



# Assisting the Worker with optical 3D Scene Analysis

## Manual assembly in the age of Industry 4.0

The trend in Industry 4.0 is towards smaller batch sizes, ever-more personalized products and shorter production cycles. Since this makes automation solutions unprofitable for many products, the employee has to carry out the necessary work tasks manually. The worker is under high pressure to implement requirements with as few errors as possible. Very few individual adjustments are made to the material flow, the process sequence or knowledge and skills of the employee. In addition, quality control is usually only performed out after completion of the manual assembly steps on the processed part or product component. Any errors result in higher reject rates or avoidable additional work.

Training new employees during busy periods is also a recurring problem, as this ties up the capacities of experienced employees and creates more work.

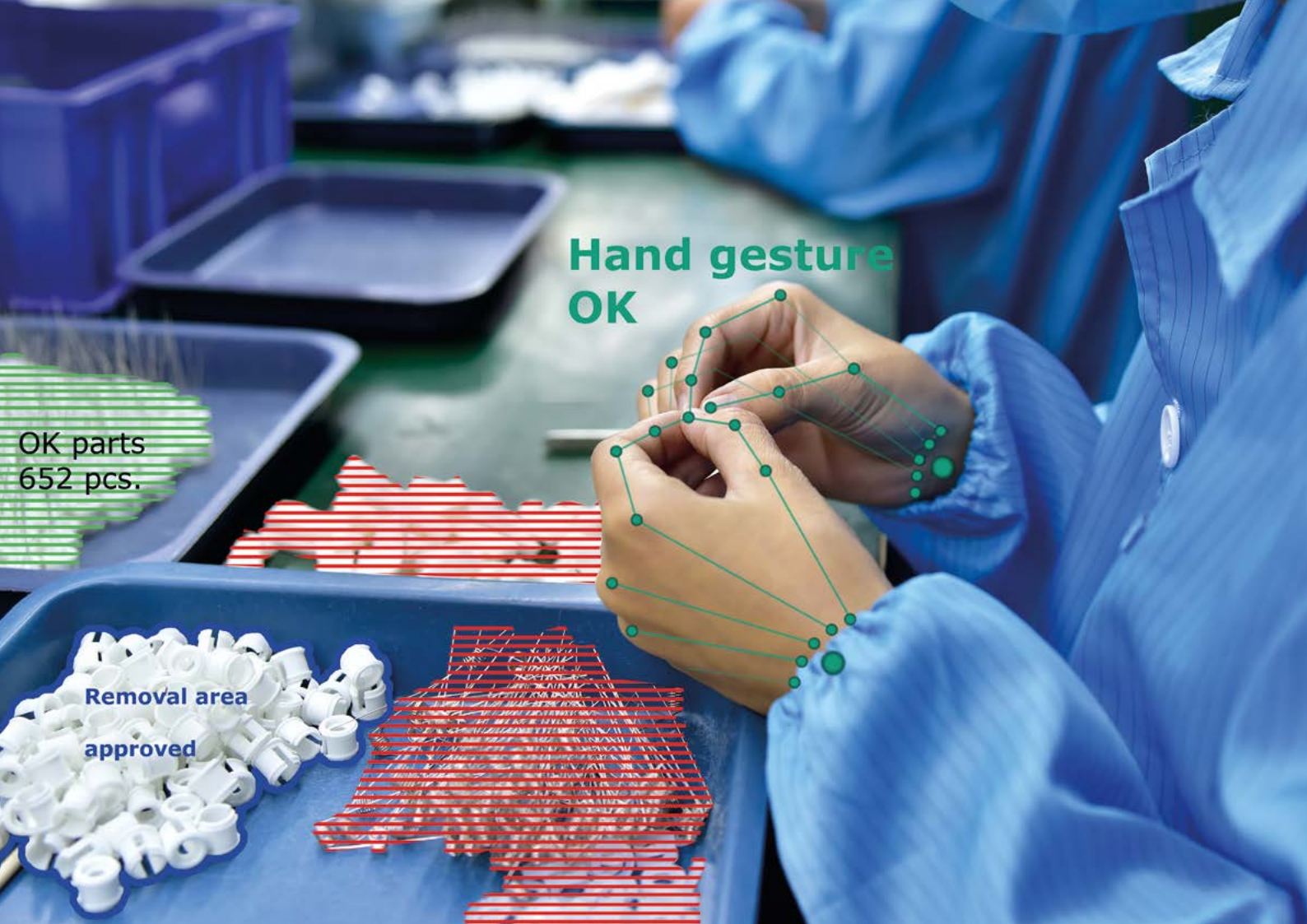
## Acquisition and analysis of the complete workspace

The rapid development of state-of-the-art 3D sensors and associated machine learning methods in recent years has made it possible to visually capture every aspect of an assembly environment. This includes all components and objects, the respective workers with their movements and work steps, as well as the entire workspace. A range of suitable sensors is deployed to do

this. By merging the resulting data with the aid of software, the complete scene and all its contexts can be recorded and analyzed in full. This includes static aspects, such as the positions of machines and workpiece boxes, as well as dynamic components of the scene, like tracking and analyzing process sequences and movements of the objects and people involved.

## Direct quality control and assembly support through 3D scene analysis

The work scene that has been visually captured can be used in many ways. For example, process and motion sequences can be assessed to verify that instructions are carried out correctly. If a discrepancy is detected, notification of this is sent immediately via appropriate communication channels, e.g. visual or acoustic signals, tablet messages or augmented reality applications. Thanks to continuous object tracking, relevant measurement parameters and characteristics can be determined even during the assembly process. Interaction and control via gestures is simple to implement and can be mastered by employees regardless of their technical and language skills. The manual assembly process is automatically documented by logging the individual scene. Furthermore, it is no problem to link the various workstations directly to one another if desired. All this information can also be used to train new employees, which minimizes the workload on experienced employees. The visual recording of all elements involved and the ability to take



Scene analysis of a manual assembly process.

immediate interaction and derive appropriate measures offer workers optimum support as they assemble their products. This is achieved without losing sight of workers' personal rights, because they decide whether the data and analysis configuration can be accessed. Work processes are thus supported by a state-of-the-art approach which enables optimum production results to be attained.

### Our services

We provide advanced tailored solutions for assisting the worker with assembly processes, error control or for imparting skills in learning processes.

By taking a worker-centered approach, i.e., involving the employee directly in creating the assistance, we can conduct case-by-case user needs assessments and implement a machine learning training dataset tailored to your problem, or prepare a digital assembly manual.

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