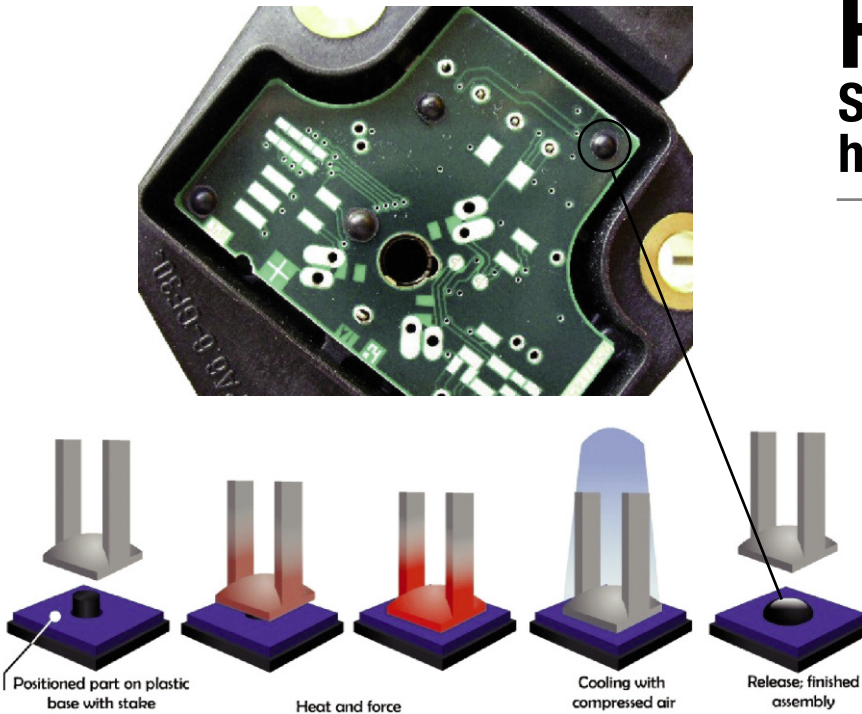


Heat Staking

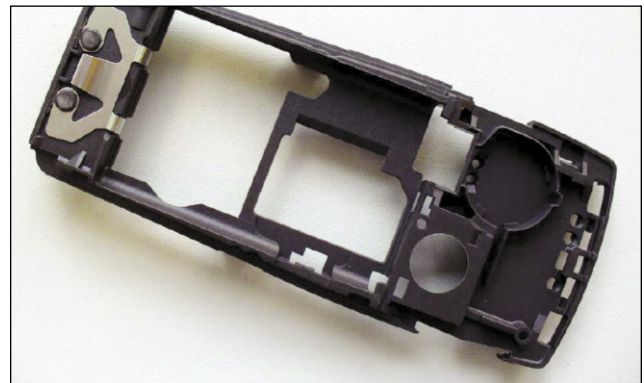
Staking plastic using heat and pressure

Heat staking is a method of joining two or more parts where at least one of the parts is made out of plastic. The bond is made by partially de-forming the plastic part in order to fix the other. Heat staking is commonly used in high volume/low cost applications like automotive components, telecommunications components and consumer appliances.



De-forming the plastic is achieved by heating it to a temperature above the glass transition temperature (T_g) via the use of super-heated air or a thermode, and then applying pressure in order to create the stake. After the stake has been formed, the plastic is cooled under constant pressure to ensure good fixation of the parts. Cooling can be done with the use of compressed air or with a cold, preformed tool.

TYPICAL APPLICATIONS



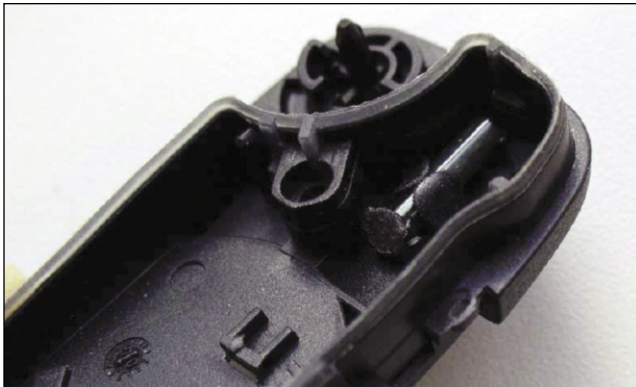
Metal battery clip in plastic housing (mobile phone)



Tubular stud (airbag)



Fixating a PCB inside a plastic housing, oil temperature sensor (automotive)

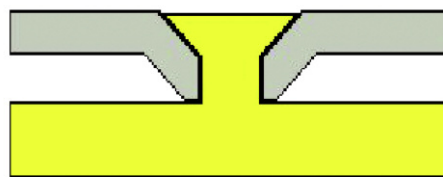


Electrical components

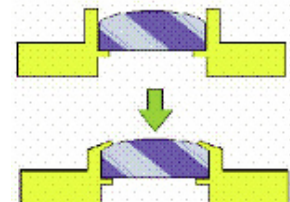
Heating the plastic makes it easier to form a stake and prevents cracking. Glass filled plastics have a small work window of +/- 10°C and therefore require precise temperature control. If the temperature is too high, the glass fibers will come out of the plastic, leading to sticking and a rough finish. Too low a temperature, on the other hand, will cause cracks and cold deformation. Plastic without glass is easier to bond because of the larger work window.

In order to create a good stake it is important to fully heat the pin while deforming. A small pin is easier to heat than one with a larger diameter. Increasing the heat too quickly may lead to an over heated surface and cold core, so heat must be increased gradually, which takes more time. Using a tubular stud instead of a pin, however, lowers the total mass of the plastic which makes it easier and faster to heat. Tubular studs require a different shaped thermode, however, with a pin that fits the cavity in the stud.

If a flat surface is necessary, other shapes of stakes are also possible like a countersunk stake. When another object should be clamped within a plastic housing, e.g. glass lenses or metal springs, captive stakes can be used.



Countersunk stake



Plastic components



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