Automatic grading without any assistance

Fully automatic loading and testing with bond testers have been possible for years. However, automated analysis without operator intervention remained a challenge. Using deep learning, xyztec can now accomplish this process! A Sigma bond tester can automatically determine the failure modes on samples, removing the need for operator intervention to grade your product.

What is auto grading?

An operator grades the test result via the microscope or image capture after each test or grading run and determines each bond test's failure mode. This results in either a ‘pass’ or a ‘fail’ for the measurement. Grading by operators is time-consuming and sensitive to interpretation differences.

Auto grading is a software functionality that makes it possible to automatically grade the image of the test result using image processing software. For example, in ball shear, the software application calculates the area of bulk material remaining as a

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percentage of the whole and can determine various pre-learned gradings. The result of auto grading determines the failure mode of the bond test. Operators can optionally set the exact rules to define the failure mode from the image to conform to their standards. For example: ‘if the ductile area > 25%”. This could be sufficient to pass the bond test, depending on the rules established.

Using auto grading, operators do not need to fulfill assessments by accepting or editing the failure modes at the end of an automation run.

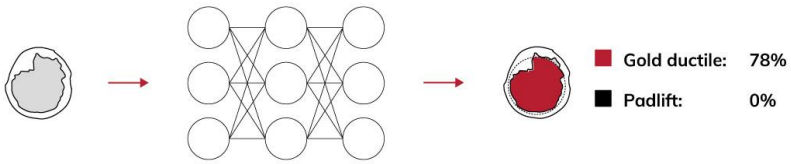
Auto grading eliminates the need for operators to assess failure modes at the end of an automation run.

Deep learning auto grading

Auto grading uses machine vision software to process the images of the test results. The algorithm uses a neural network, also referred to as deep learning.

Deep learning automatically determines the failure modes of the test result images. The system learns features that allow the classifier within the algorithm to distinguish between failures. The test target features are taught by training a neural network in image processing. As a result, operators do not need to fulfil assessments by accepting or editing the failure modes at the end of a full automation run.

Teaching the neural network and auto grading algorithm is complex. Every test (i.e. shear, pull) needs a unique auto-grading algorithm setup.



Does it work on my sample?

The current algorithm already covers numerous applications, however some applications might require custom work. A small set of target images is required to determine auto grading feasibility for individual samples to determine the auto grading possibilities.

Auto grading on Sigma bond testers is currently available for ball shear and wire pull tests:

Ball shear

Auto grading on ball shear determines surface areas with regard to the bond area. It is possible to determine the failure mode depending on the different areas:

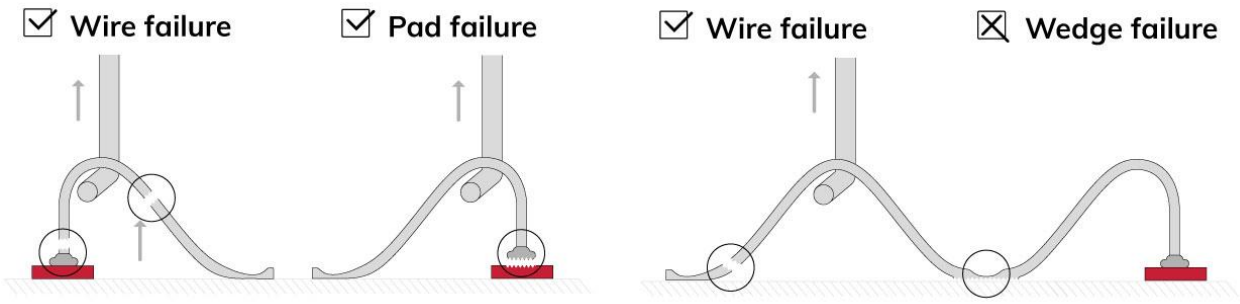
- Area of cratering/pad lift
- Area of gold ductile
- Area of ball lift

☑ **Ball failure**

Wire pull

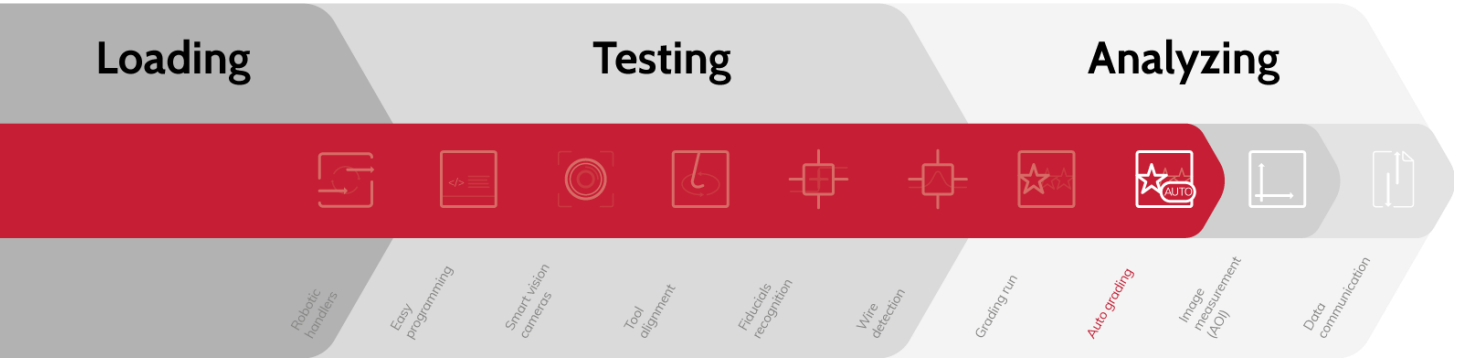
Auto grading of wire pull tests determines the location where the wire is broken. High wire bonds or variable bond heights can be hard to detect.

- Results for ball bonds:
  - Ball bond broken from pad
  - Wire broken from ball bond (breaks Heat Affected Zone)
- Results for wedge bonds:
  - Wire broken from wedge bond



One step forward in realizing 100% automatic bond testing

This new development comes with very promising functionalities to grade failure modes without any assistance. As the bond test technology leader, xyztec expects to continue improving the auto grading functionality. Are you ready to automate your processes? Contact xyztec and choose a Sigma bond tester with game-changing automation capabilities.



Technology leader in bond testing worldwide