Increasing production volumes call for an ever greater number of automated solutions. For many industrial applications, manual production in the required cycle time is not stable or is susceptible to significant quality fluctuations. However, the acquisition of production systems is a major investment that can only be justified by high volumes or exceptional quality features. Automated systems from Infotech, based at Solothurn in Switzerland, demonstrate that it is possible to reduce or almost completely eliminate these quality fluctuations. The company specialises in the areas of dispensing, component placement and assembly processes (Figure 1). A key advantage is that the hardware and application software is flexible and can be tailored to specific customer needs.

For micro-dispensing, the new ›IC-900‹ dispensing cell (Figure 2) satisfies an increasingly strong market demand for precision and reliability. A few years ago, the ›IP-500‹ desktop dispenser was successfully launched in the market (Figure 3). This product is fre-
Figures: Infotech

quently used as a process development system or in production of small volumes. One advantage of this development system is that all the modules used can be integrated into the dispensing cell. Transferring programs with the calculated dispensing parameters is also possible with no problems.

**Precise axis control and linear motors in the gantry axes**

The integrated controller from a Swiss supplier is designed for extreme accuracy. The gantry axes are equipped with linear motors and encoders. The repeat accuracy is specified at 10 µm at 3 Sigma, while the resolution of the main axis is 0.2 µm. When moving to a defined position, it is crucial that the axis movement is controlled. The axis parameters are adapted and optimised for the specific requirement or task. The control concept also allows synchronised axis movements.

**Image processing for precise positioning**

Exact positioning of an axis is only worth half as much if the dispensing position is only known from CAD data. As a result, image processing software from Cognex is used to identify contours, lines and dots. The cameras are connected to the PC by Gigabit Ethernet. The image processing software is fully integrated into the Infotech user interface. To operate the vision process, the familiar Cognex interface is displayed, while the entire calculation of coordinates is carried out in the Infotech software. This enables register marks and local structures to be identified. If the dimension of the register mark is larger than the field of view (FOV) of the camera, it is possible to use a ›multi-FOV‹ feature. In this case, up to four positions at the register mark can be viewed as a reference. The software automatically calculates back to the CAD position. Various lighting, FOV sizes and image resolutions are available depending on the requirements of the application. The camera is not only needed to determine the precise dispensing or component placement positions, but also for calibration of dispensing systems and vacuum pick-up tools.

**User-friendly application software**

Programming of the system has been designed to be very user-friendly. No CNC, PLC or other programming knowledge is required. All dispensing or component placement positions can be reached with the camera on the dispensing head, and can learnt by the system. Auxiliary tools are also available for creating position patterns, and it is even possible to import CAD data. At first glance, implementation of a new program seems relatively complex, although a closer look quickly reveals the advantages. The components and the entire process lists are stored as a library in a database. This enables the component to be assigned to any program. One advantage of this programming approach is that should any components change, it is only necessary to edit the component itself and not all of the individual programs in which it is utilised. A graphical user interface is provided for entry and representation of dispensing patterns, which can be integrated into a new or existing program with just a few mouse clicks. The standard Gerber format is used to import CAD dispensing patterns.
Calibration of the dispensing system

In packaging technology, dispensing is a central process. In most situations, the biggest challenge is accuracy. The main feature of the Infotech system is the XY gantry robot. The robot head is attached to the X-axis. Depending on the application, this can be fitted with multiple Z-axes.

As described above, the dispensing head camera is used to identify the exact dispensing position. The camera is also used for calibration of the dispensing system (Figure 4). When calibrating the X and Y offset, the dispensed dots are calibrated instead of the needle. For very precise applications, it is possible to dispense multiple dots onto a transparent film. The X and Y offset is calculated using statistical filters based on the dot positions. An upward-pointing tactile probe is available for calibration of the needle length or height of the nozzle.

Process reliability

Process reliability is becoming increasingly important in dispensing. Infotech has developed various process control tools in both the hardware and the software. Cleaning of the dispensing needle or the dispensing nozzle is performed fully automatically as part of the program. Manual and continuous cleaning of the entire dispensing system is an important aspect of precise and repeatable dispensing. With the preventive maintenance integrated into the software, the exact time when cleaning is required can be defined. If necessary, the X, Y and Z offset calibration is performed automatically during the process. It is also possible to use the dispensing system for dispensing onto process control scales. The pressure is adjusted dynamically based on the measured weight.

Changes in viscosity during the pot life are a frequent occurrence for many dispensing media. A special software solution has been developed to automatically adjust the dispensing pressure to take account of possible changes in the viscosity of the dispensing medium. Inspection of the dispensing result is particularly interesting. This can be a simple presence check or verification of the dot or line size. The results can be saved as a log file or processed using traceability software. A link to a line controller is also available as an option.

3D dispensing and component matrix

In dispensing developments, a wide variety of different dispensing systems are required, including...
time/pressure, precision screw dispensers, jet dispensing systems and piston dispensers. Because of this demand, a universal interface has been developed for easy changing of pneumatic and electrical connections on the different dispensing systems. Mechanically, the valves can be changed with just a few simple actions (Figure 5).

The demand for 3D or spatial dispensing is constantly increasing. To meet the needs of the market, a pivoting and rotating station has been developed. The dispensing system is permanently attached to a Z-axis of the robot head. Unlike other suppliers, the Z-axis is not pivoted and rotated; it is the substrate on the pivoting and rotating station. The key here is that all axes can be synchronised (Figure 6).

Infotech does not supply standard machines from a catalogue. Every system is a customised design based on what we call the component matrix - a modular system. If it is not possible to provide the customer with a solution using existing standard components, special modules are developed and implemented. The component matrix and the modular design of the system provide the exceptional flexibility needed.

**AUTHOR**

BSc-Ing. SIMON HOFER is a Sales Engineer at Infotech in Solothurn/Switzerland; simon.hofer@infotech-automation.com

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1/3 Eigenanzeige oder Füller?
Bilder kann ich nicht größer ziehen