

# *Milestones in Posiva's FSW development*

starting from year 2014 and ending  
year 2022



# Choosing of the welding method

- Main evaluation criterias in order of importance:
  1. Long-term safety and Posiva VAHA
  2. Production readiness and schedule
  3. NDT and quality assurance
  4. Investment, operation costs and maintenance of the equipment

FSW was chosen as final welding method during early spring 2014 and it was published on March.

It should be noted that EBW fullfills the demands that has been set to the canister weld but FSW gives better safety margin.

Working Report 2014-22

State of the Art of the Welding Method  
for Sealing Spent Nuclear Fuel Canister  
Made of Copper  
Part 1 - FSW

Tero Purhonen  
Posiva Oy

May 2014

Working Reports contain information on work in progress  
or pending completion.

Working Report 2014-21

State of the Art of the Welding Method  
for Sealing Spent Nuclear Fuel Canister  
Made of Copper  
Part 2 - EBW

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Posiva Oy

May 2014

Working Reports contain information on work in progress  
or pending completion.

# Posiva's own preliminary timetable until year 2022

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2122
<b>Welding system</b>										My retirement
Preliminary design of the welding system										
Detailed design of the welding system										
Manufacturing of the welding system										
FAT (factory acceptance tests)										
Installation of the welding system to encapsulation plant										
SAT (site acceptance tests)										
<b>Development work of the welding process cooperation with SKB</b>										
<b>Qualification, training and acceptance</b>										
Operators										
Welding process										
Welding system										
<b>Operations as part of the encapsulation plant and comissioning tests</b>										...
<b>PUSH THE BUTTON</b>										
<b>OPERATION AND WELDING NUCLEAR WASTE CANISTERS</b>										

# Preliminary design of the welding system

- US company Bond technologies Inc. (BTI) is making preliminary design work for Posiva during year 2014.



# Content of the preliminary design work

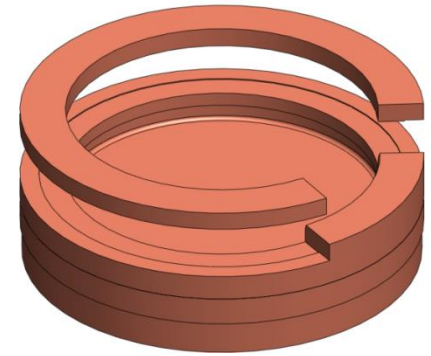
- Concept designs are created, reviewed, optimized, down-selected.
- A Hazard Risk Assessment is performed. Design is optimized in response to results.
- Functional requirements are reviewed, clarified and documented in detail.
- The design specs are divided into mechanical, control, process, system and any other groupings that are relevant to the specific project.
- Update system description as same level as EBW and close outer dimension at the welding room



# Future development projects with SKB

## Years 2014 - 2016

- Optimizing of the lid design for final machining, 200 kg → 80 kg??
- FMEA of the controller and overall welding system ( industrialization)
- Test and develop tools depth controller
- Test different cleaning methods for the welding grooves and implement cleaning station. Options:
  - plasma
  - CO<sub>2</sub>
  - laser
  - Mechanical cleaning
- Improve gas shielding method
- Make verification test for residual stresses by DHD
- Get more experience how does different material properties affect to welding, for example tubes pierce&draw vs. extrusion
- Testing internal and external gas shielding
- Creep testings for "optimized" welds



# Posiva's own development

2014 -

- Update system description of the welding system and gather needed information for encapsulation plant designers
- Start planning of the qualification and acceptance procedure (partly with SKB)

2015-

- Continue as detailed design of the welding system
- Continue planning of the qualification and acceptance
- Work full cooperation with SKB



# Questions for the future and notified matters

- Where to find suitable operators from Finland?
- How to improve finnish knowledge concerning FSW and support universities and companies
- Lack of specified standadrs through the eyes of FSW

Kiitos  
Thank you

