

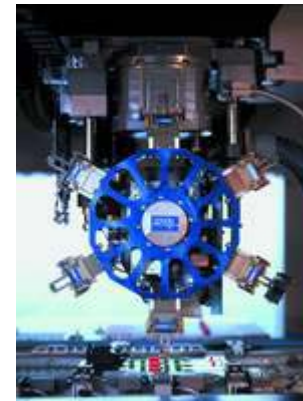


Control systems for automatic PC board component insertion and separation

Optimised cycle times

-PC-based CNC for automatic PC board machines

The trend in electronics production is towards processing ever larger PCB panels with higher and higher component densities. The extremely sensitive multiple panels must be separated quickly, with no strain and with maximum precision to form individual PC boards after component insertion and testing. ECKELMANN equips the PC board separating systems and automatic special-component insertion machines of IPTE GmbH with reliable and high-performance CNC technology. The sophisticated interplay of machine design and control system produces optimised tools for PC board production.



PCB insertion machine

The IPTE Germany GmbH company (Integrated Production and Test Engineering), previously named IPE, resulted from the former Production Technology Division of Grundig AG. As a member of the Belgian IPTE Group, the company avails of a wealth of competence in the sector of test and production automation. Development and production of both PC board separating systems and automatic machines for insertion of special components on PC board panels are of particular importance. Both systems are based on the same machine platform and are integrated in assembly lines of leading manufacturers in the electronics industry.

The IPE Speed Moulder

With its Speed Moulder Series, IPTE has implemented a new, modular machine concept for high-speed special-component insertion. The component-insertion capacity is up to 1,200 components per hour, dependent on the particular component, with a place accuracy of 100 µm at 4s. The use of a 12-segment turret head allows sequential picking of 12 special components. The components are thus picked and collected first and then inserted one after the other. The traverse path and, thus, also the processing time can be minimised. At the same time as placing is underway, the 12 feeders can each ready a new component, thus saving on additional process time. These two strategies must, of course, be supported optimally by the control system.



IPE Speed Moulder: Insertion machine

The IPE NTM-4133 Speed Router

Separation of high-tech PC board multiple panels necessitates highly precise processing which subjects the workpiece to as little strain and stress as possible. At the same time, the separating process must be matched to the production line timing in the case of inline production. This means that all handling and tool components must be moved quickly but free of vibration. The demand for vibration-free movement is met by the particularly sturdy design, comprising a basic module with granite support, and a stable, cast-aluminium superstructure in conjunction with the wear-free linear drive axes.



The cutting tools have been selected very carefully in order to achieve separation with minimum stress and strain. Two separating methods are available:

- Carbide-metal shank-type routing cutter for separating PC boards with any contours
- Diamond-coated wheel-type tools for straight separating cut

The separating precision and optimised machining time are essentially dependent on the speed and operating convenience of the control system used.



IPE Speed Router: PCB engraving machine (separation)

ECKELMANN PC-based control

All IPTE automatic PC board machines are operated with ECKELMANN PNC control systems. These comprise a plug-in PC board containing all functions of a CNC controller with integrated PLC. The plug-in board features its own 32-bit processor so that the CNC and PLC application runs independently of the actual PC software. In the case of PNC application, the machine wiring is reduced to a minimum. The machine inputs and outputs are interfaced via a field bus system (CANopen) and the machine axes are interfaced via digital drive interfaces (SERCOS, CANopen). All interfaces to the upstream and downstream devices do, of course, comply with the SMEMA Recommendations but may also be matched customer-specifically.

The powerful NC operating system covers all machining methods in PC board production. The integrated PLC allows free programming of the application-dependent machine functions to IEC 61131-3. The powerful PNC-MMI operating software allows convenient operation in all CNC operating modes and can run under Windows 9x/2000/NT.

The user interface, matched to the process sequences, displays the operating state of the systems and is used for programming the paths and contours for component insertion or PC board separation. Statistics functions supply, manage and archive information on the production processes, information which is also valuable.

In conjunction with the ECKELMANN PNC control system, the IPE Speed Moulder and the NTM-4133 panel separation module represent optimised machine solutions for automating electronics production.



E-PNC55: PC-based-control