Glass Primary Packaging Trends
Carlos Navarro
Expertise

- Full portfolio (ampoules, cartridges, syringes, vials) from glass tubing
- Expertise on manufacturing cartridges for insulin
- Innovative solutions for Biotech
- Full Range of Sterile products (vials, cartridges and syringes)
- Leader in converting technology
- 100% Dimensional and Cosmetic Controls by Camera
- Full range of Automatic Inspection Machines
- Assembly, Packaging and Process Equipment
OMPI do Brasil

30 milhões de Euro de investimento

40 mil mq de terreno

12 mil mq de área construída

15 linhas de produção

Cartuchos e Ampolas

200 Funcionários
Range of Products today

Bulk Containers

ampoules  vials  syringes  cartridges  Special devices

Ready-to-Use Containers (Sterile)

vials  syringes  cartridges
OMPI portfolio critical to Quality

Technological and Quality Solution Level

Market Needs

Benefit/Value

Connecting People, Science and Regulation ©
Aim for Parenteral Drugs

Intended Use
- Vaccines
- Diagnostics
- Small Molecules
- Anti-coagulants (i.e. Heparin)
- Anesthetics
- Veterinary
- Insulin
- GLP-1
- WFI/Diluents
- Other Pharma applications
- Cosmetics

Request for:
- Suitable for a wide range of applications
OMPI Nexa – Use, Features & Benefits

Intended Use
- Biologics
- Large Molecules
- Sensitive Drugs
- Insulin & GLP-1
- Hormones & Proteins
- Adrenaline & Emergency
- Auto-injectors
- Drug Delivery Systems

Request for:
- High dimensional process capability
- Higher Mechanical Resistance to minimize breakage issues
How the Pharma Market is changing?
Market Segmentation – Brazil

Source: Stevanato Group Marketing & Business Intelligence
Market Scenario – Challenges and new needs

High Costs for Developing new drugs

Patent Losses

Niche Market vs Blockbuster

Cost Pressure
- Reducing capital investment,
- Reducing waste
- Reducing TCO

Increase Flexibility
- Reducing time to market
- Increasing business opportunities
- Differentiation

Outsourcing of «non core» activities
- Core pharmaceutical activities:
  - Research
  - Fill/Finish
  - Marketing

Pharmaceutical Industry is looking for new manufacturing solutions to increase flexibility and reduce manufacturing costs
Global Market Growth Estimation 2013 - 2018
Small Volume Parenterals (up to 50 mL)

Source: PDA Presentation of Dr. Friedrich Haefele, Boehringer Ingelheim Pharma GmbH & Co. KG
Glass is the ideal material for parenteral packaging; even if has some limitations these can be mitigated

**CHALLENGES**

- **Breakage**

- **Delamination**

- **Needle stick**

**SOLUTIONS**

- Use forming and converting best practices
- No Glass-to-Glass and Glass-to-Metal contact to reduce flaws
- Glass strengthening
- Surface treatments
- Enhanced and optimized process techniques
- Thermal cycle optimization with low heat/energy forming process
- Test method to guarantee the quality and the stability of vials production
- Integrated needlestick protection capability
- Passive protection
Glass breakage

• Standard converting technology can induce flaws
• Flaws concentrate the stress locally, decreasing the overall strength of the glass
• When a load is applied, e.g. during the injection with a pen injector, the critical defect could trigger the failure in the glass leading to the breakage of the whole component
Platforms to improve product performances

Vials–Cartridges–Syringes

- Use forming and converting best practices
- No Glass-to-Glass and Glass-to-Metal contact to reduce flaws
- Improved Camera Inspection

Optimized containers manufacturing process with an higher cosmetic quality and stronger mechanical resistance
# Vials – Critical Defects

## Critical Defects

<table>
<thead>
<tr>
<th>CRITICAL DEFECTS</th>
<th>BODY</th>
<th>SHOULDER</th>
<th>COLLAR</th>
<th>NECK</th>
<th>MOUTH</th>
<th>BOTTOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contamination</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Scratches</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>Folds / Deformations</td>
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<td>X</td>
<td>X</td>
<td>X</td>
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<td>X</td>
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<tr>
<td>Bubbles</td>
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<td>X</td>
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<tr>
<td>Pressure marks</td>
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<td>X</td>
<td>X</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Airlines</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Chips / Cracks</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
Have a high dimensional process capability

- **COLLAR**: Compatibility with caps and filling lines
- **NECK/MOUTH**: Blowback repeatability
- **SHOULDER**: Optimized for inspection, to reduce false rejects
- **BOTTOM**: High stability of the vials on the transport belts
  - Freeze-dried drugs
Syringes – Very High Cosmetic Quality

Linear Scan - Shoulder

Linear Scan - Body

Area/Matrix Scan Flange

Cone Inspection

Linear Scan

Area/Matrix Scan (Internal Channel)
Syringes – High dimensional process capability

Cone Dimensions (Inside and Outside)
Flange Dimensions
Total Length
Syringe – Features needed

- **Low Tungsten**
- **Optimized siliconization**
- **UV Curing**

<table>
<thead>
<tr>
<th>Feature</th>
<th>OMPI MAX LIM [ppb]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tungsten free</td>
<td>0</td>
</tr>
<tr>
<td>Low Tungsten</td>
<td>&lt; 500</td>
</tr>
</tbody>
</table>
**Syringe – Features needed**

**Siliconization Controls**
- Presence of silicone inside the barrel
- Correct distribution inside the barrel
Glass Delamination

- **Separation of thin glass layers (lamellae)** that appear as shiny, needle shaped particles floating in the contact liquid

- The formation of a **silica-rich layer poorly bonded** to the substrate is the first stage of an extended delamination

- **Glass-liquid interactions** are responsible for the formation of an altered layer

The Answer for Glass Delamination

Low Delamination Propensity

- Thermal cycle optimization with low heat/energy forming process
- Qualitative test method to guarantee the quality and the stability of vials production fully aligned with USP 1660
- Optimized vials manufacturing process with an higher quality product from chemical point of view
# Needle stick injuries & evolution of needle safety devices

<table>
<thead>
<tr>
<th>Early Devices</th>
<th>1st Generation Devices (add-on)</th>
<th>2st Generation Devices (add-on)</th>
<th>PFS Integrated Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Manually Activated</strong></td>
<td><strong>Automatic Activation</strong></td>
<td><strong>Passively Activated</strong></td>
<td><strong>Passively activated and preassembled</strong></td>
</tr>
<tr>
<td>User must manually activate the needle shield; additional movement and manipulation of device to activate the safety feature</td>
<td>Needle is shielded automatically; activation step required to deploy safety mechanism</td>
<td>Requires no additional action by the user; safety mechanism activated upon administration of the injection</td>
<td>Provide added benefits preassembled in ready to use format</td>
</tr>
</tbody>
</table>
Safety Systems - (ISS) designed to meet the needs of all drugs (Biotech, Heparine, Vaccines)

**Standard primary packaging**

**Fully passive protection**

A standard ready to fill syringe with integrated needlestick protection capability
It is no longer about stable production alone. Production facilities must be ready for adaption to changes in corporate strategy, in market dynamics and in short-term targets.

SOURCE: NNE PHARMAPLAN
Industry change as an opportunity to compete

“The success of a manufacturing site is moving from site stability to site agility: in addition to maintaining stable production, pharmaceutical sites are now required to accommodate more changes and deliver on unexpected targets”

SOURCE: NNE PHARMAPLAN
How to be faster?

**SITE STABILITY**
- Mono Product
- Core and Non core Activities
- High Capex
- High Running Costs

**SITE AGILITY**
- Multi Product
- Only Core Activities
- Very Limited Capex
- Reduced Running Costs

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**Big Size**
- Full Process

**Flexibility**
- Fast Reaction
A Comprehensive Range of RTU Containers

Washing (Siliconization)
Depyrogenation
Nesting (no G2G)
Final Sterilization

Nest & Tub

Vials

Cartridges

Syringes

Tray

Vials

Cartridge Only Glass
What the market is looking for?

- **Productivity**: Tray for dedicated filling line
- **Flexibility**: Nest & Tub for combo line
How PharmaCo Value Chain Changes

Minimizing T.C.O.
Increasing Quality
Increasing Flexibility
Reducing Time-To-Market

Pharmaceutical needs

Value Chain: Roles & Responsibilities

Packaging Industry: PharmaCo

Packaging ● Washing ● Sterilization ● Filling

More Resources Available

- Capex
- Validation and Regulatory
- Upstream Operations

«non quality» Costs and issues
PharmaCo Value

Minimizing T.C.O.
- Reduction of initial investments on:
  - Equipment (washing, WFI system, tunnel)
  - Utilities (WFI, kWh,..)
  - Workforce
  - Validation
  - Maintenance

Increasing Quality
- No-glass-to-glass contact during transport
- Feeding, Washing, Depyrogenating Tunnel are very stressed phases for packaging

Increasing Flexibility
- A unique fill&finish equipment for different packaging
- Easy & fast change packaging/format in the same machine (combo line)

Reducing Time-To-Market
- Reduction of the time, using Ompi EZ-fill® from research to industrial scale

Cost Reduction for PharmaCo

Pharmaceutical needs
Thank You for Your Attention!

Further information: ez-fill@stevanatogroup.com