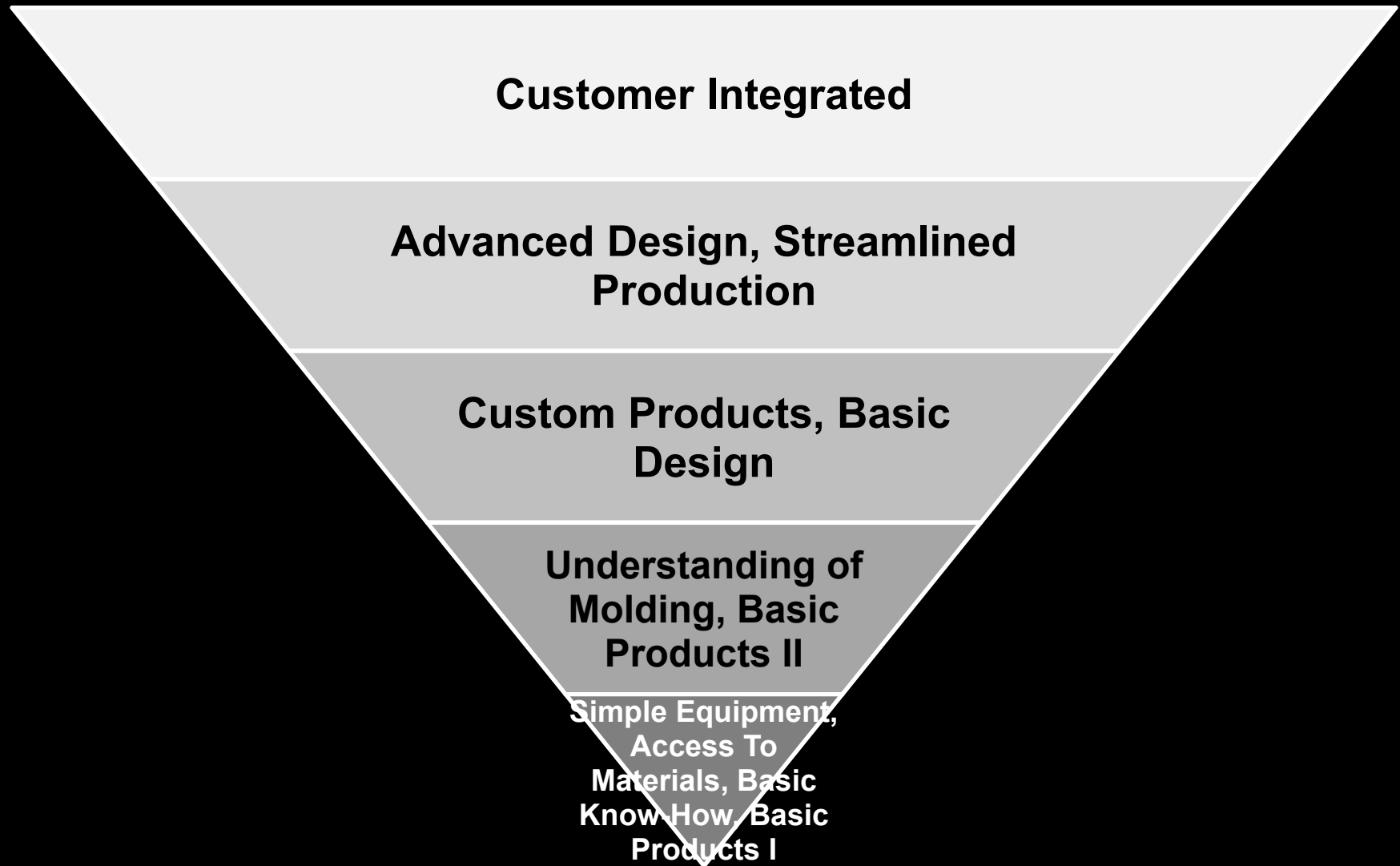
Not-so-Fab

- Small Industry
 - Polyethylene
 - Small Batch Production
 - Entrepreneurial
 - Low Barrier-to-Entry
-
- Wide Tolerances
 - Slow Throughput
 - Manual Dependency

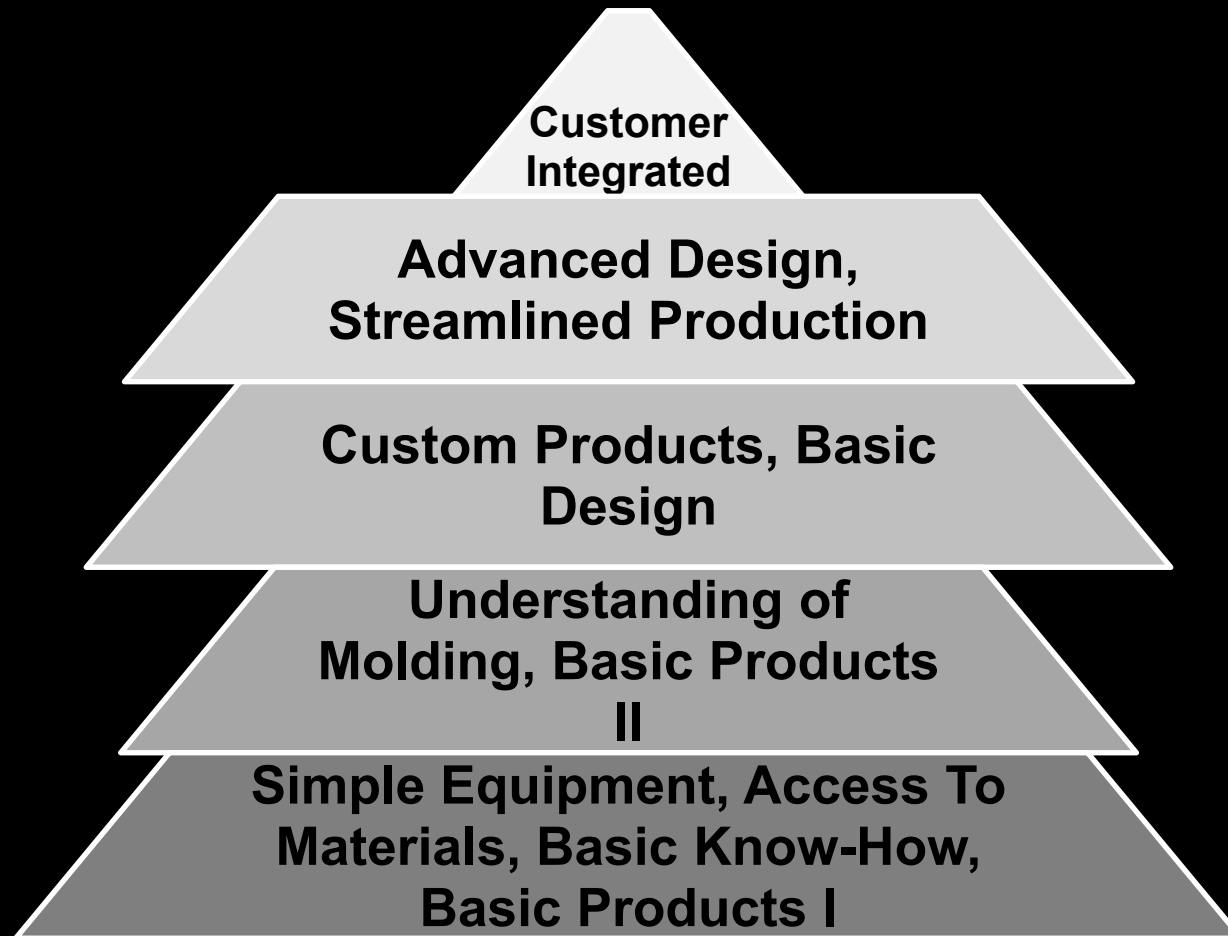
Progression of Molders – 2003



Progression of Molders – 2056?



Progression of Molders – Maybe

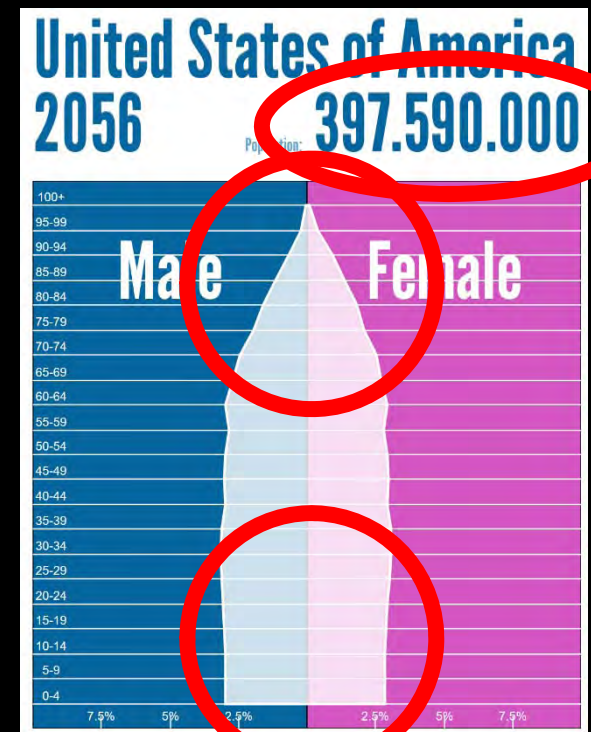
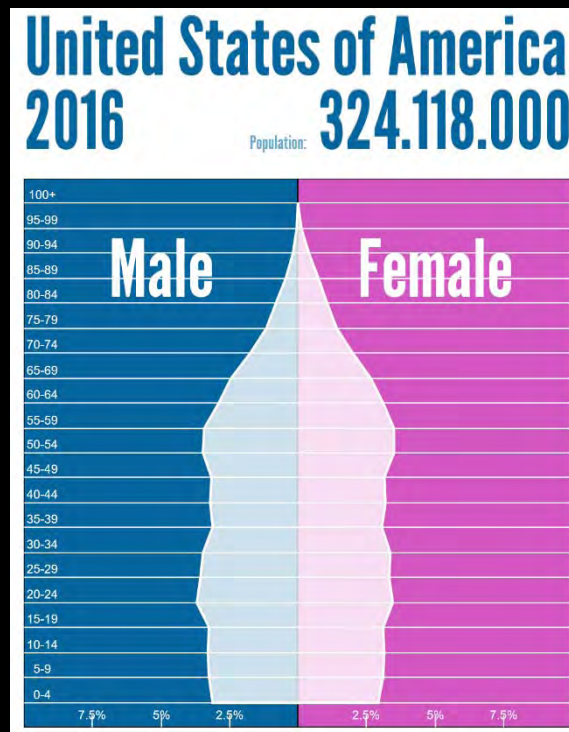
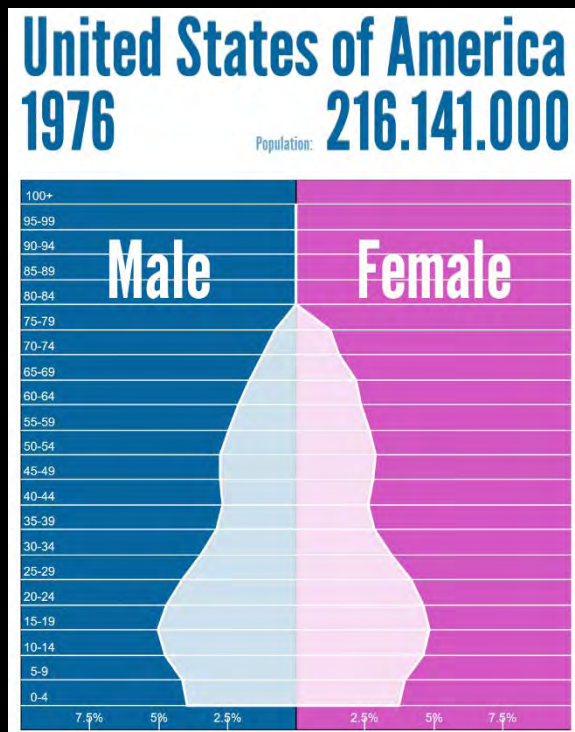


- Low End Molders with Low Margins will Continue to Thrive
- High-End Molders with Profitable Markets will Drive Technology

Our Changing World

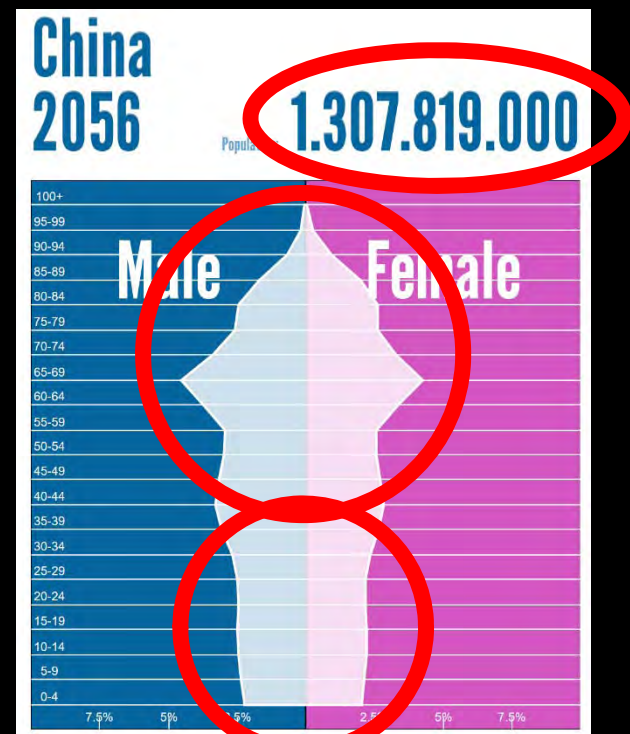
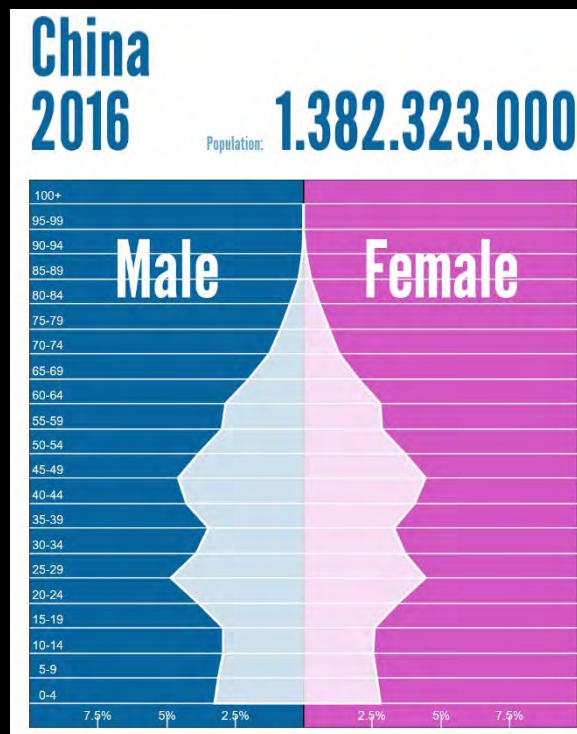
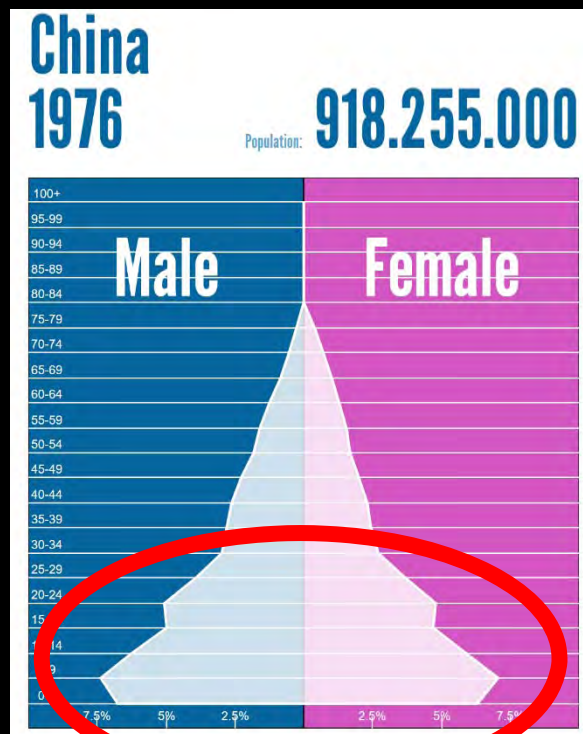
- Population
 - Micro-Finance
 - Communication
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 - The Microbiome & Microbiology

Population Trends – USA



- Ageing Population – Increases in Health Costs
- Fewer Entry Level Workers – Higher Expectations
- Growth in Overall Population

Population Trends – China



- Disastrous Inversion of Ages
- Population Stagnating
- China Needs Our Help - They Know it Too

Changes

- World Population is Currently 7.5 Billion
- Growth Rate Falling but Projected to be 10 Billion by 2056 (UN Estimate)
- Boomers Retiring in Waves
 - Most Divorced, Less Socially Engaged, Less Religious
 - Need to Keep their Experience in the Market-Place
 - ‘Grey Haired Army for Positive Change?’
 - High-End Consumers
 - Tired of Walmart Effect on Quality
 - Less is More

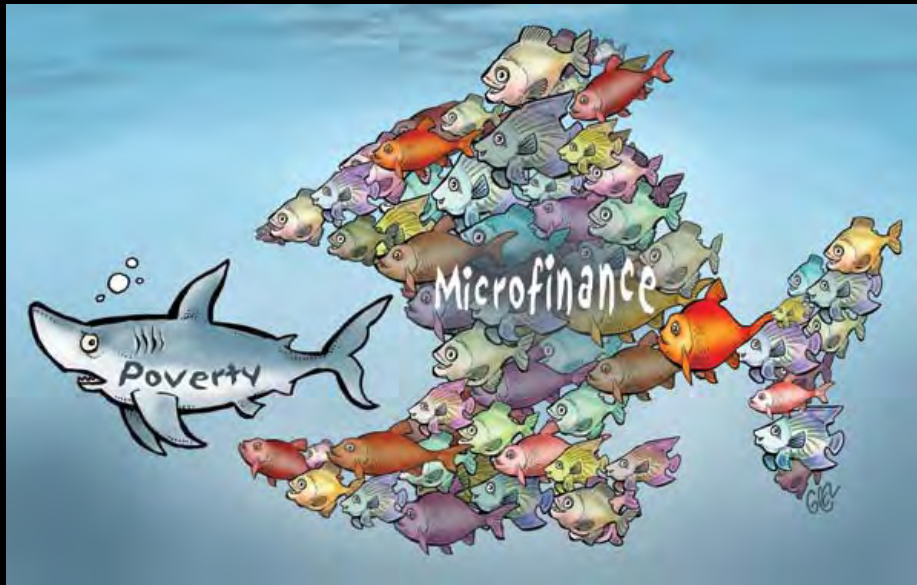
Changes

- Millennials Better Educated but Worse-Off
 - Marry Later, Fewer Kids, Living with Parents
 - Likely to Live Longer than Any Generation
 - Six Decades of Work Instead of Four
- Boomers – Re-Hiring
 - Second Careers Needed
 - Reduced Physical Ability – Simplified Work Needed
 - Retain Experience & Intellectual Capacity
- Millennials – Inspiring
 - Increased Involvement
 - Seek Inspiration Rather than Simply a Pay-Check

Our Changing World

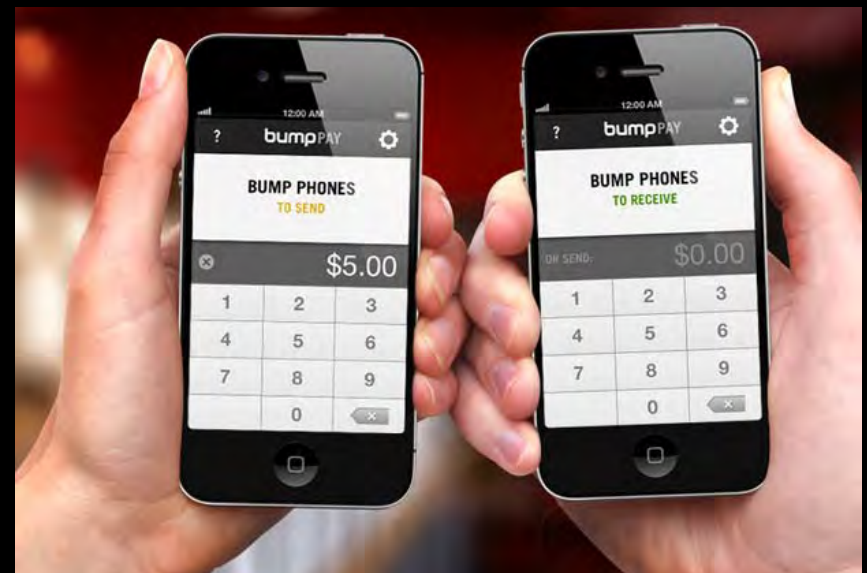
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Expanding Opportunities



No Bank? No Problem.
Mobile Phone based
Peer-to-Peer Transfers
& Lending

Micro-Loans, Local
Support Raising 10s of
Millions from Poverty in
Africa & Asia



Global Averaging

- Developed Nations Slowing
 - Developing World Catching Up
- Internet Allows Everyone with a Phone Visibility
 - World's Poor Demanding an Equal Share
- Rising Standards and Financial Models
 - = More Entrepreneurs
 - = More Rotomolders
 - = More Standard Products

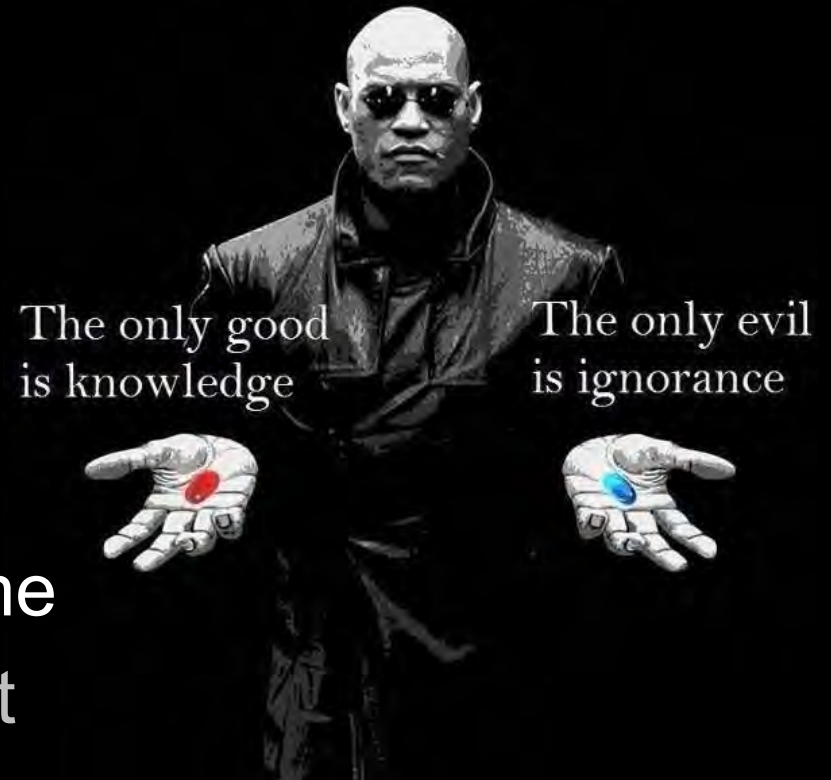


Our Changing World

- Population
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You Are in the Matrix

- Internet
 - Social Media
 - Phone Tracking
 - 24 hour News Cycle
 - Access to Anything, Anytime
 - You are Part of the Harvest
-
- Data and Information is Valuable
 - Google, Facebook, Microsoft, NSA, Banks, Credit
 - Mass Response can be Controlled



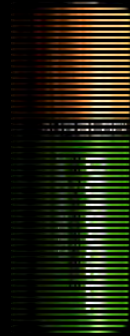
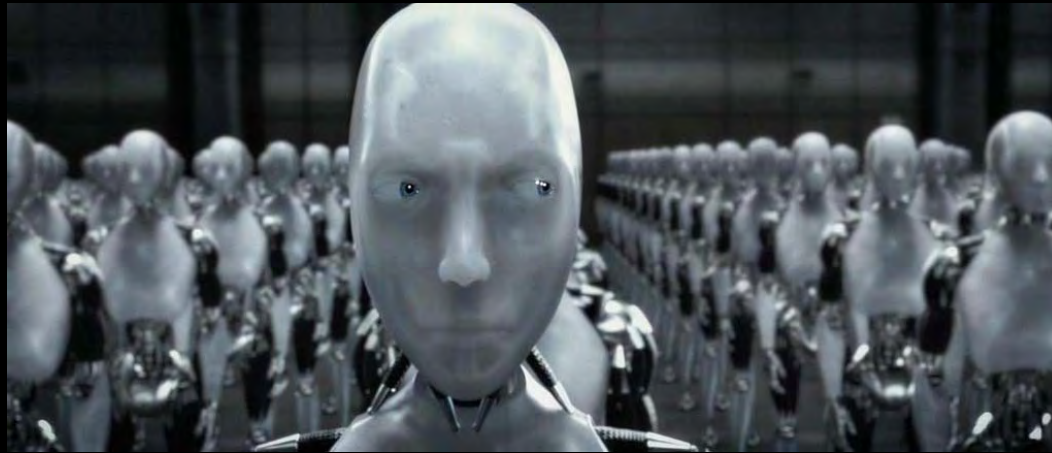
Effect on Rotomolding?

- Molders Already Well Connected to Suppliers & Technology
 - More Information & Support than Ever Before
 - Less Connected to Associations
- ARM is in Danger of Becoming ARMS
- How will Associations Operate in Next 40 Years?
 - Remote Interactive Meetings?
 - More Localized, Regional Chapters?
- Human Contact Still Critical – Networking is Key
- Better Data Gathering from Molders on Needs

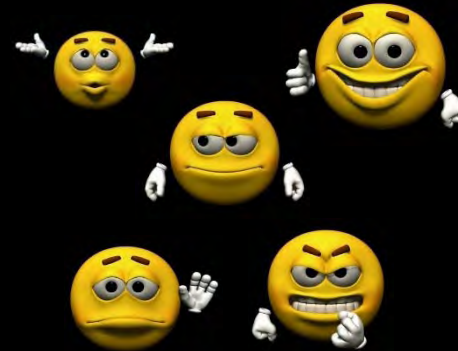
Our Changing World

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Artificial Intelligence...



Power



Emotion

...Not as Scary as Natural Stupidity

Reality Blur

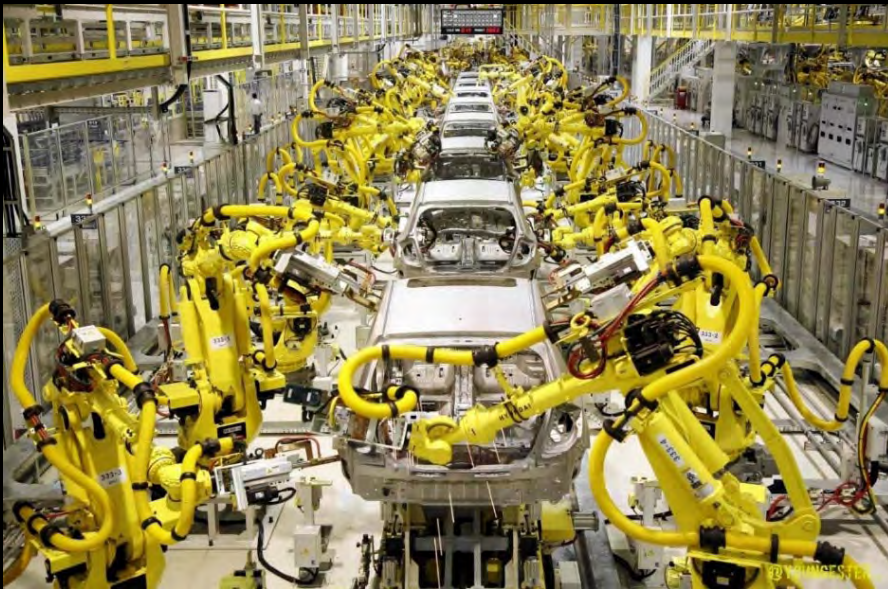
- Deep Learning / DeepMind
- Neural Networks
- Quantum Computing
- Augmented Reality



- Driverless Cars
- Automated Aircraft
- Air Traffic Control Systems
- Smart \neq Intelligence
- Real Danger is Complexity that No-One Understands

Effect on Rotomolding?

- Automation is a Must
- How Much Depends on the Product and Industry

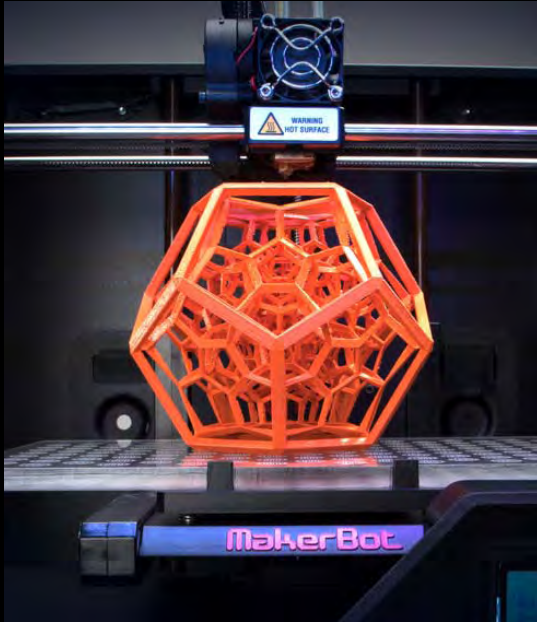


High-Volume Repetitive
High Cost but Possible



Low-Volume Flexible
Possible if Mass Produced

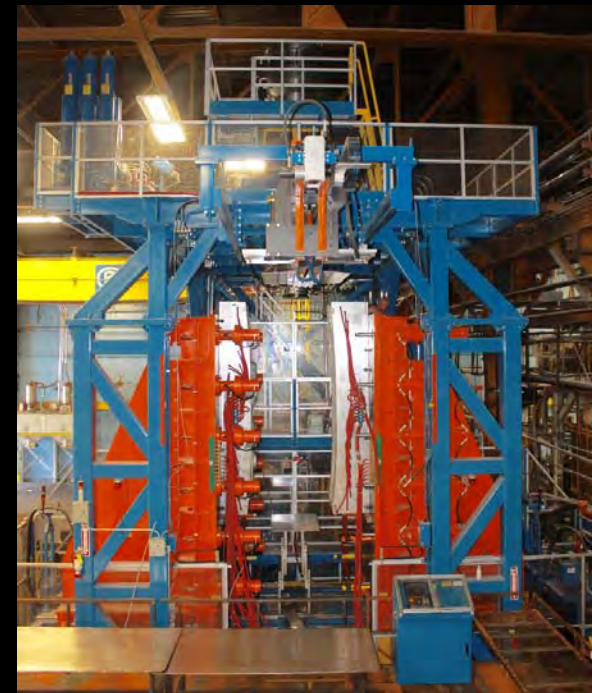
Competition – 3D Printing & Blow Molding



3D Printed Car



- 3D Printing will Take Business from Molders
- Materials Still Developing
- Scale & Speed Improving
- Blow Molders Also Capable of Large Products & Scale – High Capital Cost
- Water Tanks, Kayaks & Septic Systems



Next 40 Years – Transhuman



Tissue



Silicone

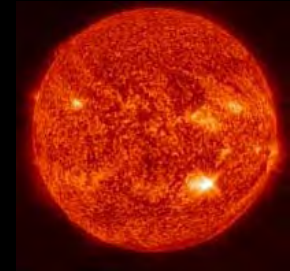
Ability to Combine High Level Thinking with
the Power of Data Analysis

Our Changing World

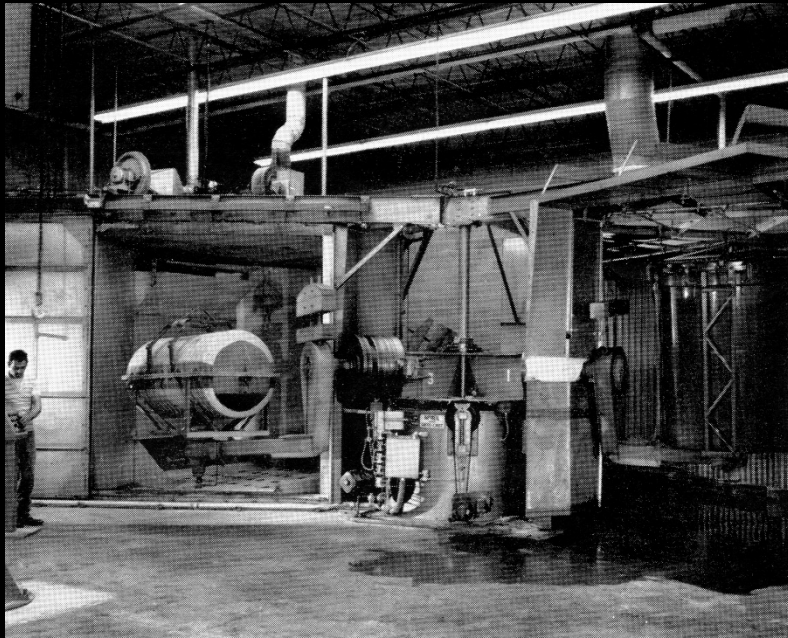
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Reality Check #1

- Climate Change is Real
- The Reason is not Singular nor Linear
- We will be Forced to Adjust to Regulation
- Rotomolding may be Considered a 'Dirty Process' at some Point
- Costs of Energy Recovery & Pollution Controls may be Prohibitive
- Electric Machines Already in Use but Power may be Expensive



Reality Check #2



McNeil 1976



McNeil 2056

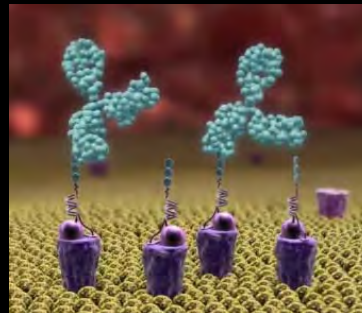
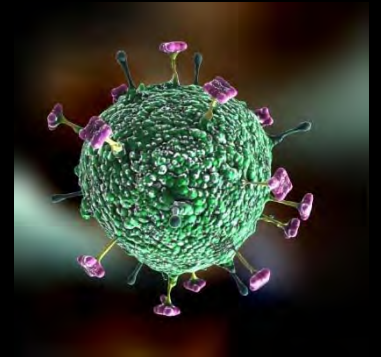
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Microbiome & MicroBiology

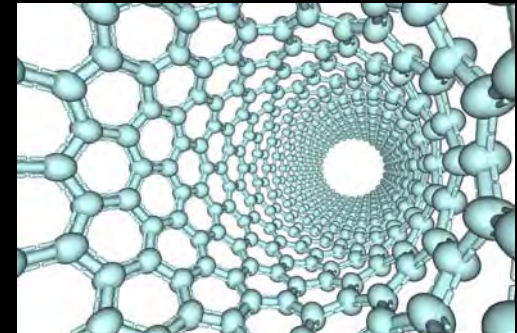
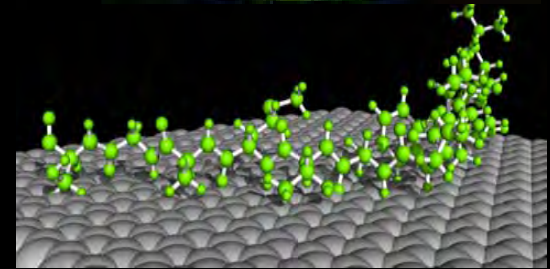
Some Interesting Developments

- Microbiome
 - You are made up of 33 Trillion Cells
 - Your Microbiome is Another 39 Trillion Microbes
 - Affects your Responses, Disease & Even Evolution
- Entered the Age of Antibiotic Resistance
- Crispr – Cas9
 - Recent Technique for Modifying DNA
 - Precise Editing
- Alphamers
 - Targeted Cell Killers



Applications

- Design Algae or Plants to 'Grow Plastics'
- Low Energy Catalyst or Enzyme Processes
- ExxonMobil Molecular Level Filter for Para-Xylene for Plastics
- Japanese Bacteria that Eats PET for Recycling
- Membranes for Converting Salt Water to Drinking Water
- Modified Crops & Animals



Possibilities



- Selected Attributes
- New Powers
- Disease Proof?

- Operator of the Future?
- Multi-Tasking
- Heat Resistant
- Low Water In-Take
- Good Memory



Glorious at 80?

Absolutely

- More Automation – Flexible Robotics
- Improved Energy Efficiencies
- Wider Material Range
- Still Entrepreneurial
- Still Making Tanks
- Still Having Fun

Fabulous

Thank You!



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