



1 *Virtual model of the available HMI platform as basis for investigations*

2 *Examination of human behavior using a VR system for granting safety and process stability*

## HUMAN-MACHINE-INTERACTION: SIMULATION, VIRTUALITY AND REALITY

### Planning and evaluation of Human-Machine-Interaction (HMI)

Many companies consider the cooperation between humans and robots to be a great potential for increasing production and for making it more flexible. An extensive process of planning and development is required for realizing a safe and efficient HMI application.

During this stage, various approaches are developed and evaluated according to specific criteria. Fraunhofer IWU offers deep knowledge regarding methodology for evaluating feasibility and safety of HMI applications. By comparing the various concept variants, it is possible to estimate the innovation potential.

### Simulation and examination of the human behavior

**Simulation:** Using a simulation environment, the developed concepts are tested by applying criteria relevant for safety and processes. By modeling the walking paths and movements, the probability of a collision during operation is minimized. A preliminary risk assessment takes place.

**Virtuality:** By using a VR system, human behavior in specific situations can be examined beforehand. This almost completely excludes the danger of human injury caused by the robot.

**Reality:** An innovative HMI platform is available at Fraunhofer IWU for testing in a real industry-oriented environment. The individual concepts can be partially implemented and validated beforehand.

#### Fraunhofer Institute for Machine Tools and Forming Technology IWU

Reichenhainer Strasse 88  
09126 Chemnitz, Germany

#### Department Robotics

Dr.-Ing. Mohamad Bdiwi  
Phone +49 371 5397-1658  
mohamad.bdiwi@iwu.fraunhofer.de

[www.iwu.fraunhofer.de](http://www.iwu.fraunhofer.de)