In order to achieve a high placement precision when assembling PCBs, it is necessary to fix the electronic components prior to the soldering process. Modern bonding technology has proven to be up to the task, providing fast-curing adhesives that can meet the highest requirements in terms of functionality and reliability in various PCB applications.

The PCB is mainly used as substrate for the mechanical fixing and electronic connection of different components. The PCB’s conductive layers (e.g. made of Cu, Ni/au, Sb, Ag etc.) applied to an insulating material (e.g. made of FR4, FR5, PI, ceramics) provide the electronic connection of the individual elements. In the first instance, the use of SMD (surface mounted device) circuit boards, where the components are directly soldered to the circuit paths, can be considered as a milestone in the progression of the PCB technology. Their development has considerably contributed to the enormous miniaturisation of electric devices and has opened up completely new scenarios for electronics. However, in order to achieve a high placement precision when assembling these PCBs, it is critical to reliably fix the electronic components prior to the soldering process. Here, modern bonding technology has proven successful. Fast-curing adhesives are already successfully used in various applications in the field of printed circuit boards and meet the highest requirements in terms of functionality and reliability.

### Adhesives for various applications

The fixing of components onto SMD circuit boards represents a broad application area for adhesives. In the PCB production process, the adhesive is applied to the circuit board by means of screen printing, jetting or needle dispensing in order to mechanically fix the SMD components. In a second step, the adhesive is cured in a tunnel oven before the components are soldered to the printed circuit board in the last step.

The heat-curing, one-component epoxy resin adhesive Delo-Monopox MK096 was especially developed for fixing SMD components. Its excellent resistance to humidity enables the highest placement precision when fixing components, especially MELFS (metal electrode faces) and glass MELFS. Thus, high process reliability can be reached during the subsequent wave soldering process in which the fixed components are soldered to the PCB. Moreover, fast curing (Figure 1) brings significant cost savings in terms of oven planning.

### Corrosion resistance

PCB production process, the adhesive is applied to the circuit board by means of screen printing, jetting or needle dispensing in order to mechanically fix the SMD components. In a second step, the adhesive is cured in a tunnel oven before the components are soldered to the printed circuit board in the last step.

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### Figure 1 - Compared to standard competitive products (red line), Delo-Monopox MK096 shows high strengths already after a few seconds (blue line)

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### Figure 2 - Vibration protection of soldered electronic capacitor

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of electronic components such as QFPs (quad flat packages) and CSPs (chip scale packages).

**Mechanical fixing**

A further important application in which adhesives are used is the mechanical fixing of soldered THT components. This fixing protects sensitive electronic components against vibrations. This type of protection is especially important for components that are subject to mechanic shock, stress or vibrations, such as in control electronics or automotive electronics.

Figure 2 shows a THT capacitor fixed using the one-component, light-curing epoxy resin Delo-Katiobond 4597. This adhesive was chosen due to its excellent vibration-damping properties and optimal flow behaviour.

**Fast curing**

In the mass production of PCBs, fast curing of adhesives, in the order of a few seconds, is of particular importance. In these applications, a suitable lamp system is also critical. The innovative LED technology of the newly developed spot light source DeloLux 80 enables fast and effective adhesive curing in highly automated processes due to its adjusted emission spectrum. With an operating life of 10,000 hours, the DeloLux 80 lasts at least ten times longer than discharge lamps.

**Chip encapsulation**

Besides coating of complete circuit carriers, the selective encapsulation of bare and wire-bonded semiconductor chips is a relevant application focus when fixing printed circuit boards. The anhydride-curing epoxies Delo-Monopox GE provide reliable application over a wide temperature range due to their low CTE (coefficient of thermal expansion) of approximately 20 ppm/K, which compensates for the different coefficients of expansion of substrate and chip. Furthermore, these glob top compounds provide the required resistance to ambient conditions.

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**Dual-Lane High Throughput Dispensing System**

Asymtek announces the Axiom X-1022 Dual-Lane dispensing system designed to maximise throughput during multi-pass underfill operations. The dual-lane system increases the number of units per hour (UPH) produced in high-volume semiconductor applications such as flip chip and chip scale package (CSP) underfill. The system allows parallel processing on two lanes for continuous dispensing, eliminating lost time in non-dispensing activities, such as material flow-out and substrate loading and unloading. In some applications, a 60 to 80 percent increase in throughput over single-lane dispensers can be achieved, according to the manufacturer.

The dual-lane capability allows underfill flow-out in one lane while jetting underfill in the opposite lane. According to Asymtek, when underfill flow-out time is in the 40-second range, or when more than one underfill pass is required, a single lane dispenser loses valuable production time waiting for capillary flow of material under the die before dispensing a second pass. The Axiom X-1022 system eliminates the wait-time by enabling two dispensing processes to operate simultaneously.

The conveyors are independently controlled, allowing different-sized parts to be processed in lanes one and two for ultimate process flexibility. The programmable flat-belt, dual-lane conveyor allows for a variety of process carriers, including Auer boats, lead frames, and custom carriers. The conveyor is SMEMA (Surface Mount Equipment Manufacturers Association) compliant with a fixed first rail and adjustable second, third, and fourth rails. Greatest improvements in machine utilisation and total UPH can be realised for large die with multiple fill applications.

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**Figure 2 - The newly developed spot light source DeloLux 80 featuring innovative LED technology for curing of photoinitiated-curing adhesives**