

Guided Operator Solutions enhance quality control process for air conditioning manufacturer

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The need to maximise quality, productivity and efficiency on production lines and in manual assembly cells is a challenge faced by much of manufacturing industry. It has been met at Mitsubishi Electric Air Conditioning Europe by employing Guided Operator Solutions from sister company Mitsubishi Electric, Factory Automation.

Based in Livingston, Scotland, Mitsubishi Electric Air Conditioning Europe wanted to enhance quality control processes by reducing the opportunity for picking mistakes in its production cells where several different products are assembled. In addition, there was a desire to increase productivity by helping workers to quickly adapt to new assembly processes.

The answer came from Mitsubishi Electric, Factory Automation with its Guided Operator Solutions, a versatile solution that uses a PLC to control parts picking sequences using lights, doors, terminals and touch sensors. This is coupled with high definition HMI screens that guide operators through live assembly tasks.

The HMI screens have been used to replace a system of complex product cards that were previously used for work instructions. As part of the integrated Guided Operator Solutions, the screens allow for dynamic

instructions and prompts to be added to a pick sequence that ensures the correct part is selected.

Production section manager, Mitsubishi Electric Air Conditioning Plant, Audrey Smith explained: “We operate semi-automated assembly cells, each of which offers the facility to assemble a number of different products. Due to the fact that we make several products in one work space there is a high potential for operator error. To combat this, operators have to have a high level of training in order to work on the assembly line.” The high level of training required in the past also added to the overall cost of production, and so was an obvious target for improvement.

Greg Hookings, Senior Manager Strategic Business Development EMEA for Factory Automation at Mitsubishi Electric Europe added: “The complexity of the products was clearly a challenge for the operators and was resulting in picking mistakes. This often resulted in re-work of products, which significantly reduced the efficiency of the assembly process. Furthermore the process to identify which components were required in different air conditioning systems was also time consuming.” This challenge was solved by implementing Mitsubishi Electric, Factory Automation Guided Operator Solutions.

“Guided Operator Solutions were first installed in a cell assembling modules for heating and cooling units,” says Smith. “Initially it was used only on the first two stages of the assembly operation, so that we could assess the benefits and see if it was worth moving forwards with.”

For the trial installation a pick-to-light system with visual indicators on the parts bins was combined with light curtains or touch switches for pick confirmation. Mechanised doors that opened in sequence were also used to create a physical barrier to prevent wrong part selection. The effectiveness of each combination was compared and the results

combined with user preferences in order to gauge overall effectiveness for different component bins and process sequences.

The variety of operator guidance devices ensured that a wide range of picking scenarios could be accommodated and tested. Each assembly station was then equipped with the most effective solution, improving quality, while also making the operator more productive and the production line more efficient.

The installation built for the air conditioning plant was commissioned around Mitsubishi Electric MELSEC Q series modular PLCs and GOT2000 HMI operator terminals, all connected over a dedicated network.

“From an operator’s point of view, rather than complex paper based assembly instructions, the HMI now presents a set of clearly defined work instructions. It gives the operator a sequential visual indication of the parts to be picked for building each assembly, and their quantities,” explains Smith. “Although the work instructions for the assembly of these products are complex and detailed, the installation has had an immediate impact on the assembly cells. Picking has not only become inherently more reliable and error-free, but also much faster. Quality and overall productivity have both shown a marked improvement.”

Importantly, the application has also addressed the operator training challenge at the plant. The terminals now guide operators to the correct parts and the GOT HMI shows clear images of the product to be assembled. This has reduced the resource required for training, whilst actually improving the time taken to learn each process.

Another key benefit for the air conditioning plant was the excellent integration of the hardware. The PLC and the HMI seamlessly integrated with the other components in the system, while providing the potential to

link to wider automation systems at the plant.

This will enable new product specifications to be sent directly to the production cells and an inventory report to be sent back for logistical planning. Further, connectivity to other guided assembly cells throughout the production facility in the future could also allow for workflow information to be passed downstream.

“The success of the trial on the first two stages of the assembly process has been dramatic,” Smith concludes. “Compared to the original process, we have seen a huge enhancement in the quality control process, picking accuracy, assembly speed and consistency. We are now looking at implementing similar systems on all six stages of the assembly line, plus the parts loading process. We are passionate about making improvements and the benefits of this technology are now really showing their worth.

As part of the introduction of Guided Operator Solutions, Mitsubishi Electric Europe has produced a video that explains the benefits in terms of quality, assembly time, accuracy and efficiency.

Image captions:



Picture 1: The simple but effective Guided Operator Solutions from Mitsubishi Electric, Factory Automation ensures the correct part is selected.

[Source: Mitsubishi Europe Electric B.V.]



Picture 2: The variety of operator guidance devices ensured that a wide range of picking scenarios could be accommodated and tested.

[Source: Mitsubishi Europe Electric B.V.]



Picture 3: Each assembly station was then equipped with the most effective solution, improving quality, while also making the operator more productive and the production line more efficient.

[Source: Mitsubishi Europe Electric B.V.]



Picture 4: The complexity of the products presented a challenge for the operators when it came to learning which products were needed in the assembly of different air conditioning systems.

[Source: Mitsubishi Europe Electric B.V.]



Picture 5: Audrey Smith, Production Section Manager at Mitsubishi Electric Air Conditioning Plant: “Compared to the original process, we have seen a huge enhancement in the quality control process, picking accuracy, assembly speed and consistency.”

[Source: Mitsubishi Europe Electric B.V.]



Picture 6: Greg Hookings, Senior Manager Strategic Business Development EMEA for Factory Automation at Mitsubishi Electric Europe: “The complexity of the products was clearly a challenge for the operators. The Guided Operator Solutions solve that problem comprehensively.”

[Source: Mitsubishi Electric B.V.]



Customer
Mitsubishi Electric Air Conditioning Systems Europe
Livingston Production Facility - Scotland, UK

Movie: There is a movie available about this application in Scotland, viewers can see the Guided Operator Solutions in action and hear directly from Audrey Smith and Greg Hookings.

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Note to Editor: if you would like the text in another language please contact Philip Howe at DMA Europa – philip@dmaeuropa.com.

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With around 135,000 employees the company recorded consolidated group sales of 38.8 billion US Dollars* in the fiscal year ended March 31, 2016.

Our sales offices, research & development centres and manufacturing plants are located in over 30 countries.

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The role of Industrial Automation – Irish Branch is to manage sales, service and support across its network of local distributors throughout Ireland

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