ENHANCING INDUSTRIAL TRAINING: DEVELOPMENT OF A VR GRINDING SIMULATOR FOR MANUFACTURING EDUCATION

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Why grinding, why VR?

Finnish machine shops face the risk of tacit knowledge loss as senior experts retire. The Manufacturing Academy 2.0 project helps companies by collecting knowledge and delivering grinding-process training package, including a VR environment, to accelerate onboarding and upskilling, easing workforce pressures. VR enables safe, repeatable, and cost-efficient practice of complex workflows.

Fig. 1. Co-creation with industry and educators informed content and usability. 163 companies interviewed for the project. The VR-simulator and its interface mirrors a Studer S40 CNC grinder.

Goal & Implementation

Design a workflow-focused grinding simulator that blends authentic industrial content with learner-centred pedagogy to support schools and in-company training.

- Experiential, step-by-step tasks from setup to measurement.
- “Master Button” for on-demand guidance (senior workers, mentors)
- Modular structure for curriculum-embedding (VET & UAS)
- Built with Unreal Engine, optimized for Meta Quest 3
- Development effort ~1.5 person-years coding (2 instructors + 2 students) + several person-months domain knowledge integration across the project.

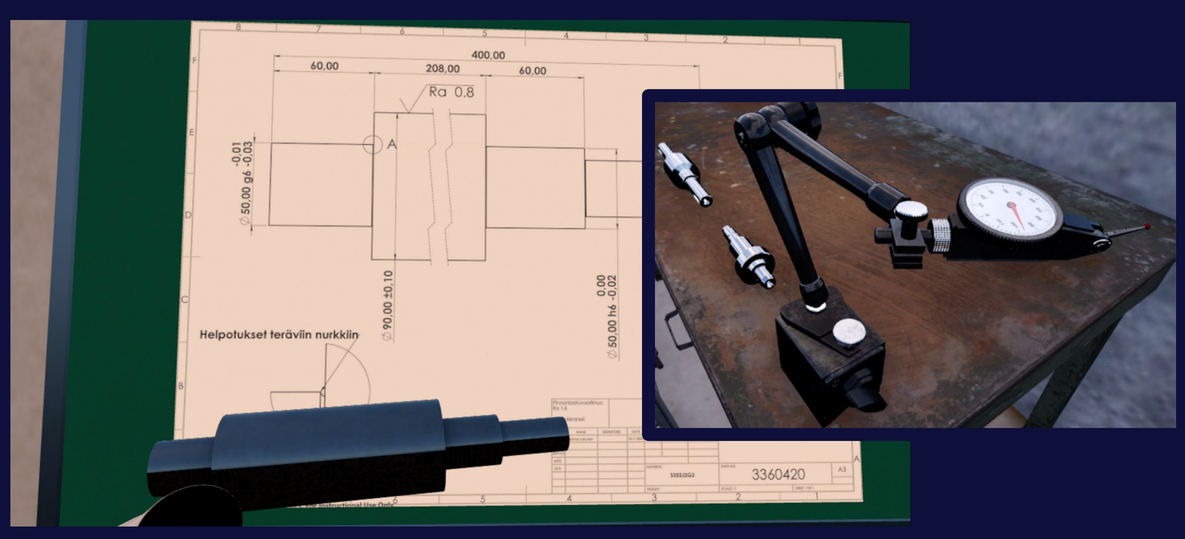

Fig. 2. Real technical drawings, workpieces and measurements anchor tasks in authentic constraints.

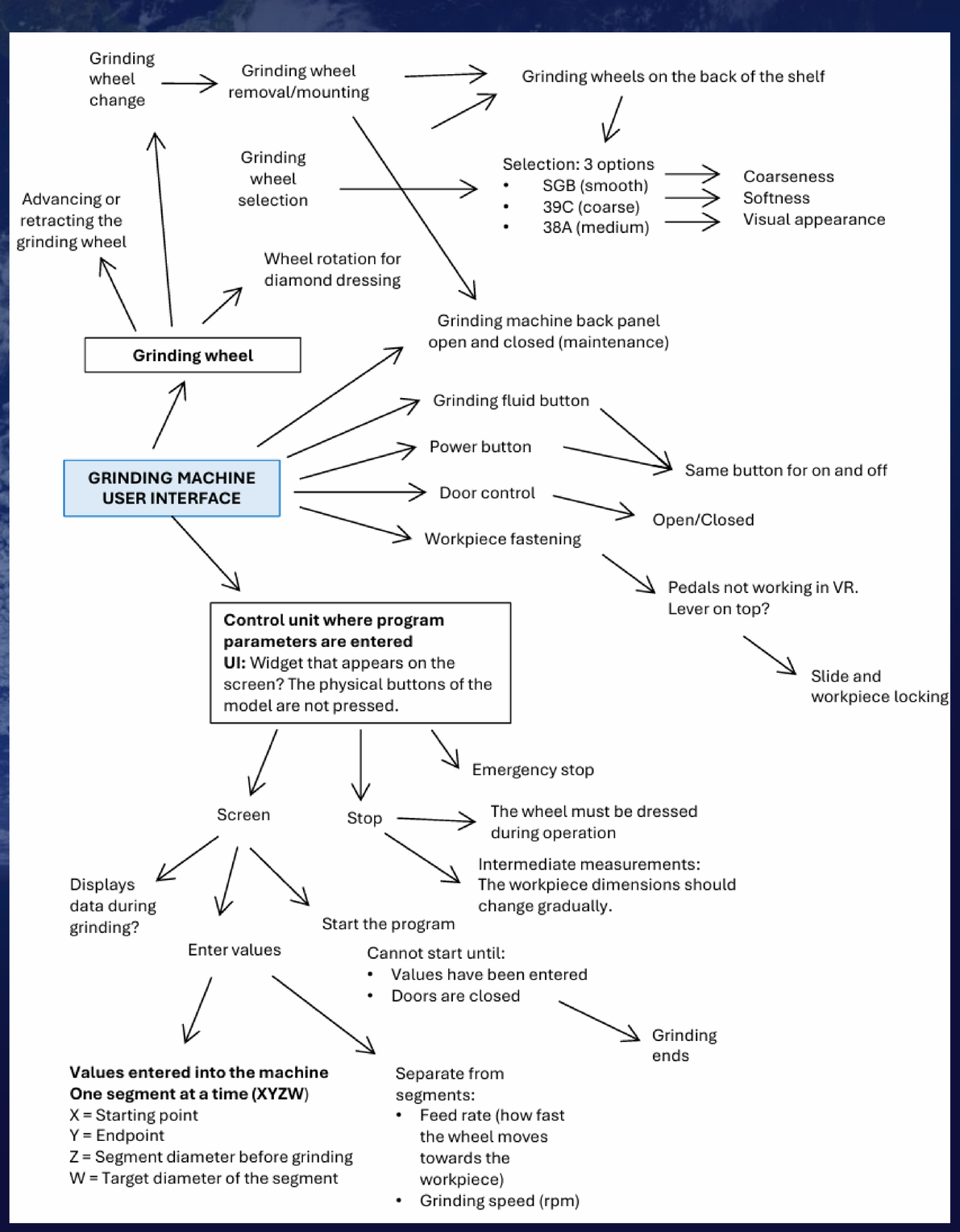

Fig. 3. A conceptual flow chart mapping out the key components and operational sequence of the grinding simulator.

Next steps

Intended for Tampere University of Applied Sciences, SASKY education association and three additional schools, and in-company onboarding/upskilling. Supports learning via modular tasks and self-paced progression; assessment (performance logs, competency checks) to be added. After company pilots, user feedback will be collected from students and professional grinders to evaluate usability, learning effectiveness and authenticity.

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https://projects.tuni.fi/konepajaakatemia/in-english/

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