Global Innovator of Performance-Enhancing Chemistries and Surfaces

Teachers Enrichment Program for STEM

Jeff Harrison
Technical Director - Oil and Gas
Agenda

› TEP for STEEM

• Introduction to OMNOVA Solutions
• Global Chemicals
• Global Surfaces
• Our Team Divisions
• Technology Positions at OMNOVA Solutions
• Technical Director – Oil and Gas
• Innovation Process
• Basic Polymer Design
• Problems Solving
COUNTLESS CONSUMER AND COMMERCIAL BRANDS DEPEND ON OMNOVA TO GAIN THAT SPECIAL EDGE IN PERFORMANCE.

THE SCIENCE IN BETTER BRANDS
With OMNOVA Products...

DIAPERS ARE MORE ABSORBENT.
RESTAURANTS AND RETAIL ENVIRONMENTS LOOK BETTER, LAST LONGER, AND COST LESS.
BUILDINGS HOLD UP BEAUTIFULLY IN HARSH CLIMATES AND CAN BE OCCUPIED SOONER.
With OMNOVA Products...

A DURABLE, COMFORTABLE (AND AFFORDABLE) RIDE FEATURES THE LOOK & FEEL OF LEATHER.
Global Chemicals Markets

Broad set of specialty applications and markets leveraging core technology
Global Surfaces Markets

- Food Service
- Healthcare
- Retail
- RV
- Automotive Interiors
- Marine
- Industrial Films
- Cabinetry
- Transportation
- Luxury Vinyl Tile
# Performance Materials – Established Brands

<table>
<thead>
<tr>
<th>Brand</th>
<th>Category</th>
<th>Applications and Markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>DURON™</td>
<td>Automotive Interiors</td>
<td>- Automotive Interiors</td>
</tr>
<tr>
<td>PREVAILL®</td>
<td>Transportation</td>
<td>- Transportation</td>
</tr>
<tr>
<td>NAUTOLEX®</td>
<td>Marine</td>
<td>- Marine</td>
</tr>
<tr>
<td>BOLTAFLEX®</td>
<td>Healthcare</td>
<td>- Healthcare</td>
</tr>
<tr>
<td>BOLTAFLEX®</td>
<td>Food Service</td>
<td>- Food Service</td>
</tr>
<tr>
<td>WINGSTAY®</td>
<td>Antioxidants</td>
<td>- Antioxidants</td>
</tr>
<tr>
<td>GENVLO®</td>
<td>Paper / Packaging</td>
<td>- Paper / Packaging</td>
</tr>
<tr>
<td>GENCAL®</td>
<td>Carpet</td>
<td>- Carpet</td>
</tr>
<tr>
<td>PLIOLITE®</td>
<td>Rubber Reinforcement</td>
<td>- Rubber Reinforcement</td>
</tr>
<tr>
<td>PLIOCORD®</td>
<td>Tire Cord</td>
<td>- Tire Cord</td>
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</tbody>
</table>

Broad set of applications and markets leveraging core technology
### Specialty Segments and Targeted Markets

**Demand for high performance products**

**C.A.S.E.**

<table>
<thead>
<tr>
<th>Coatings</th>
<th>Adhesives</th>
<th>Sealants</th>
<th>Elastomers</th>
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<tbody>
<tr>
<td>Masonry</td>
<td>Tapes</td>
<td>Caulking</td>
<td>Transportation</td>
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<tr>
<td>Intumescent (fire resistant)</td>
<td>Release coatings</td>
<td>Casting</td>
<td>Industrial</td>
</tr>
<tr>
<td>Direct-to-metal</td>
<td>Adhesives</td>
<td>Cement</td>
<td>Consumer</td>
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<tr>
<td>Primers</td>
<td>Construction binders</td>
<td>Gaskets</td>
<td>thermoplastic products</td>
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<tr>
<td>Odor and stain blocking</td>
<td>Foam sealants</td>
<td>Foam sealants</td>
<td></td>
</tr>
<tr>
<td>Wood treatment</td>
<td>Roofing</td>
<td>Concrete</td>
<td></td>
</tr>
</tbody>
</table>

**Laminates**

<table>
<thead>
<tr>
<th>Laminates</th>
<th>Nonwovens</th>
<th>Oil &amp; Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail display</td>
<td>Diapers</td>
<td>Drilling</td>
</tr>
<tr>
<td>Cabinets</td>
<td>Adult incontinence</td>
<td>Cementing</td>
</tr>
<tr>
<td>Food service</td>
<td>Healthcare</td>
<td>Fracking</td>
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<tr>
<td>Kitchen and bath</td>
<td>Wipes</td>
<td>Environmental</td>
</tr>
<tr>
<td>Recreational vehicles</td>
<td>Transportation</td>
<td></td>
</tr>
<tr>
<td>Flooring</td>
<td>Transportation</td>
<td></td>
</tr>
<tr>
<td>Healthcare</td>
<td>Filtration</td>
<td></td>
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<tr>
<td>Commercial furniture</td>
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</tr>
</tbody>
</table>

**Common need for differentiation, strong OMNOVA position, room for growth**

*Market data based on internal estimates and OMNOVA’s place in the value chain.*
Technology Positions

Four Technical Directors
1. Oil and Gas
2. Performance Materials
3. Specialty Coating and Ingredients
4. Laminates, Films and Coated Fabrics

Innovation Leaders
Application Managers
Synthesis Engineers
Plant Engineers
Scientists
Designers
Technical Director

Oil and Gas

• From a R&D and Production Innovation, I am a Petroleum Engineer working in a Chemistry world

• I use Chemistry, Petroleum Engineering, Mechanical Engineering, Chemical Engineering and Geology to solve problems and develop new products.

• I have four main job functions:
  1. Research and Development
  2. Product Innovation
  3. Customer support
  4. Solving Customer Technology Problems
Innovation Process

Development centers and application technology on three continents | State-of-the-art pilot plant | World class material characterization capability

Innovation Excellence to enable profitable growth for our customers through differentiated high-value solutions
Core Competency in Polymer Design

Multiple emulsion polymerization processes → customizable performance

Batch, Continuous, Semi-continuous, Continuous Multifeeds, Sequential

Molecular engineering through particle architecture, molecular weight, cross-linking, and more

- Raspberry
- Biphasic
- Multilayer
- Core-shell
- Functionalized
- Crosslinked
- Hairy particles
The latex particles arrange around the cement hydrate needles and reduce porosity.
Problems We Solve

Choosing right salts, and Gas Hydrates

We have to use chemistry and well conditions to solve problems
Problems we solve

Calcium Naphthenate Scale, Shale (Gumbo) Attack

We see problems caused well bore conditions and fluid incompatibilities
Problems We Solve

Flow screens plugged, Metal failures caused by fluids

Down hole conditions created because of CO$_2$ and H$_2$S
Our Values

SAFETY
Everyone goes home injury-free every day
We do not accept unsafe conditions or behavior

AGILITY
We adapt swiftly and efficiently delivering innovative solutions
We make timely, data-driven decisions

INTEGRITY
Our legal, regulatory, and ethical behavior is impeccable
We are candid, transparent and respectful

ACCOUNTABILITY
We keep our promises
We develop our people
OMNOVA’s Core Chemical Competencies

What We Do For Our Customers

We Leverage Our Core Technologies

Specialty Polymers
- Styrene Butadiene
- Acrylics
- Vinyl Acetate
- Vinyl Pyridine
- Nitro Rubber
- Ionic Polymers
- Bio-based Copolymers

Specialty Chemicals, Emulsions and Dispersions
- Fluorochemicals and Fluoropolymers
- Antioxidants
- Calcium Stearate
- Fatty Amides

Diverse Process Technologies
- Emulsion Polymerization
- Advance Emulsification Capability
- Multiple Ways to Provide Dry Polymers Resins

To Enhance Performance Across Many Applications

Protect and Beautify Surfaces
- Decorative and Protective Coatings for Masonry, Wood, Metal, Cement, Flooring
- Intumescent Coatings

Modify Surface Properties
- Stain Resistance
- Fluid Permeability and Fluid Management
- Corrosion Resistance
- Surface Energy, e.g. Leveling Agents
- From Highly Hydrophobic to Highly Hydrophilic

Bind and Seal Surfaces and Materials
- Nonwovens
- Paper
- Adhesives
- Tire Cord
- Carpet
- Sealants

Modify Bulk Properties
- Increase Strength And Stiffness
- Increase Flexibility And Ductility
- Improve Chemical Resistance
- Reduce/slow performance degradation

Achieving Lower Total-Cost-of-Ownership

Attaining Sustainability Goals
### OMNOVA’s Surfaces Facilities Around the World

#### North America
- **Beachwood, OH** (World HQ)
- **Akron, OH** (Technical Center)
- **Auburn, PA**
- **Jeannette, PA**
- **Monroe, NC** (Manufacturing and Design Center)
- **Columbus, MS** (Distribution Center)

#### Asia
- **Shanghai, China** (Regional HQ / Manufacturing & Technical Center)
- **Rayong, Thailand**