



Prototyping and Innovation Centre
ME Faculty of Technical University in Kosice

IFE Institute for
Energy Technology



DigiDecom 2021 – DIGITAL

Online international workshop focusing on digital transformation, robotics and other game changing trends in nuclear decommissioning



ROBOTIC FRAGMENTATION OF LARGE EQUIPMENT AT DECOMMISSIONING OF NPPs

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Robotic systems from cooperation of Technical University and industry in harsh environment



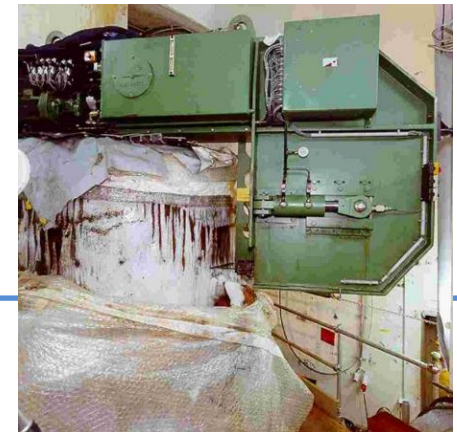


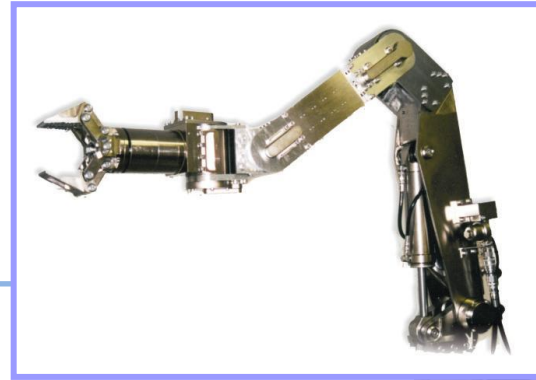
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Segmenting technique	Material	Preferred thickness in mm	Cutting speed	Manual use	Effort to control secondary waste
Flame	Carbon steel	5-600	Fast	Yes	Medium
Flame with powder	Metal	>100	Fast	Yes	High
Thermic lance	Concrete	<1 000	Fast	No	Very high
	Concrete	<2 000	Medium	Yes	Very high
	Metal	>500	Medium	Yes	High
Plasma arc	Metal	<130	Fast	Yes	Medium
EDM	Metal	>10	Slow	No	Low
CAMC	Metal	<200	Fast	No	Medium
Laser	Metal	<10	Fast	Yes	Medium
Sawing	Metal	10-3 000	Medium	Yes	Low
Shearing	Metal	<10	Fast	Yes	Low
Grinding	Metal	<5	Slow	Yes	Medium
	Concrete	<500	Medium	No	High
Diamond wire	Concrete	>300	Medium	No	Medium
	Metal	>50	Slow	No	High
Water jet with abrasives	Metal	<300	Slow	No	Medium
	Concrete	<500	Medium	No	High





Fragmented equipment: **Evaporator**

- max. wall thickness – 30 mm
- Other material – mineral wool, wires, sheets 1mm thick

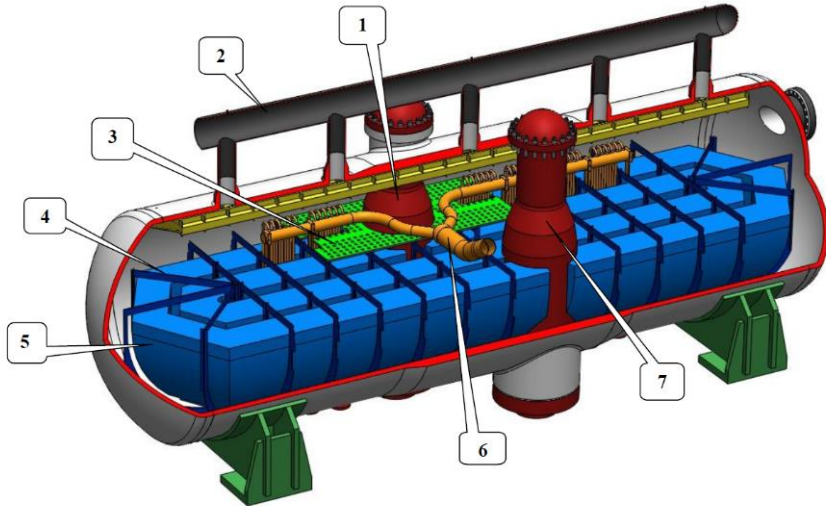
Harsh environment characteristics:

- Radioactivity:

Evaporator room – up to 3 mGy/h

Liquid RAW – up to 10^{11} Bq/dm³- Aerosols from fragmentation operations





Fragmented equipment: **Steam Generator**

- Casing with wall thickness – 75 and 140 mm
- 5500 pipes D16
- Length – 16 m
- Outer diameter – 3200 mm
- Weight – 160 t

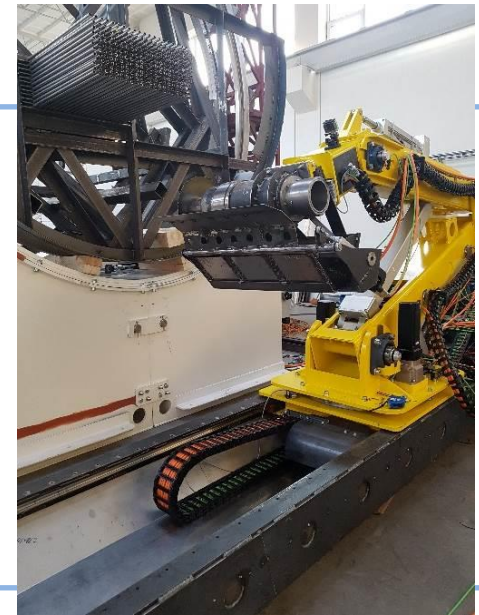
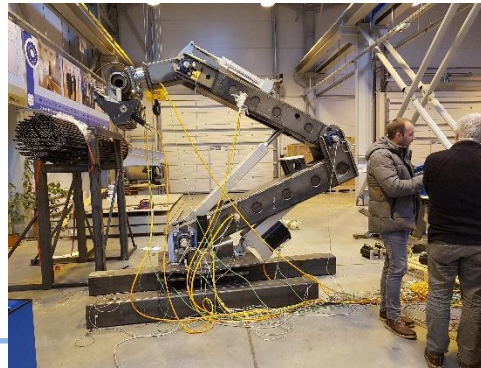
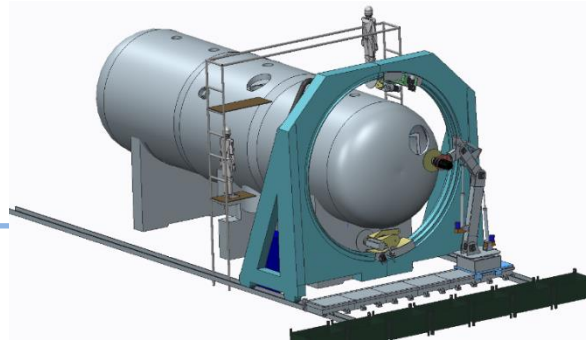
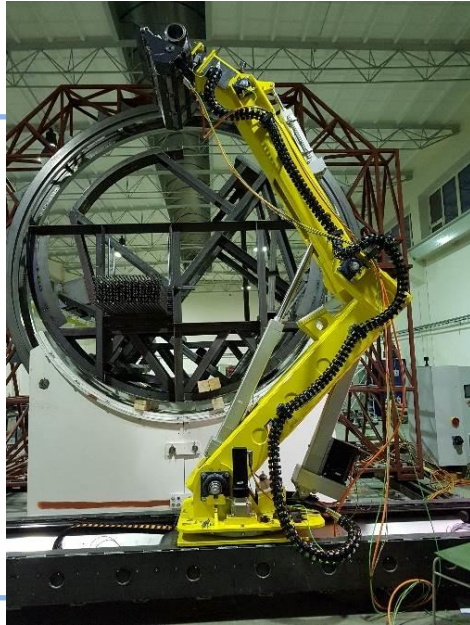
Harsh environment characteristics:

- Radioactivity:
 - up to 6 mGy/h
- Liquid RAW – up to 10^9 Bq/dm³



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Cutting speed:

180mm/min at wall thickness 75mm, using circular milling cutter

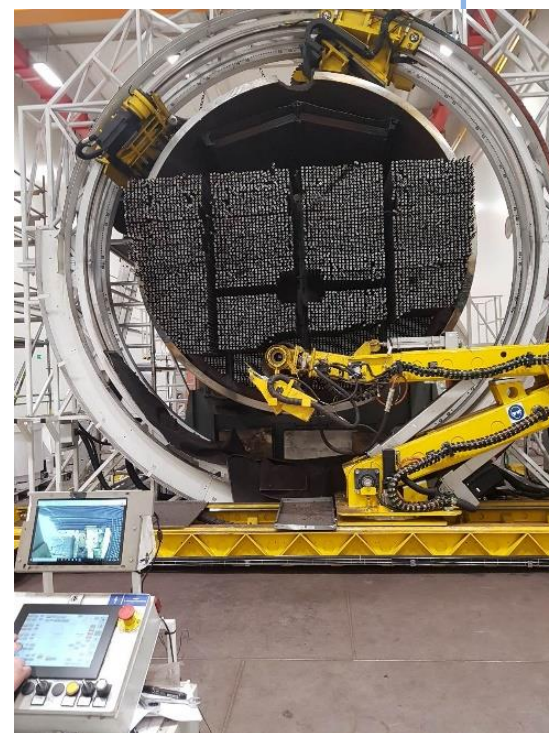
90mm/min at wall thickness 140mm, using circular milling cutter

200mm/min for sawing 5 rows of pipes using circular saw



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Thank you for your attention

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