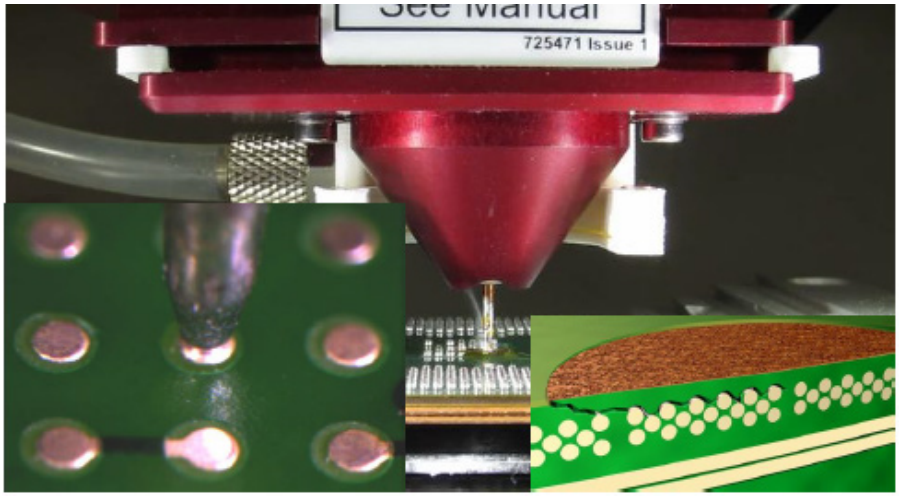
DAGE HOT BUMP PULL TESTING

ADVANCED TECHNOLOGY FOR RESEARCH & INDUSTRY

KNOWLEDGE BASE FACT SHEET

SCOPE: What is Hot Bump Pull Testing and how does it work?



HBP test process

- The HBP (Hot Bump Pull) test process involves the following phases:
- Applying a test pin to the solder ball or bump under test
- Heating the pin to melt and re-flow the solder onto the pin-tip
- Cooling the pin and test site in a controlled manner to solidify the solder
- Applying a vertical pull load (of up to 10kg) until the joint fails

HBP test applications

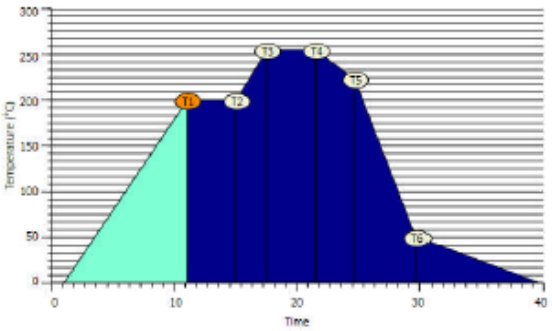
Typically, the HBP test method is used by substrate manufacturers during research and development in order to:

- Remove the maximum amount of material possible from a bonding pad
- Evaluate the strength of the various interconnecting materials
- Test low profile or irregular shape samples where standard gripping techniques do not work

HBP testing is applicable to both traditional solder ball and flip chip bumps either bonded or formed by the deposition process and is also used to identify pad crater failures on the substrate side (IPC 9708). Generally, HBP testing is destructive. However, you can configure the test to be non-destructive if required.

Temperature / Time profiles

Dage Paragon software provides accurate HBP test temperature control using a series of user-definable *Temperature / Time Profiles.*



A profile consists of six individually configured temperature/time points, defined as follows:

T1 Warmup 1 Initial temperature to ramp to in the specified duration
T2 Hold 1 Duration to hold at the temperature defined in T1
T3 Warmup 2 Final temperature to ramp to in the specified duration
T4 Hold 2 Duration to hold at the final temperature defined by T3
T5 Cool 1 Initial temperature to cool to in the specified duration
T6 Cool 2 Final temperature to cool to and the duration of the cooling period

Details

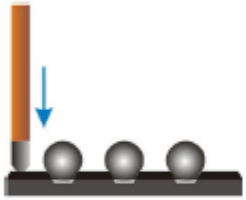
- Patented industry unique test solution
- Up to 10kg tensile pull
- Pneumatic clamping for rapid pin load and unload
- Built in extraction to remove fumes from any flux used
- Rugged design forreliable and reproducible load measurement
- The HBP cartridge can apply the following range of pull loads: Range 1 - 10kg, Range 2 - 5kg, Range 3 - 2.5kg, Range 4 - 1kg

Performing a HBP test cycle

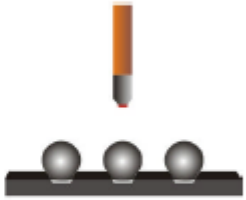
Follow the typical HBP test cycle, as illustrated:

5. Using the microscope, chose a suitable site and lower the Z axis until the test pin just contacts the work sample surface.

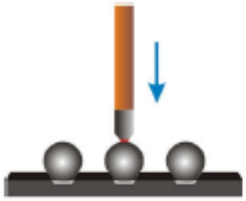
   Set the **Lower Limit**.



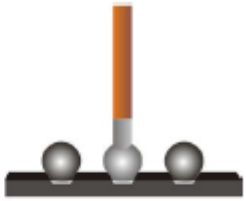
6. If required, raise the Z axis and carefully apply a small amount of flux to the test pin-tip. Position the test pin over the ball/bump to be tested. Ensure it is aligned correctly in both X and Y axes.



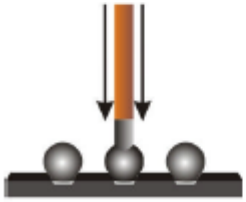
7. Lower the Z axis until the test pin-tip just touches the ball and inspect alignment. Lower Z axis to the preset Lower Limit.



8. Start the test. The temperature is controlled by the current temperature profile and its status reported in the Paragon software. The solder melts and re-flows and the test pin drops into the ball/bump.



9. During the cooling phase of the temperature profile, air is directed down onto the test site (see note below)



10. Once the final temperature has been reached (T6 in the temperature profile) the test pin is clamped and the pull test automatically carried out.