UDC 629.735.018.7.015.3.025.1

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Intelligent PCB production system on Mirae Mx-200 system

Development of a project for automatic guidance, centering, optimization by emulating the environment of the installer with the Mirae elements. Everything described below shows the accuracy of work, efficiency and a lower percentage of defects in production.

Introduction

Usually, in every private or public production, you can see SMD lines of different companies, for example, Miray or Yamaha. Each of the lines includes processes from loading, coating, quality control, installation of SMD components and taking solder paste in the oven with the output of the final western PCB and further quality control. To improve the work process of the department, the project "Grape Tec" was developed, the results of which are shown in the speed of implementation of the plan in production and the reduction of rejects with a quick automatic check of the PCB design in the installer.

Formulation of the problem

Practical development of a project for aligning and optimizing a project without manual control, using a Mirae simulation algorithmic process via a raspberry pi or a computer.

Review of existing works

The project is already in the approval stage for the workflow. The Mirae installer has a rather complex conveyor, drive, crane parts that are programmed through the logic of the machine directly in the console. In fig. 1 and fig. 2 you can see the ratio of the percentage of time to the efficiency of the project in manual and new simulated automatic mode. Also, you can see the ratio of the percentage of scrap in these modes on the example before and after the development of the technology. Scrap will be low in automatic mode. All calculations are accurate and certified in the practice of private production according to special standards set by the technological department. Note - the error of the machine in automatic mode is minimal and almost invisible.

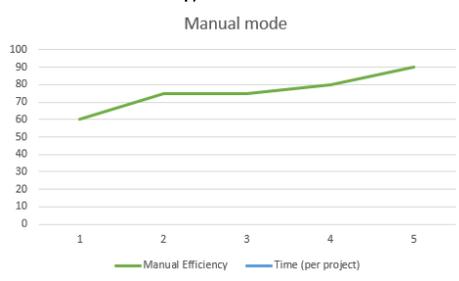**Automatic and manual alignment in relation to time and scrap**
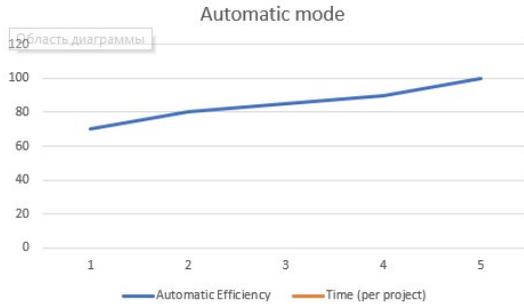

Fig. 1. Results of manual mode per 5 projects
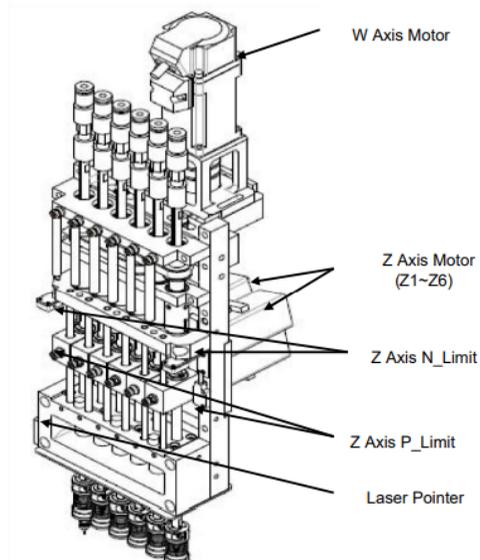
Fig. 2. Results of automatic mode per 5 projects

Fig. 3 Head structure of the mounter
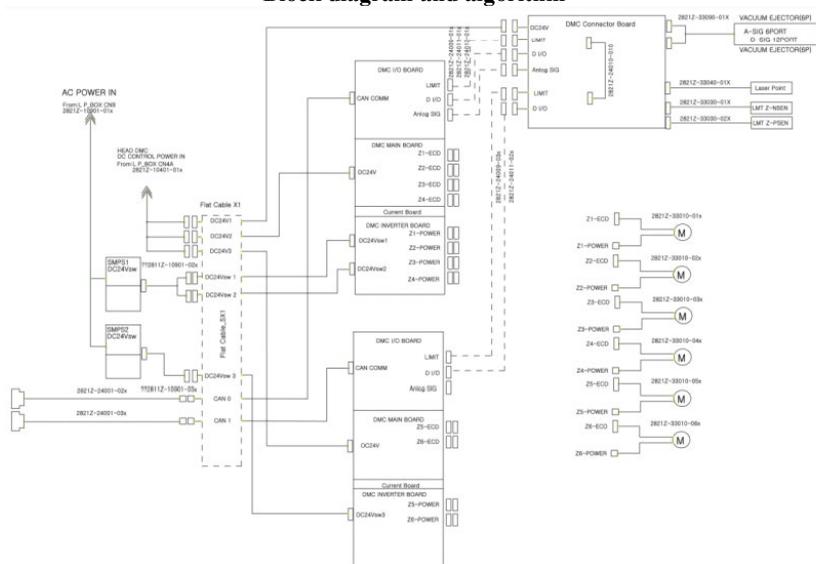
Block diagram and algorithm

Fig. 4 front head block diagram

Mirae uses a system where elements are taken by ultra-precise heads, brought to the recognition and transillumination camera with an accuracy of 0.4 microns. At the same time, there are speeds of rotation, approach, each axis and drives. The coordinate system is described through the x, y and z axes.

By using the speeds of each part of the machine and the emulation of the project on a new medium, data processing and the speed of project optimization are accelerated, which makes it possible to transfer the correct project faster in automatic mode than in manual mode. The algorithm of the machine is too simple, the starting point of the coordinates and the final one along the diagonal are taken, the printed circuit board is checked in the coordinate system with the set reference original and centered, and later it optimizes the installer's work environment.

The starting and ending points of the coordinates are taken from the 2 reference points on the printed circuit board.

You can work with this project at any production site and with any type of installers. With the help of emulation and loading of the design part, the circuitry base and the speed of action, it can be applied in practice.

Conclusion

This development removes the percentage of scrap and increases efficiency with less energy consumption for both the operating engineers and the production department and the warehouse.

References

1. Mirae Mx manual. SMT customers Support Team. Chaam-dong, Cheonan city, Chungham.