Instron® TechNotes **Getting the most up-to-date information on materials testing**

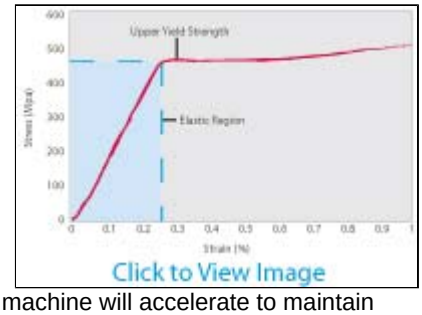
In This Issue

- **Tech Tip:** Why Am I Not Seeing Upper Yield?
- **Tech Tip:** Testing of High Strength Rebar
- **You Asked – We Answered:** Q. Which grips are best for testing thin metal specimens?

ISSUE 29

Tech Tip

Why Am I Not Seeing Upper Yield?



Are you testing for upper yield strength, but not seeing a "dip" in your stress/strain curve? This is often the result of using improper test control parameters. During yielding, the strain rate needs to be as constant as possible. This is best achieved by using crosshead position or strain control*.

For example, if you run a test in stress control at the onset of yielding, the testing machine will accelerate to maintain the desired stress rate. Incorrectly running in load control causes unwanted acceleration. This prevents the stress from dropping relative to the increase in strain. As a result, the upper yield strength calculation will fail because it can't find the dip in the stress-strain curve (a zero or negative slope).

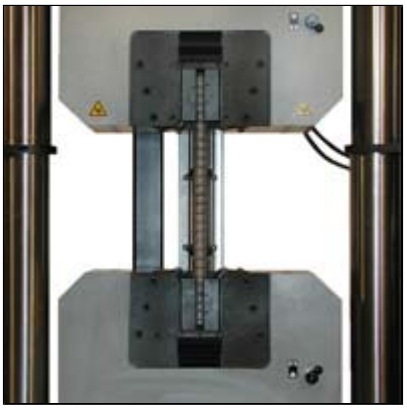
To correct this situation, set up the test to use stress control during the first half of the elastic portion. Prior to the onset of yielding, switch to either position or strain control. We have **software packages** that are designed to allow for control transition.

For more information, **contact us**.

* Refer to test standards such as ASTM E8, ISO 6892 or EN10002 for the allowable test rates during yielding.

Tech Tip

Testing of High Strength Rebar



Many standards govern rebar testing including: ASTM A370, ASTM A615, ASTM A996, BS4449 and EN 10002-1. The mechanical tests these standards outline can be demanding on operators and testing equipment. So, when testing large rebar samples – #14 (all grades) – we suggest using a single test space load frame in lieu of traditional dual test space styles. For this test we used a **1500 KN** model, which has a capacity of 1500 kN (337,500 lbf) and accommodates rebar specimens ranging in length from 400 mm to 700 mm.

This load frame features a top-mounted hydraulic actuator which places the loading area at ground level. This significantly reduced our lifting requirements for loading the heavy rebar specimens. Additionally, we were able to perform both tension and bend tests on the rebar sample by adding compression adapters to the tension grips. This saved change-over time because we didn't need to use the overhead crane to remove the large, heavy tension grips. Adding the compression adapter and bend fixture took only a few minutes and involved tightening a few screws.

For the tension test we used hydraulic wedge grips because the initial clamping force reduced grip slippage on the uneven surface of the rebar. These hydraulic wedge grips accept rebar specimens from 10 mm (0.39 in) to 70 mm (2.75 in) in diameter. The grip jaws are vee-shaped with a custom-cut groove to accept the ribs found on rebar.

Finally, we used an **automatic extensometer** to capture strain. The model we selected, an M300B, has an adjustable gauge length from 10 mm to 300 mm (required for most rebar applications). It automatically clamps to the ribs of the rebar surface when a test is started and unclamps at a specified point during the test. The strain data can be used for required **modulus** and **yield calculations**.

You Asked – We Answered

Q.Which grips are best for testing thin metal specimens?

Screw side-action grips open the door for specimen slippage, high standard deviation, and low throughput. We recommend **self-tightening wedge grips** for metal applications. They offer improvement in all of these areas, do not require any tools, and are easy to use.

Once the specimen is inserted between the jaw faces, manually turn the lever to close the wedged faces and apply only a slight amount of clamping force. This is sufficient enough for the jaw faces to pull on the specimen once the test is started. The clamping force increases as the specimen is pulled, eliminating jaw breaks that are normally caused by high initial clamping force.

The exact model of grips and faces often requires a discussion about the material you're testing. **Contact** our Applications Specialist to review your specific requirements.

What do you think? Tell us!

Ask the Expert

Have a question about materials testing? Submit your question and you may see it featured in a future issue of TechNotes.
Ask Us

FREE iPod™ Nano

Tell us about your testing and you could win an iPod Nano! **Learn how**

Worldwide Headquarters
825 University Avenue
Norwood, MA 02062-2643 USA
http://www.instron.com/