

# TREATMENT OF RADIOACTIVE SECONDARY WASTE FROM WATERJET ABRASIVE SUSPENSION CUTTING USING SEPARATION TECHNIQUES

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# Project overview

- Wet sieving and magnetic separation of grain mixtures to minimise secondary waste in the dismantling of nuclear facilities (NaMaSK)
- Project partner: Institute for Nuclear Waste Disposal (INE)
- Time duration: 01.01.2021 – 31.12.2023
- Working together with: Dipl.-Ing. Alexander Heneka, Dr.-Ing. Dipl.-Phys. Carla-Olivia Krauß
- Special thanks:

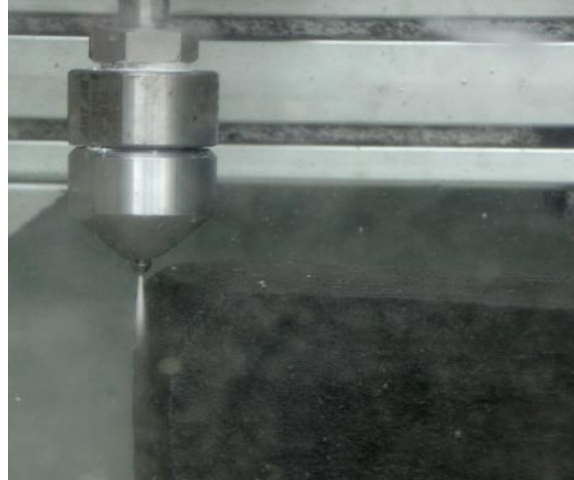


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# Waterjet-Abrasive-Suspension-Cutting (WAS)

WAS nozzle at the start of the cutting process



Used abrasive material and steel particles



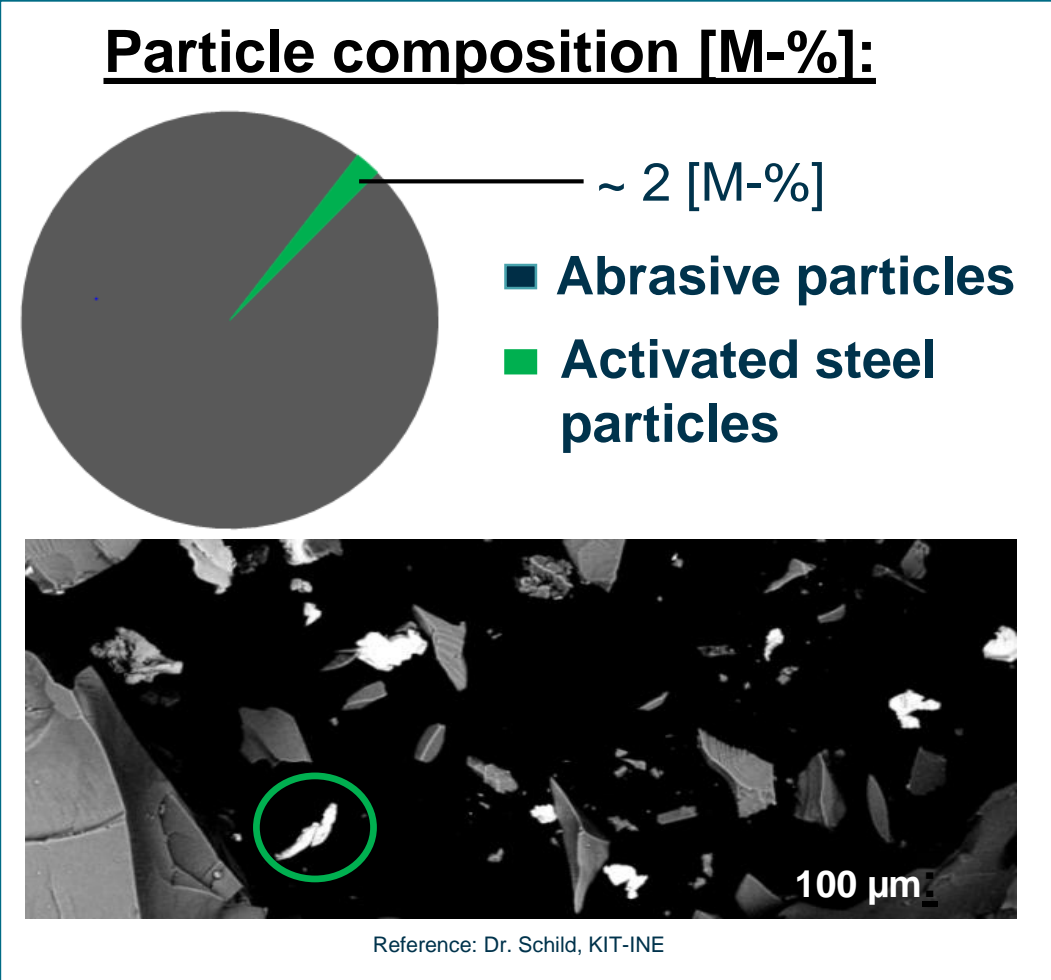
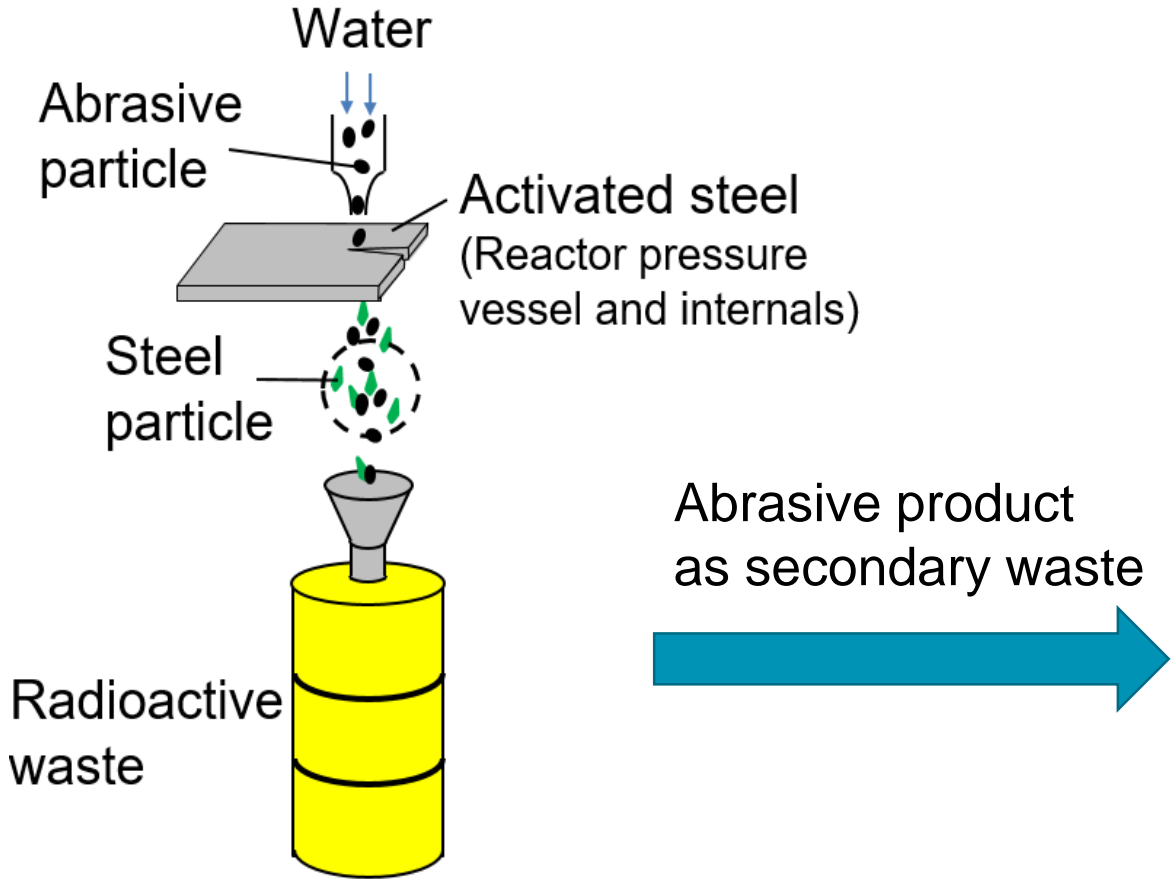
## Technical advantages:

- Remotely-controlled to provide maximum safety for the operating personnel
- No aerosol by-products
- Cutting-capability for a wide variety of materials
- Application also underwater

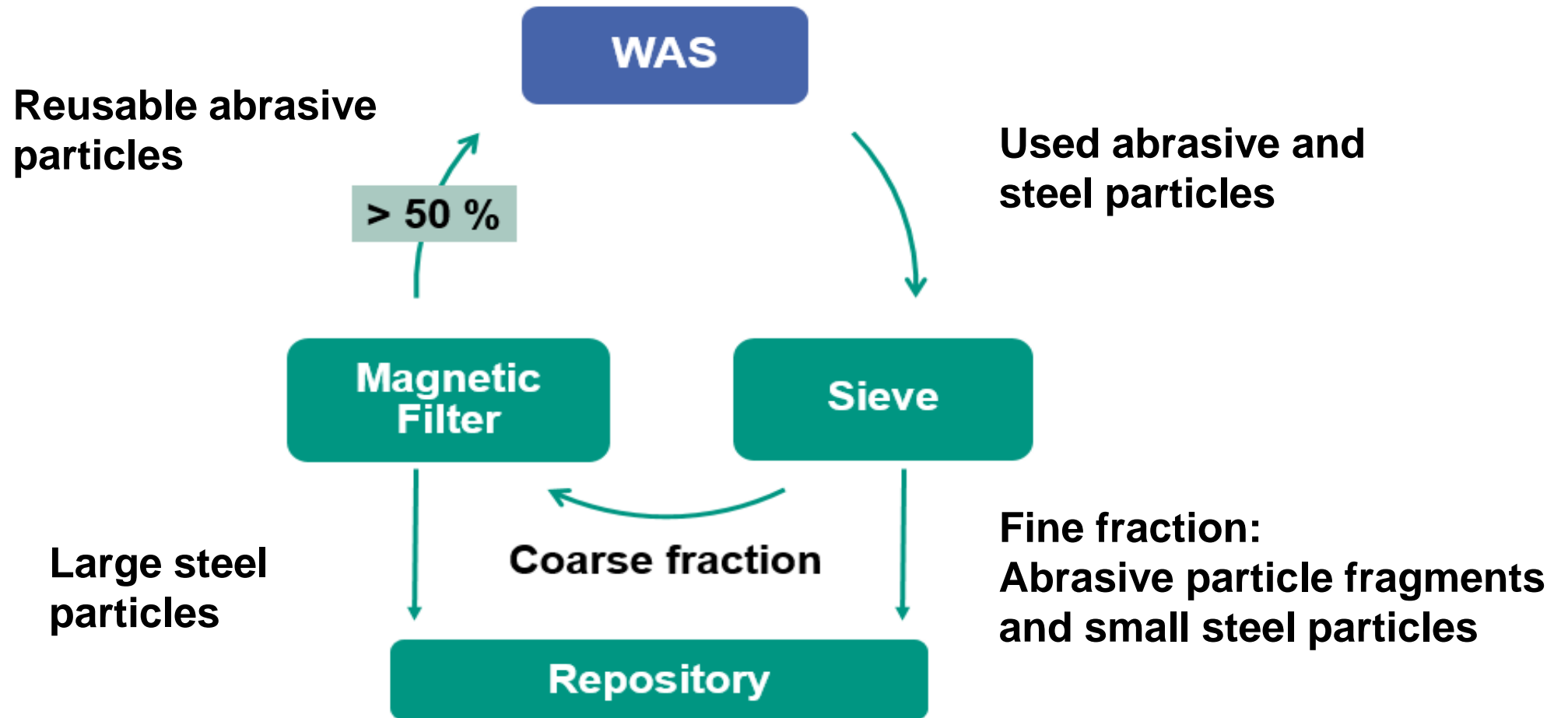
## Downside:

- Large amount of secondary waste

# WAS-Cutting and secondary waste



# Principle of reuse of abrasive and separation process



# Development in abrasive treatment through separation process (Previous project MaSK)

- Separation unit containing sieve and magnetic filter
- Batch process
- **Over 98%** reduction of steel in the reusable abrasive after sieving and magnetic separation

Sieve (enclosed in housing)

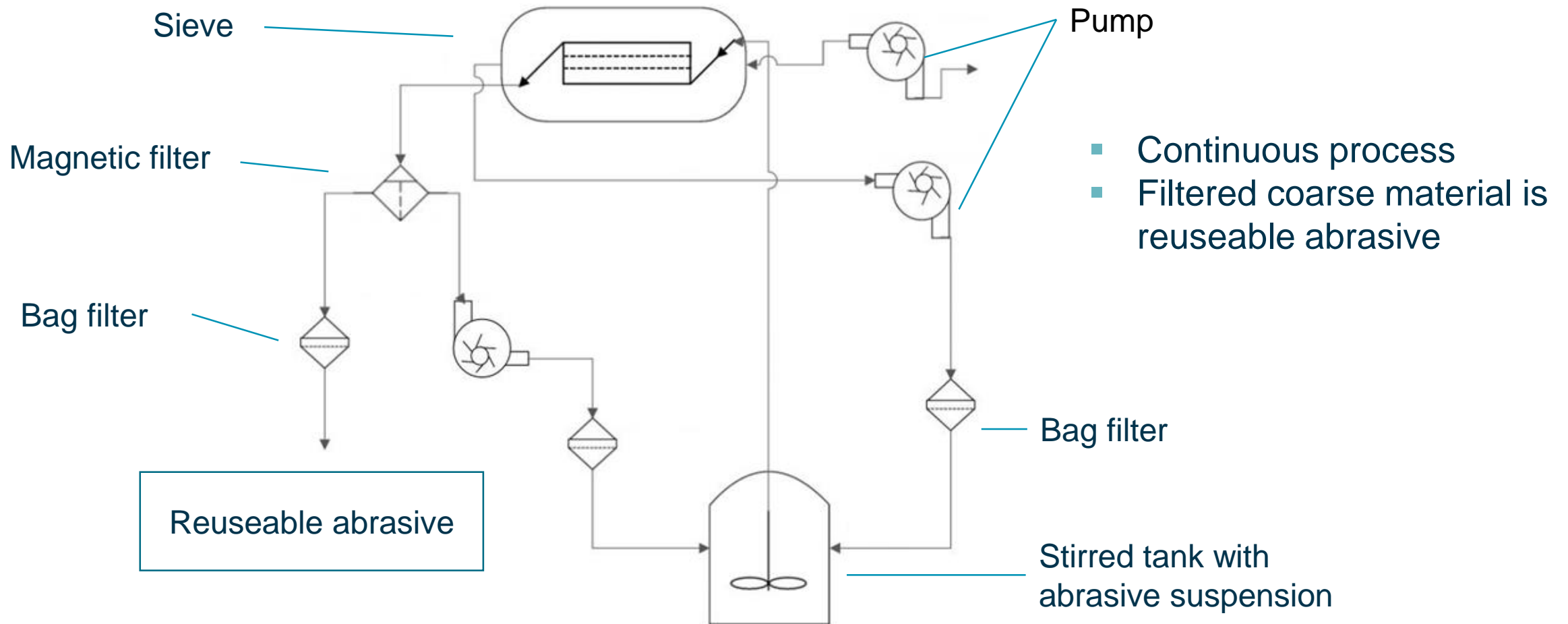
Magnetic filter



Batch process made it challenging to operate in glove-box



# Separation process through wet sieving and magnetic filtration (Project NaMaSK)



# Sieve

- Operation under negative pressure
- Continuous suction of coarse fraction and fine fraction
- Sieving results are good enough for abrasive reuse

Need for improvement:

- Increase in residence time
- Efficient suction of coarse and fine fraction

Coarse fraction

Water level in the sieve housing

Suction of fine fraction





# Magnetic Filter

Structure of magnetic filter:

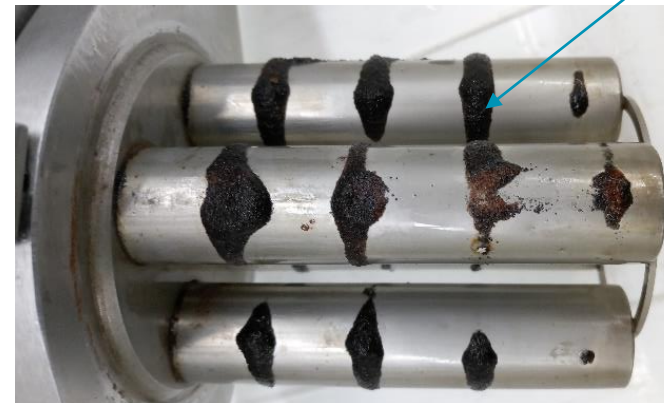
- Permanent magnetic bars in cladding tubes
- Washing the filter after removing the magnets from the cladding tubes

Need for improvement:

- Filter is quickly loaded
- Testing under negative pressure
- Selection of appropriate type of filter



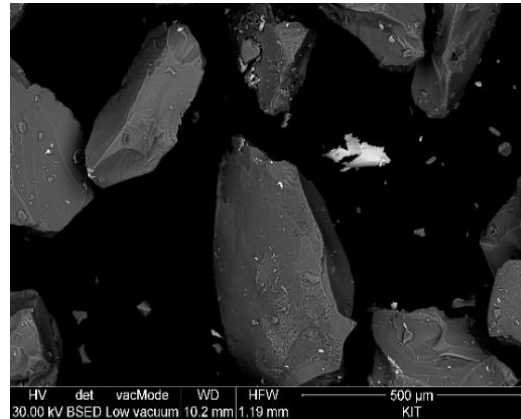
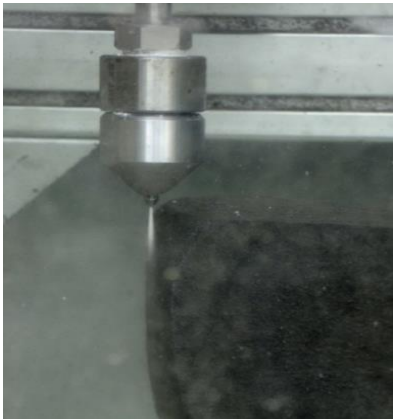
Steel particles



Loaded magnetic filter

# Outlook

- Improvement in the efficiency of sieve and magnetic filter by optimising process parameters
- Continuous and effective suction of coarse and fine particles
- Adaptation of the system for operation in a glove box



# Thank you for your attention

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