



J.A.M.E.S

FundAMEntals: IR-Heater Soldering

Step-by-Step HowTo
NNDM DragonFly IV

In this FundAMENTal document, we will give a step-by-step explanation on how the soldering process is done using an Infrared heater and solder paste. The used equipment, materials and temperature profiles are presented in the corresponding IR-Heater Soldering datasheet, which can be found on the Library of the J.A.M.E.S FrAMework.

The following workflow is applied and verified by the J.A.M.E.S engineering team:

1. Program Heating profile

We are using an Infrared IC-Heater Model T962 for soldering our applications in one heating profile process. It is possible to create an individual heating profile which is needed to realize a proper result for 3D-printed AME-structures out from the DragonFly IV multijet Printer. For this, we choose wave7* or wave8* to program the temperature vs. time and store following profile.

(Please have a look into the provided manual of the T-962 Infrared heater)

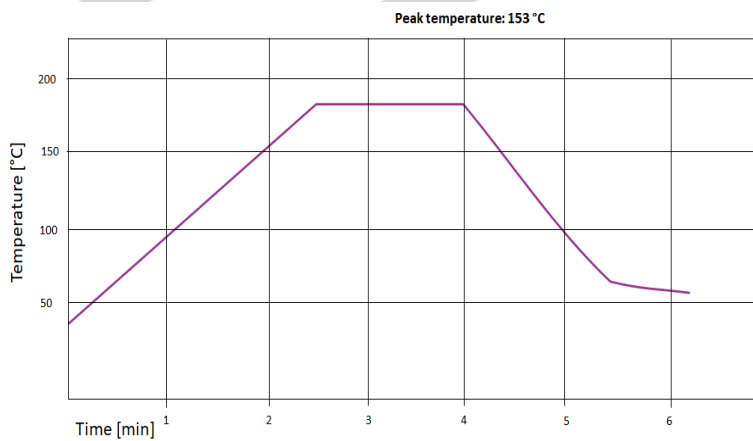


Figure 1: Heating profile for Infrared IC-Heater (Solder Paste Heraeus Bi58Sn42)

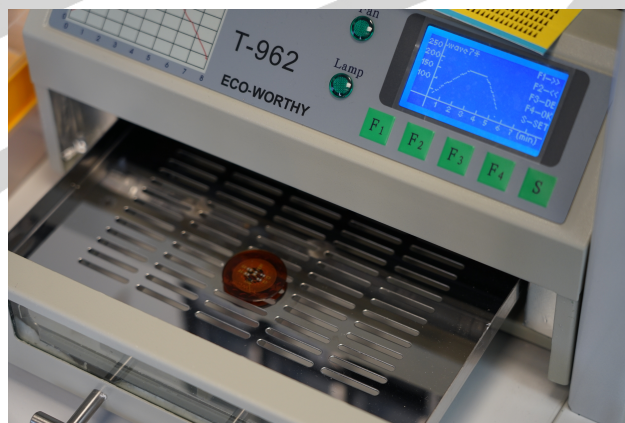


Figure 2: J.A.M.E.S Coin prepared for soldering in the IR-Heater

2. Cleaning the pads

In order to clean the pads or remove some oxidated silver use a simple rubber eraser. Since the silver pads of the NNDM DragonFly IV AMEs might be very sensitive, it is important to proceed here with caution. As an alternative to the rubber eraser, also a fiberglass pen might be used.

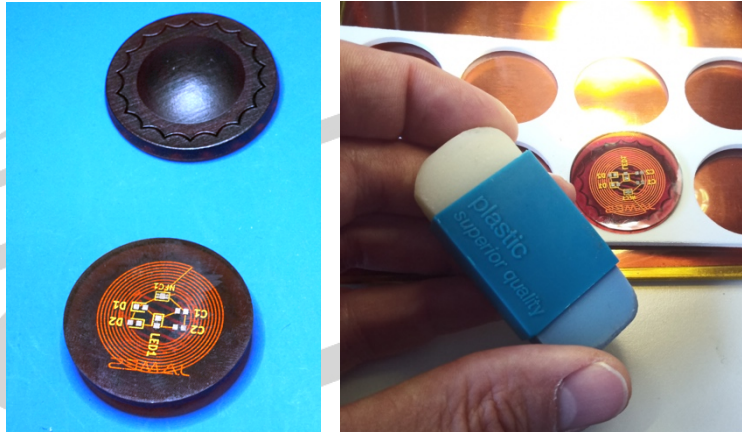


Figure 3: J.A.M.E.S Coin with cleaning conductive pads

The following pictures show the difference of soldering pads before and after cleaning:



Figure 4: J.A.M.E.S Coin before and after cleaning

After cleaning, the wetting of the pads with the solder paste will be much better.

3. Dispense solder paste on pads

Depending on the size of the pads and the viscosity of the solder paste, either a manual dispenser can be used, or alternatively the material can also be applied by a small needle. The result will look like this:

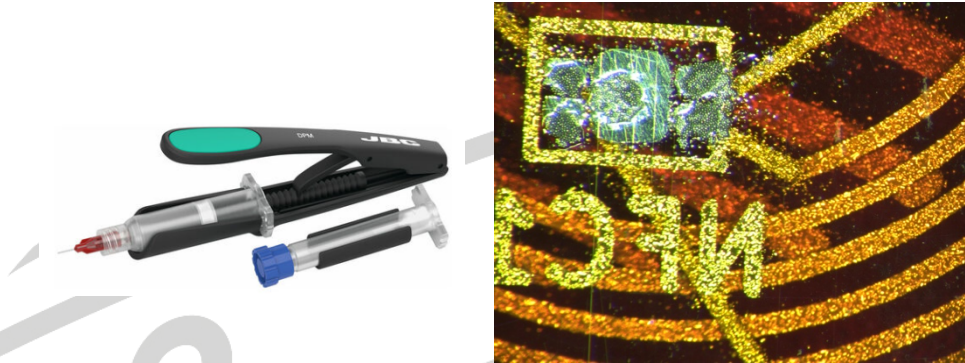


Figure 5: Use of a manual dispenser for placing solder paste (here on the Pads of NFC Tag component)

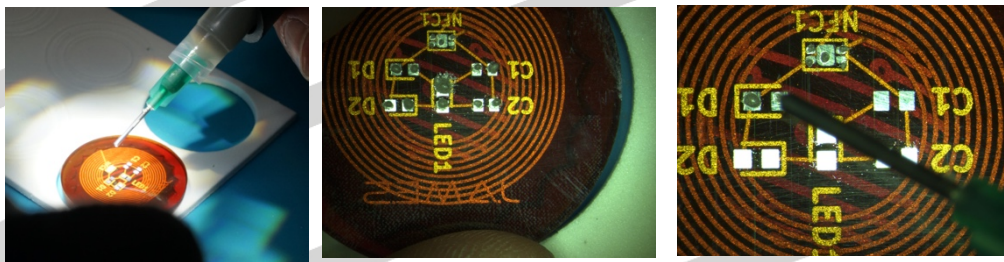


Figure 6: Manual dispensing of solder paste

4. Manually Pick & Place components

After the solder paste is applied, the next step consists in placing the components. In the case of the J.A.M.E.S Coin, this will be two capacitors, two diodes, one LED and of course the NFC chip. The result is shown in the following pictures:

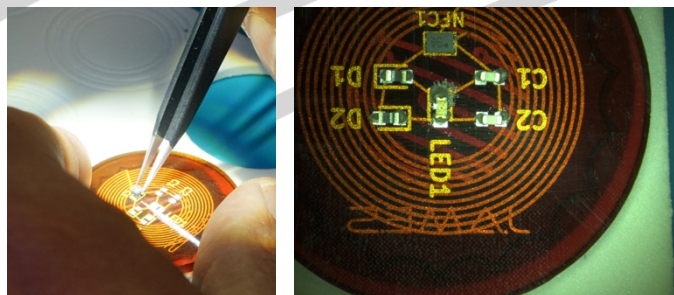


Figure 7: Manually steps to apply solder paste to the pads of the J.A.M.E.S Coin

5. Put AME in oven and start heating sequence

Recommendation for use of the IR-heater. Before you start to put all samples into the heater it is helpful to do a test run heating sequence to avoid a cool start.

After the components are placed. The AME structure can be put in the IR heater and the previously defined heating sequence can be started by pressing [F1] Temp. wave AutoExe. The IR-heater then starts automatically to process the heating sequence of your waveform.

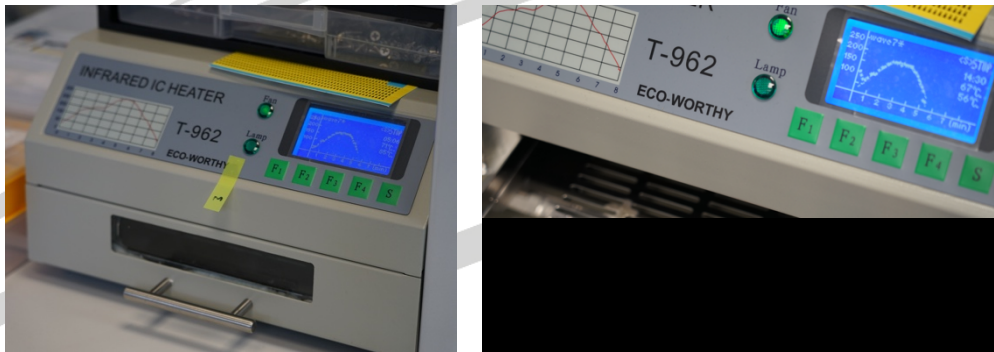


Figure 8: Working IR-Heater for J.A.M.E.S Coin population

After the waveform is completed, the heater starts to ring, and you can stop by pressing "S" button. When the heating sequence is finished, you should not immediately open the oven in order to enable smooth cool down of the samples. Open the oven and put out your samples to have a look on the result.

6. Check soldering contacts

Afterwards do a quick visual check if all soldered pads are connected and looking proper.

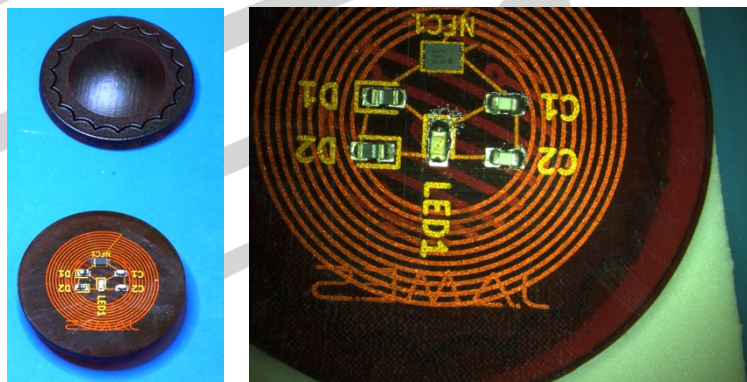


Figure 9: Placed components after soldering process