

# Radioactive Materials Container Closure - Technology

Cleanup Technology Roadmap Fourth Meeting:  
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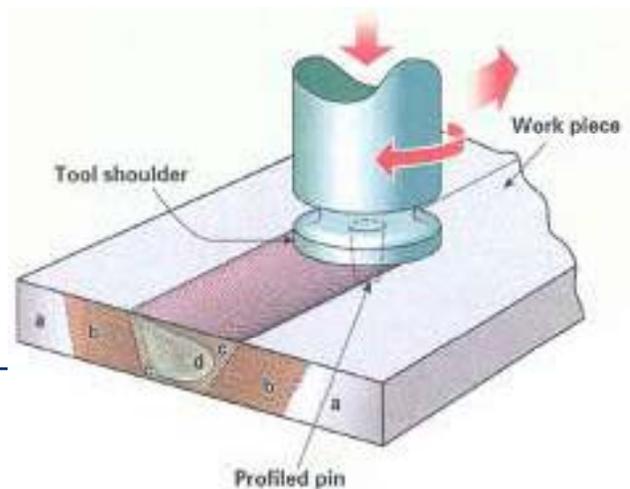
# Radioactive Materials Container Closure

- **Container closure – key element in materials packaging**
- **Fluor Hanford experience with container closure**
  - SNM – Pu 3013 containers
  - SNF – MCO canisters
  - SNF – TRIGA overpacks
- **Current closure-welding process – GTAW**
  - Issues with GTAW (fusion process) include:
    - Quality – solidification, shrinkage and stress
    - Equipment – complex and unreliable
    - Materials – high heat input, degrades container material properties
    - Environmental – welding fumes (CrVI)
    - Efficiency – relatively slow deposition rates
- **New technology needed**



# FSW Technology

- **Friction Stir Welding (FSW) ideal for container closure**
  - High weld quality – Solid state joining process, reduced repair rates
  - Simple machine tool technology – robust equipment, good for remote application
  - Materials friendly – preserves long-term degradation resistance properties
  - Environmentally friendly – No welding fumes, including CrVI
  - Increased closure efficiency – single vs. multi-pass welding
- **Technology at point of implementation**



# Nuclear Materials Packaging Applications

- **DOE SNF and HLW – approx. 25,000 storage containers**
- **Yucca Mountain – approx. 11,000 waste packages**
- **Commercial reactor plants – approx. 7,500 TADs**
- **Future Hanford packaging needs:**
  - Remote-handled TRU waste
  - More SNF
  - Miscellaneous materials for on-site/interim storage
- **Similar packaging needs across the complex**
- **DOE under great pressure to reduce packaging cost and schedule**
- **FSW can significantly improve production efficiencies over the current baseline process**



Courtesy MegaStir

# Fluor Hanford FSW Technology Activities

- **Draft teaming agreement with Battelle for Joining Technology Center**
- **Shared Battelle/Fluor development facility**
- **Battelle-owned gantry-styled FSW machine**
  - Ideal for development and materials evaluation
- **Fluor-owned orbital FSW machine**
  - Ideal for demonstration/qualification on actual container mockups
- **2-year plan to develop/qualify FSW technology**
  - Plan is for closure of SNF and various waste containers
- **2-year plan to obtain ASME code acceptance for FSW technology**
  - Acceptance will allow use of FSW for waste package container closure



Courtesy MegaStir

# Technology Path Forward

- **Fluor Hanford**

- Believes it has the right people, agreements and plans to successfully pursue FSW technology for DOE cleanup, container closure activities
- Implementation of the FSW technology would be accelerated and benefit greatly from access to DOE technical and funding resources
- This effort/initiative would assist cleanup activities throughout the complex, not just at the Hanford Site

- **DOE**

- Should support this technology and initiative

