The following is based on the article "Menschen funktionieren nicht wie Roboter" which first appeared in the German magazine Technical Review, May 2011.

Humans Don't Work Like Robots

Human learning and performance abilities vary greatly from person to person, and a worker's ability to concentrate on a job is subject to any number of fluctuations.

So how can you be sure an exact set of manual work procedures are completed in the proper sequence? To reliably ensure quality assurance at manual workstations, the LPS QualityAssist from Sarissa in Germany is the answer.

LPS stands for Local Positioning System and it operates similar to Global Positioning System (GPS), except the receiver doesn't pick up signals from satellites in space, but rather from ultrasonic transmitters worn on the workers' hands.

A scale determines the total weight of some packaged parts and confers with the LPS PC for comparison with a target value. If the packing sequence is correct, the LPS automatically displays the next step without the need for any response.

Managing Director Volker Jauch of Sarissa GmbH promises, "The LPS immediately detects whether any work steps or installation instructions have been overlooked or ignored, and it alerts the employee. The LPS virtually eliminates sorting and assembly errors."

The LPS supports continuous improvement processes according to the Japanese principles of Kaizen and Poka Yoke. Kaizen is a Japanese management philosophy of change and improvement. Poka Yoke is the Japanese zero-mistake-strategy of random error avoidance by using simple technical methods or procedures.

"The LPS not only monitors…it guides…and instructs the employee with multimedia instructions"

The LPS can be installed at any work station where correct assembly or sorting sequences are essential to ensuring 100% quality. The LPS not only monitors each movement of the hands within 1mm, it also reliably guides the employee through clear textual, multimedia and even acoustic instructions, even through very complex processing steps. This accelerates the training of new employees, and makes employing temporary help and backup workers much easier.

"Reliably guides the employee, even through very complex processing steps"

During the training phase the QualityAssist can be used as the employee's trainer, as the system works like an electronic instructor. First, the correct work sequences are programmed into the LPS, after which it is then able to follow the worker's steps and point out any errors. If there are serious errors, the system forces those faulty products to be discarded. As long as the worker makes no mistakes, he or she will never notice the presence of the QualityAssist "looking over their shoulder" as it interferes only if irregularities arise.

Just a Little Bit of Hardware

The heart of the system is a Windows-7 based PC and a large (12") color touchscreen. The PC is connected to the receiver by USB, and the whole system can be quickly installed at any work station. The PC receives ultrasonic signals from ultrasonic transmitters, which are worn on the employee's hands. The transmitters are small and weigh only a few grams. Within milliseconds, the transmitters begin sending their ultrasonic signals, which are undetectable and physiologically harmless to humans.

"Accurate assembly steps are indicated either acoustically or visually while unintended movements are reported as errors"

The receiver is basically a microphone which picks up the ultrasonic signals of the transmitters. The effective reception range can be described as a parabola with a maximum radius of three meters. The movements of the transmitters in the reception area are passed along to the program in real time and compared to the previously defined sequence of assembly steps. Accurate assembly steps are indicated either acoustically or visually, while unintended movements are reported as errors. The 3D system detects positions with a resolution of up to 0.1mm. In normal usage an accuracy of +/- 0.1 to 2.0 mm can be expected.

Configuring the system requires only two steps: First the workplace needs to be defined. This includes the work areas that need to be monitored, such as assembly positions on a work bench, or remote positions such as material containers or parts boxes, as well as various tool positions. Next, the assembly sequence needs to be specified, and the preset sequence programmed step by step into the PC.

Once programs have been created they can be modified at any time, or they can be transferred to other assembly lines which have the same configuration. Access to these settings and functions are password protected, as they should be.

To get started, the employee simply activates the start button on the touch screen, and everything else runs automatically.

The software is sleekly programmed and to a large extent self-explanatory. The system configuration and data input is organized into clearly structured and user-friendly input windows. Incorporating designs and pictures into the sequential program is easy, as is the use of the Input/Output channels, as well as setting up data exchange with external devices, for example, scales or printers.

The ultrasonic transmitters are small and lightweight, sending ultrasonic signals within milliseconds. The signals are undetectable and physiologically harmless to humans.

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