Flexible Aseptic Syringe and Vial Filling for CMO applications

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Pharma Liquid
OsoBio – The Injectables CMO

- OsoBio is a contract manufacturing organization (CMO) that focuses on biologic and pharmaceutical injectable finished drug products
- Located in North Central Albuquerque, NM
- Four dedicated facilities
  - Manufacturing
    - 2 Compounding/Formulation areas (4 suites)
    - 3 Grade A aseptic filling suites
    - 1,230 square feet of lyophilization capacity
  - Warehouse
    - 139,000 square feet warehouse space
    - 2 Vial labeling and packaging lines
    - Cold Storage
  - Laboratories
  - Administration Building
## A Rich History

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>Built by Summa Medical at the current site</td>
<td><img src="image" alt="Adriamycin structure" /></td>
</tr>
<tr>
<td>1988</td>
<td>Purchased by Erbamont and renamed Adria SP</td>
<td><img src="image" alt="Adriamycin structure" /></td>
</tr>
<tr>
<td>1993</td>
<td>Acquired by Pharmacia</td>
<td><img src="image" alt="Pharmacia &amp; Upjohn" /></td>
</tr>
<tr>
<td>1997</td>
<td>MBO executed SP Pharma</td>
<td><img src="image" alt="Pharmacia &amp; Upjohn" /></td>
</tr>
<tr>
<td>2001</td>
<td>SP Pharma becomes part of Cardinal Health’s PTS division</td>
<td><img src="image" alt="Cardinal Health" /></td>
</tr>
<tr>
<td>2007</td>
<td>Cardinal PTS is spun-off, becoming Catalent</td>
<td><img src="image" alt="Catalent" /></td>
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</table>

OsoBio has taken the best practices from its diverse set of prior owners to create a unique platform with superior capabilities and customer service.

Packaging Technology

Manufacturing Services

### Commercial and Clinical Manufacturing
- Able to handle variable commercial batch sizes
- Handle nearly every category of sterile liquid, suspension or lyophilized biological or pharmaceutical product, aseptically filled and/or terminally sterilized
- Specialized capabilities ensure the smallest of projects receives the same attention and expert handling most competitors reserve for only larger customers

### Potent, Cytotoxic Compounds and DEA Scheduled Substance Manufacturing
- First adopter of new international containment guidelines recommended by ISPE – balance quality and operator safety
- Works with nearly every category of biological or pharmaceutical agent
- Excellent regulatory compliance and QA track-record

### Filling & Storage
- Flexibility to handle broad range of volumes and vial sizes
- Three Grade A aseptic filling suites (2 cc to 100 cc vials)
- ICH stability storage

- Aseptic vial filling
- Lyophilization
- Terminal sterilization
- Emulsion
- Medium to small batch manufacturing
- Packaging
- Lab analytics and testing
- Clinical trial manufacturing for phases I – III
Established track-record of cGMP production of complex products

- Liquid fill and lyophilized products
- Highly potent compounds
- Variable batch size capabilities
- Cytotoxics
- Nano-sized particles
- Proteins/Peptides
- Monoclonal antibodies
- Inactivated and attenuated live vaccines
- DEA registered products
- Liposomal suspensions
**Product & Services Overview**

*Strong demand for pre-filled syringes driven by the pursuit of improved compliance, especially in the high growth ‘home-health’ market*

- In 2009, the U.S. pre-filled syringe market generated $740 million of annual sales
- The pre-filled syringe market is expected to grow at a 9% CAGR from 2009-2019

**Growth Drivers:**
- Increasing incidence of long-term diseases which require regular injections (e.g., diabetes, auto-immune diseases such as multiple sclerosis and rheumatoid arthritis)
- Ease of use continues to drive adoption
- Greater medication safety (reducing risk of overdose)
- Managed care pushing adoption as improved compliance controls costs
- Advances in biotechnology generating new therapies that must be injected

**U.S. Pre-Filled Syringe Projections**

<table>
<thead>
<tr>
<th>Year</th>
<th>Injectors</th>
<th>Cartridges</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>$124</td>
<td>$143</td>
<td>$267</td>
</tr>
<tr>
<td>2004</td>
<td>$190</td>
<td>$263</td>
<td>$453</td>
</tr>
<tr>
<td>2009</td>
<td>$455</td>
<td>$285</td>
<td>$740</td>
</tr>
<tr>
<td>2014P</td>
<td>$755</td>
<td>$395</td>
<td>$1,150</td>
</tr>
<tr>
<td>2019P</td>
<td>$1,140</td>
<td>$590</td>
<td>$1,730</td>
</tr>
</tbody>
</table>

Source: VisionGain Research, Greystone Research Associates, Freedonia

*Note: CAGR values for total, injectors, and cartridges are 10%, 8%, and 9% respectively.*
Key Selection Criteria

✈️ Vial Filler (FLC 3080)
  • Integrated machine from vial washing to tray off
  • Improved cGMP compliance (RABS)
    • Reduction in cross contamination
    • Improved occupational safety
    • Reduced interventions
  • Integrated check-weighing & automated fill volume adjustment
  • High throughput

✈️ Syringe Filler (FXS 3100)
  • Filling of nested syringes such as SCF™
  • Small footprint (load & unload from same side)
  • Dispensing flexibility (pump options, vacuum assist, etc.)
  • Adaptable to multiple syringe configurations
  • RABS
Vial filling

Filling Machine

Combi filling station
FXS 3100 – line in RABS, room layout
Clear separation of the clean room areas
ABO 5000 – Automatic Bag Opener

Cutting area (grade C-area)

Transfer to grade A-area
Lengthwise movement for optimized tub transfer into grade A area (option)
Gripper for removing the tub stays in grade A area!

Camera for checking proper lid removal

Transport body: Alu
Cover: Stainless steel (option)
Tests tub opening

In clean room area (ISO class 5)

- Opening with a vacuum suction device and pre-heated rim
- Opening with gripper at room temperature
- Opening with gripper and pre-heated rim
Comparison (suction device 135°C/gripper room temp./gripper 120°C)

- Particle size in µm
- Bosch method
- Particle count

- ≥ 0.3
- ≥ 0.5
- ≥ 5.0

Legend:
- Blue: Suction device 135°C
- Green: Gripper at room temperature
- Red: Gripper at 120°C
Tub opening - detail

Gripper open gripper closed

Packaging Technology
Combi filling station

Rotary valve piston pump
Peristaltic pump
Rolling diaphragm pump
Disposable filling system

PreVAS (pre-Validated, pre-Assembled, pre-Sterilized)
FXS 3100 – Stopper supply
In process checkweigh - detail

- Weighing cells
- Gripper for syringes
Outfeed, reject module

Nest Matrix showing good/bad syringes

Eject lane

Pusher for reject
Mock up for Barrier System - outfeed
Topics for mock-up (selection)

» Positioning and number of gloves
» Media connections
» Stopper supply
» Position of particle and microbiological monitoring
» Handling inside the barrier system: Start up of line, line clearance and trouble shooting

Conclusion: After the mock-up major adaptions of the machinery can be necessary for optimized barrier system use.
Conclusions and outlook

- Flexible filling lines with a small footprint
- Mock up helped with material flow, operation and layout optimization
- Combi filling station allows adaptations for different customer needs and product types
- Disposable filling systems for potent compounds
- In Process Checkweigh for improved yields

Next steps
- Installing FLC within the next weeks
- Syringe line is on the Bosch booth for viewing
Nested syringe filling – Bosch understands