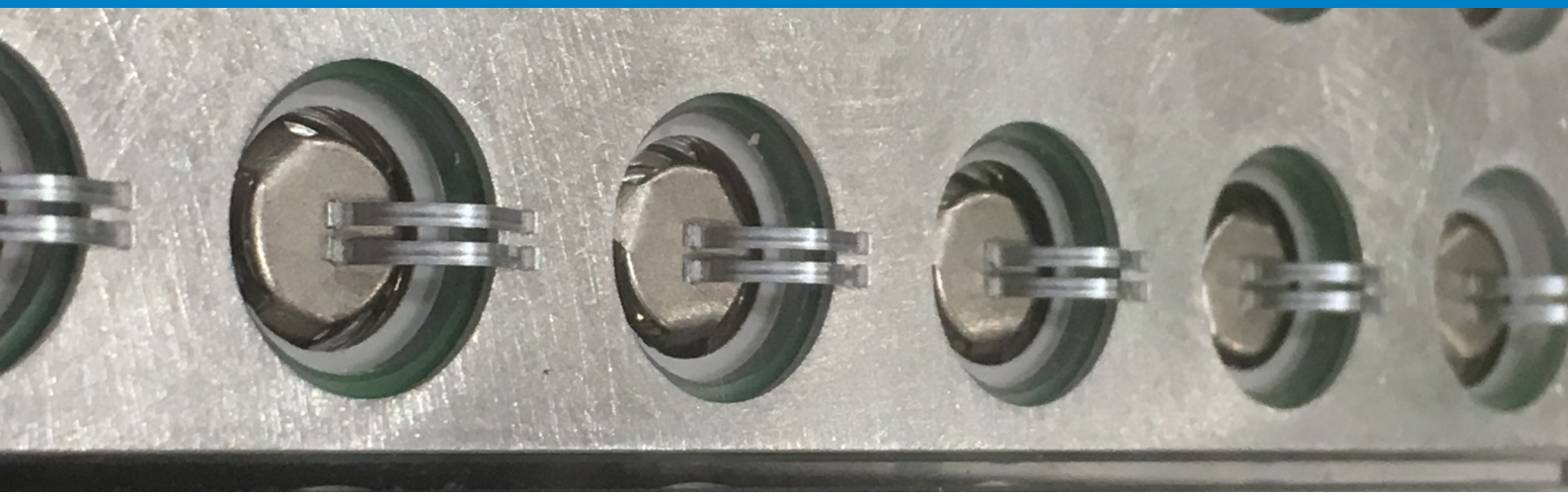
Ribbon Testing

Application Note



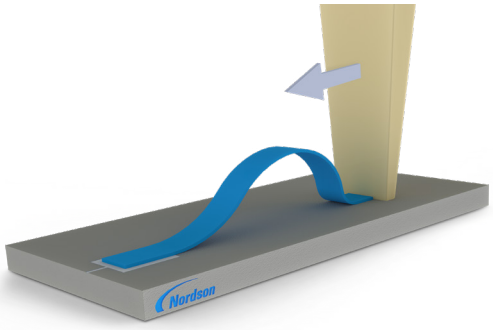
Aluminium ribbons are used for high current/ high frequency interconnectors. Poor (high resistance) connections of high current connections can lead to failure through thermal runaway, a process of accelerating degradation of the connector until the electrical connection breaks. Arcing and fires can occur from this process, so quality control of ribbon connections is critical to product safety. Nordson DAGE bondtesters can be used to understand the manufacturing process, as well as provide non-destructive testing of every bond.

Ribbons are made in a wide variety of sizes and shapes therefore Nordson DAGE bondtesters have been developed to provide testing capability across this range.

There are two main types of mechanical load that can be placed on ribbons; shear load, which is encountered when the connector is stretched, and pull load, which is encountered when the ribbon is being lifted off from the components. Ideally ribbons in a variety of locations on the component should be tested for their strength in both directions.

Shear Testing

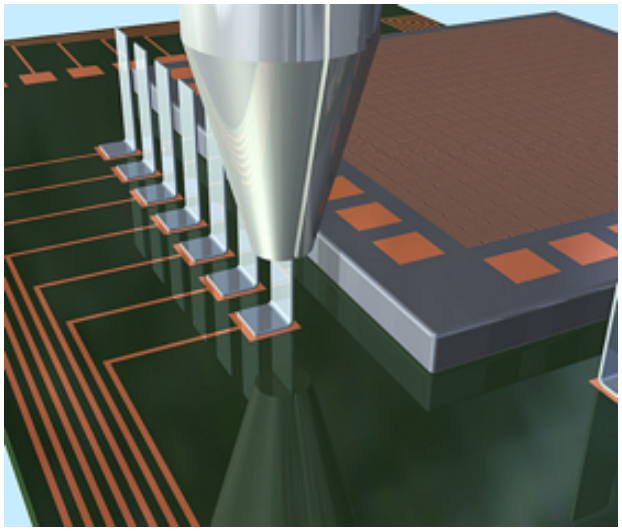
Shear tests are carried out on ribbons using a dedicated shear cartridge, which is installed into a bondtester by simply slotting it into place. Shear cartridges that can apply a load of 200kg force allow testing of a wide range of ribbon designs. A shear tool is selected to match the width of the ribbon and the tool is positioned next to the bond, using the stage and trinocular microscope for alignment. During the test, Paragon™ software records the load and displacement, then the test site can be visually assessed.



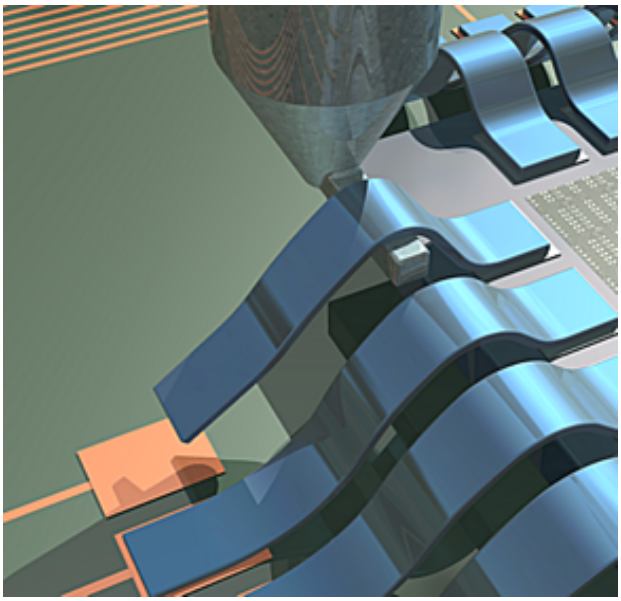
To prevent the shear tool from either scraping along the component or missing the ribbon bond entirely, Nordson DAGE bondtesters use a step back height function. They gently touch down on the surface when the tool is lowered and then withdraw to a specified height above the surface. It is essential that the shear height is as low as possible to ensure that the ribbon bond is sheared instead of peeled off the surface. If the shear height is not consistent between tests then the test will not provide repeatable results.

Pull Testing

Ribbons are vulnerable to being pulled from the assembly in service therefore Nordson DAGE also offer pull testing capability on the same system by simply swapping the cartridge. For ribbons that are 20mm wide or less, pull cartridges are available with a variety of hooks or custom loops for low profile ribbons. This method tests both the ribbon strength and the bond strength simultaneously, with the break at the weakest link, replicating damage in service.



Wider ribbons that require greater testing forces can be pulled by gripping the ribbons with a tweezer cartridge. The ribbon is peeled off the surface, with the stage automatically moving to maintain the peel angle at 90°.



Non-Destructive Testing

Bondtesters can carry out non-destructive testing with any test by programming the maximum applied load to less than the expected failure load and operating the Bondtester in force control. Nordson DAGE Bondtesters can be used to physically test every bond in a safety critical device. The XY stage allows the operator to manually navigate around a device to test specific components or set-up an automated pattern to test all of the ribbons in a row and produce a report of the results. While X-ray or ultrasound inspection techniques can identify the presence of defects such as voids, only mechanical testing can prove that a bond can support the desired load. Nordson DAGE bondtesters provide the access, precision and repeatability to carry out this testing.

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