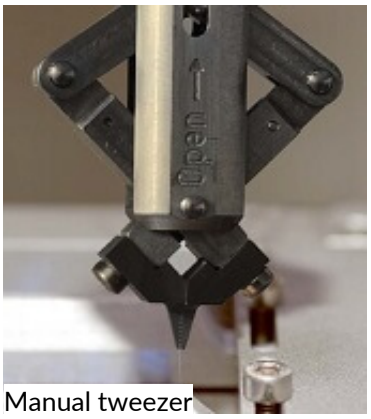
How to test bonds » Tweezer Pull » Tweezer Design

...this is page 2; click here to go to page 1.

3. Tweezer design



Manual tweezer

Automatic tweezer

i. Manual and automatic

There are two fundamental types of tweezers; those which open and close manually and those with automatic opening and closing.

ii. Types of jaws

There are many different types of jaws to suit the wide range of applications. The most common are plain, serrated, hook and cavity type as shown in the illustration.

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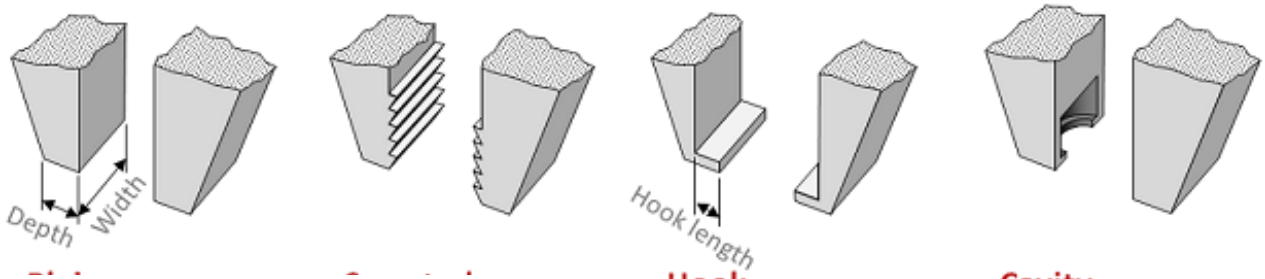
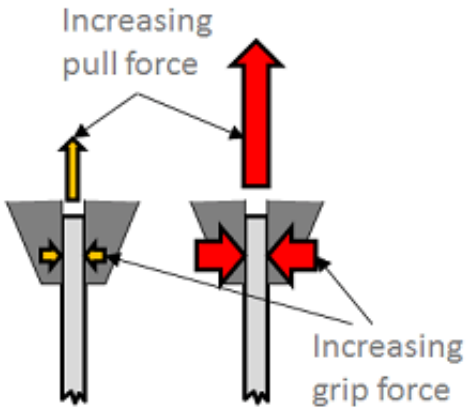


The four most common types of jaws for tweezer pull

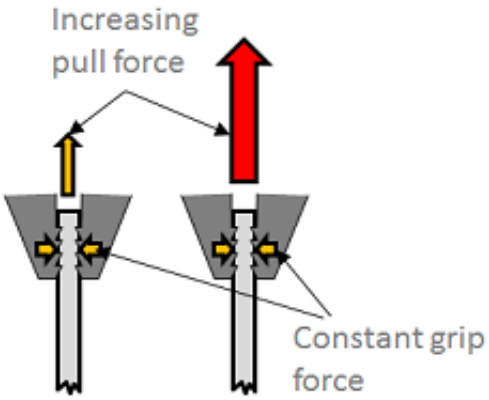


Increasing grip force

iii. Closing function

There are three types of closing function. They are selected to suit the application;

- Increasing grip force
- Constant grip force
- Closing distance



Constant grip force

Increasing grip force as the pull force increases is typically used when gripping hard and parallel

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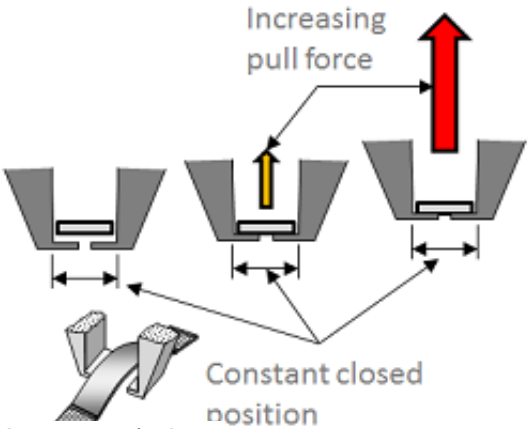
parts. This way the grip is maintained as the pull force increases.



Constant grip force

A constant grip force regardless of the increasing pull force is useful when gripping soft parts, where the sample can be deformed to obtain a grip but squashed too much if the grip force gets too high.

A fixed closing distance (or: closing position) is used when the part already has a feature that the jaws can "hook" under.

You can use the following chart to select the type of hook your application requires.

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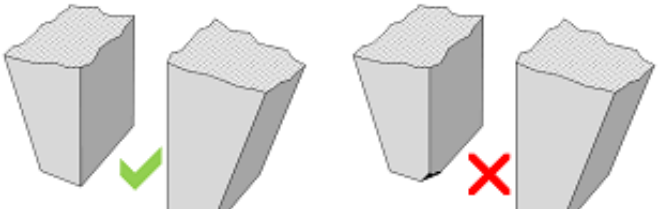
EXAMPLES	Increasing grip force Typically used when gripping hard and parallel parts so the grip is maintained as the pull force increases	Constant grip force Typically used when gripping soft parts where the sample can be deformed to obtain a grip but squashed too much if the grip force gets too high	Closing distance Typically used when the part already has a feature that the jaws can "hook" under
Hard sample	✓	✗ Slips	✗ Error does not grip OR Error cannot close
Soft sample	✗ Squashes sample	✓	✗ Error does not grip OR Error cannot close
Ball pull	✗ Squashes sample	✓	✗ Error does not grip OR Error cannot close
Ribbon pull	✗ Squashes sample	✓ Might grip unevenly	✓ Might not fully support sample

Choose a closing function that fits with your sample and test type

iv. Material

Jaws are normally made from a tough steel. Tool steel is a good example. When the jaws require small detail and precise tolerances, hard materials are required because smaller detail can be machined into these materials. The disadvantage of harder materials is that it makes the jaws brittle and fragile.



Damaged tweezer jaws may still be acceptable to use

v. Quality

As with other tools, if the jaws are damaged or worn they may not work correctly. The amount of acceptable damage depends on the application. Any jaw damage is acceptable if;

1. You get the failure mode of interest
2. You get the same highest possible test force as with undamaged jaws

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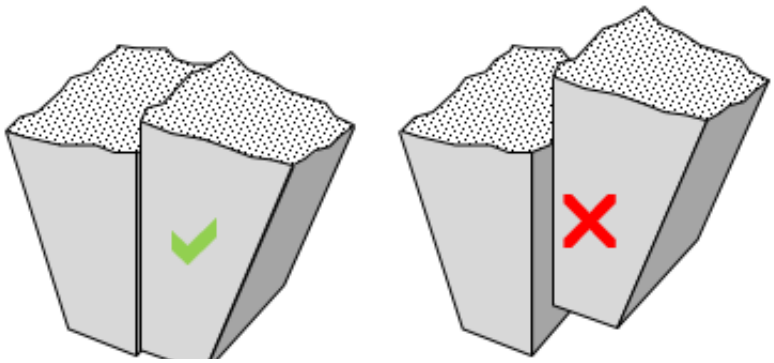
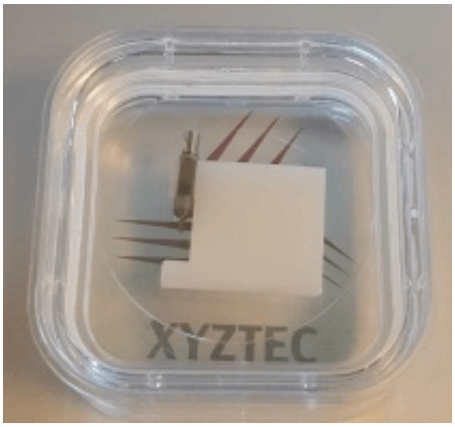


Misalignment of the jaws must not influence the failure mode of interest or the test force

It is also important that the tips of the jaws align closely with each other when closed. The same guidelines for acceptability exist for jaw alignment as for jaw damage. However, as a very general guide, misalignment should not be larger than 5% of the jaw width.

vi. Force control

Depending on the type of sample it is often highly important to have precise control over the grip force of the tweezers. This is not only vital in order to do a correct test on one bond tester, but also to maintain correlation between tests on multiple machines. Especially with pneumatic tweezers, it is almost impossible to obtain consistent settings between multiple systems. Electric tweezers with intelligent jaws and built-in closed loop force control solve this issue.



USB Tweezer tips are shipped with safety in mind

vii. Handle tips with care

Tweezer jaws (tips) can be fragile, depending on the application. To avoid damage, it is important to handle them with care and always store them in their cases when not installed in a bond tester. Preferably, use tweezers with quick, safe and easy methods of tips exchanging.

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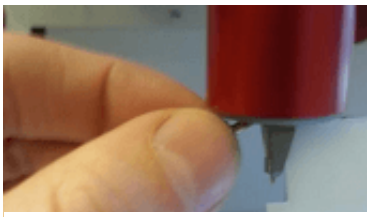

Minimal risk of damage when replacing tips

XYZTEC USB Tweezer tips ship to you in a safe case and already mounted in a bracket. This bracket later enables the operator to place the tips in the USB Tweezer and tighten the fixation screw without ever touching the fragile tips by hand.

When contaminated, use extreme care to clean the tips. Many companies that do Cold Bump Pull use the contactless CBP Jaw Cleaner, which virtually eliminates the risk of damage when cleaning the cavities.

Continue to read:

Previous page: Introduction

Next page: Alignment and Failure Modes

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