

Expert report



Preventing reliability problems in
soft soldering

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Even the use of high-quality solder does not guarantee that solder joints are always of consistent and uniform quality.

The fact that other parameters play crucial roles in the soldering process is often ignored. These parameters include:

- *Constant speed of the solder wire feed*
- *Precise, uniform solder quantity*
- *Constant temperature of the soldering tip*
- *Maximum control speed for temperature recording*
- *Fast power adjustment*

All these settings can be configured and ensured only in new, state-of-the-art soldering machines.

[A comparison of low-cost soldering machines](#)

In many low-cost machines, as well as in manual soldering, the lack of precision is usually compensated for by using solder with a higher flux content. This means accepting considerable disadvantages, such as larger quantities of flux residue and increased soldering tip wear.

Contemporary soldering machines facilitate the production of solder joints of the highest quality. Particularly in applications that are exposed to extreme weather conditions (moisture) and temperature fluctuations (e.g. solar power systems and aerospace products), flawless solder joints are immensely important.

[Automated soldering machines](#)

Automated soldering machines with correspondingly high-quality supply stations, paired with high-precision wire feed, guarantee processes that meet today's demands for solder joints of the highest quality.

It is essential that the solder wire is fed at optimal speed and in compliance with all required parameters.

The soldering process

The solder deposit on the soldering tip transmits the temperature (=thermal conductor) to the parts to be joined. In addition, the flux breaks open the oxide layer of the parts to be soldered. All this must happen within an extremely short time and requires the coordination of the following components:

- A high-precision wire feed
- A robotic solder tip that maintains the temperature
- A solder station that provides the corresponding power as required without loss of time



Optimal soldering requires a process in which all parameters involved can be individually configured. These parameters must be consistent and precise for all soldering jobs. This is the only way to ensure that there are no fluctuations in the quality of the solder joints.

Special robotic soldering heads have been developed to optimally coordinate the interaction of these different soldering parameters, for both pneumatic applications and electric applications. Compressed air is required for robotic soldering heads for pneumatic applications, while robotic soldering heads for electric applications work with linear drives. These soldering heads are installed in soldering machines such as the SolderSmart tabletop soldering robot¹, as well as in large robotic soldering cells.

CONCLUSION:

End customers expect solder joints to be extremely reliable and have long service lives. The prerequisite for process reliability and consistent solder quality is the use of high-quality solder. In conjunction with cutting-edge robotic soldering heads and compliance with all essential parameters in the automated soldering machine, a low ppm rate can be achieved.

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