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Development and testing of a tool for the decontamination of corners and inner edges on concrete surfaces

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Development and testing of a tool for the decontamination of corners and inner edges on concrete surfaces

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1. State of the Art

- Decontamination of corners, inner edges, gaps and other geometrical discontinuities ist a huge challenge because of the lack of suitable tools.
- These corners and geometrical discontinuities are difficult to access or are located overhead, for example with inner edges and corners on ceilings.
- The combination of using heavy hand operated tools with exhaust systems, on difficult to access areas as well as the forces and vibration of the tools, make the task of decontamination a burden and cause the operators additional physical stress.

Fig.1: Currently used tools A: needle gun DIMU type 34 B [1], B: milling tool enviro C25 [2] and C: concrete grinder enviro ASM 125 [3] (from left to right)

Source: [1] Dieter Muthmann GmbH; https://www.dimu.de/nadelpistole-typ-34-b.html. [Accessed 08 06 2021].
[2] ASUP GmbH; https://asup.info/marken/enviro/enviro-eckfraese-c25. [Accessed 08 06 2021].
[3] ASUP GmbH; https://asup.info/marken/enviro/enviro-hand-schleifmaschine-asm-125. [Accessed 08 06 2021].

2. Aim of the Project

- Development of an innovative, semi-automated demonstrator for dry-mechanical decontamination of corners, edges and geometrical discontinuities in nuclear facilities
- The scientific investigation of experimentally collected performance parameters, such as feed rate, forces and torques, removal depth per operation, surface roughness, vibrations, …

3. Development of the prototypes

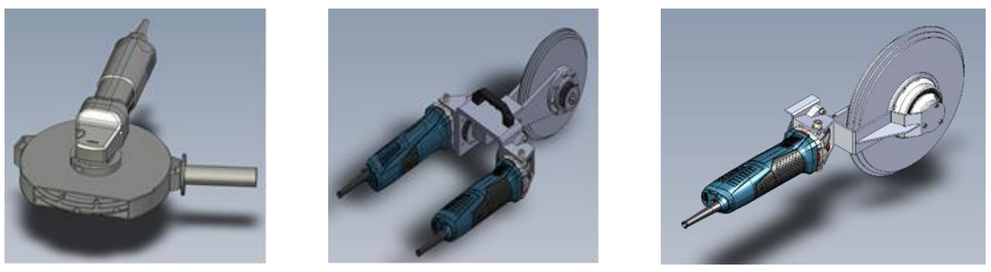

Fig.2: New developed prototypes A, B and C (from left to right)

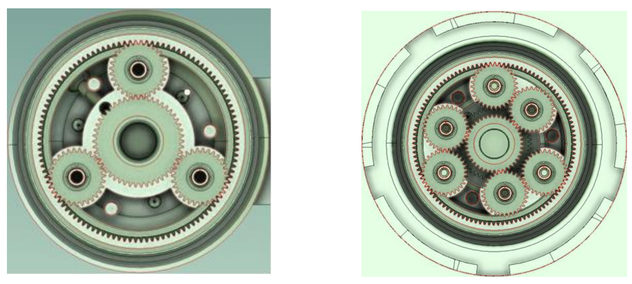

Fig.3: Planetary gear sets for the two diamond discs from the right and left side (left) and for the middle diamond disc (right) in Prototype C

4. Test bench

Fig.4: Test bench (left) and tool holder with prototype B (right)

5. Test results

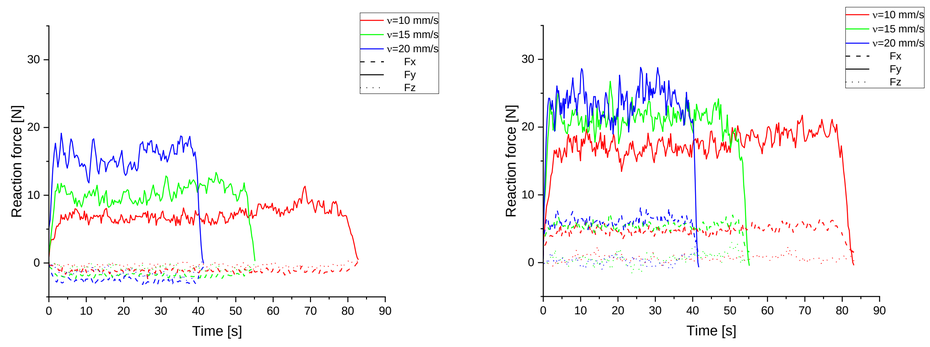

Fig.5: Reaction force in relation of time, feed rate and prototypes (prototype A: left; prototype B: right) with 5 mm removal depth

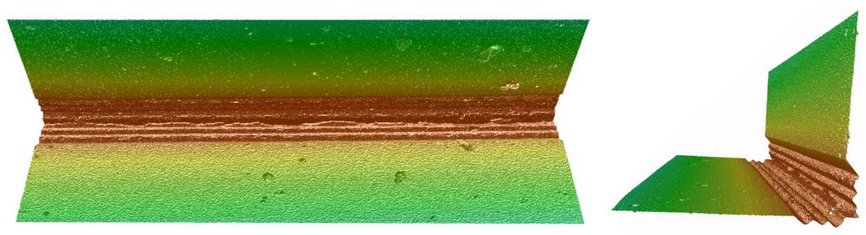

Fig.6: 3D displays for the inner edge after the test with the prototype B

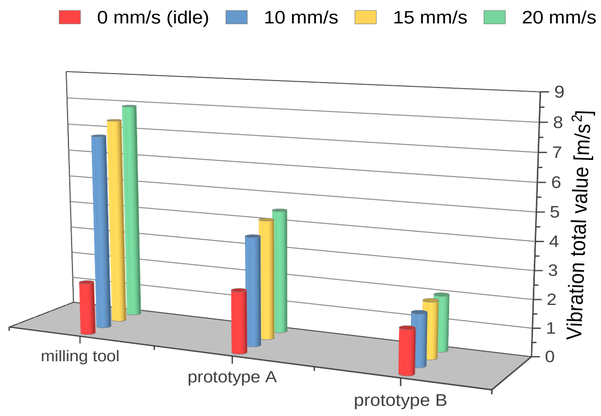

Fig.7: Vibration total value in relation of feed rate and tools

Project Partner

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SAT Kerntechnik GmbH

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