Servo press technology's impact on feedlines in progressive die stamping cells.

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Servo presses have been the star of presentations for some time.

- How does each provider's servo press work?
- What new abilities do they bring?
- How are they the same as mechanical presses?
- What can you do differently in the tooling?
- How much can it increase throughput?
- What is the impact on reverse tonnage and spring back?

Drivers of the technology – why has it become so popular?

- Automotive's move into HSLA for weight reduction
- Increased through put
- Increased opportunity for in die operations
- Lowering tooling and other costs

“The Rest of the Story” - Paul Harvey

- What have we learned after installing the technology?

First of all, it works.

- Reduction of reverse load
- Reducing spring back
- Ease of in die value added operations
- Higher output
- Better part quality
- Better tool life
- Incredibly flexible to handle tooling and material issues
- Allows one work center to work on wider application range

It needs support around it to get the most out of it.

Feed Line considerations

High yield materials often seen if you use servo presses

Higher speeds especially on progressive dies

More frequent coil and die changes per shift

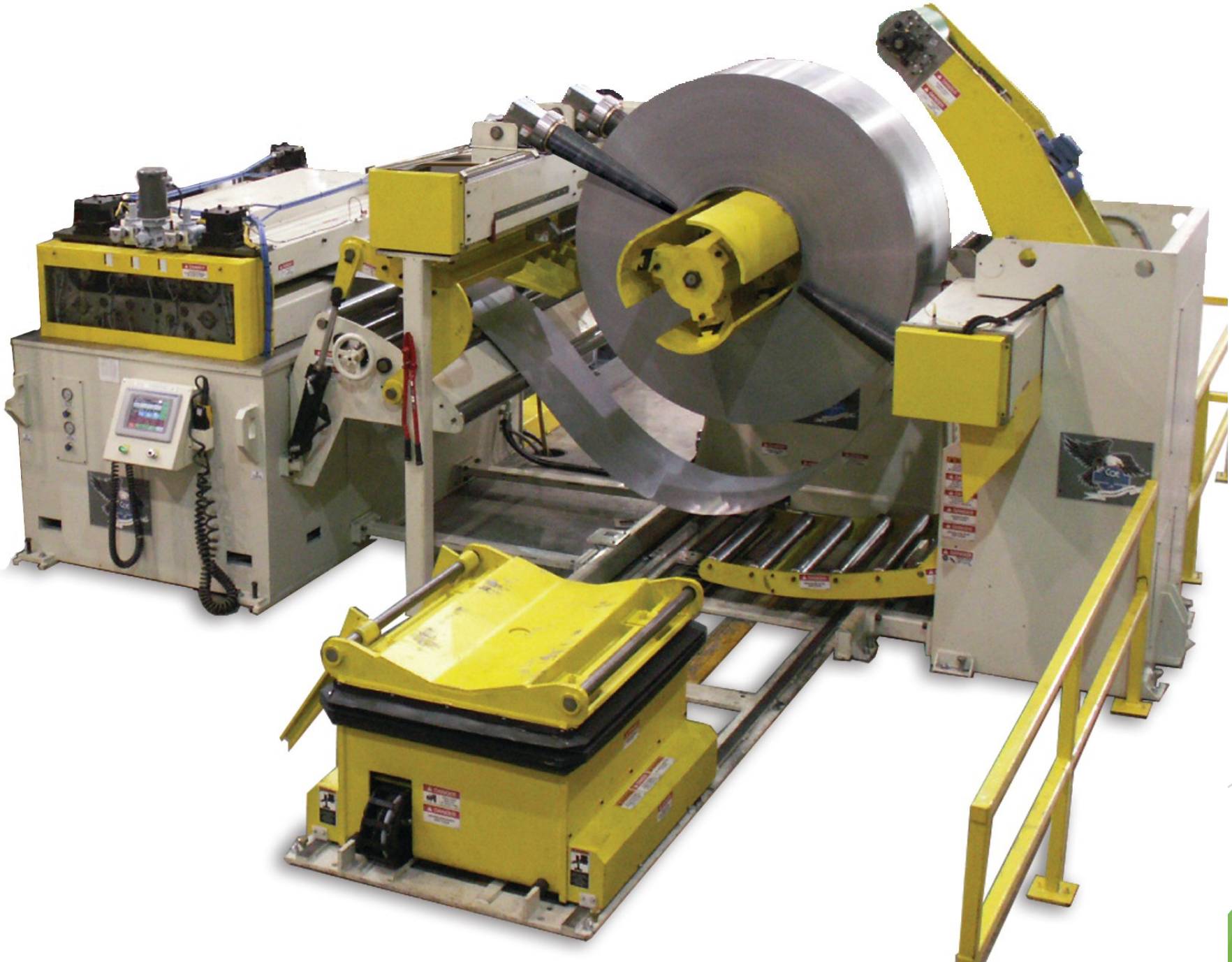
Reels, what do you need to pay attention to for high yield materials?

- Effective hold downs for safe un-banding
- Hydraulics more common
- Hold down and hold ups may be required
- Hands free thread up
- Back guards
- Thread tables
- Fail safe brakes

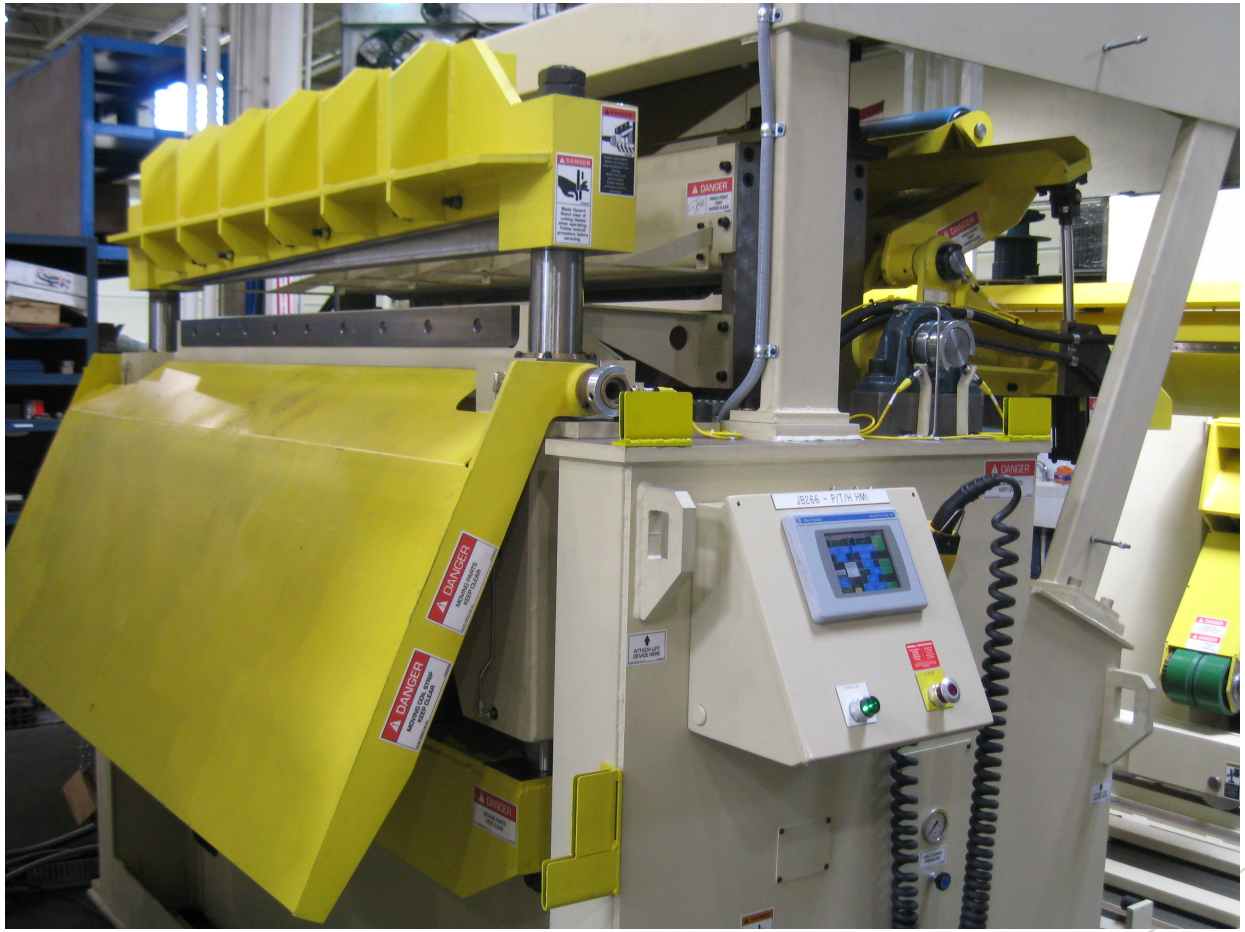
Hold down and up, peeler/threader/de-bender, all hydraulic actuated

Reel considerations for more frequent coil changes

- Coil staging at reel
- Coil cars
- Tools for starting coils
  - Higher capacity nibblers
  - Crop shears built into the line
- Powered coil guides



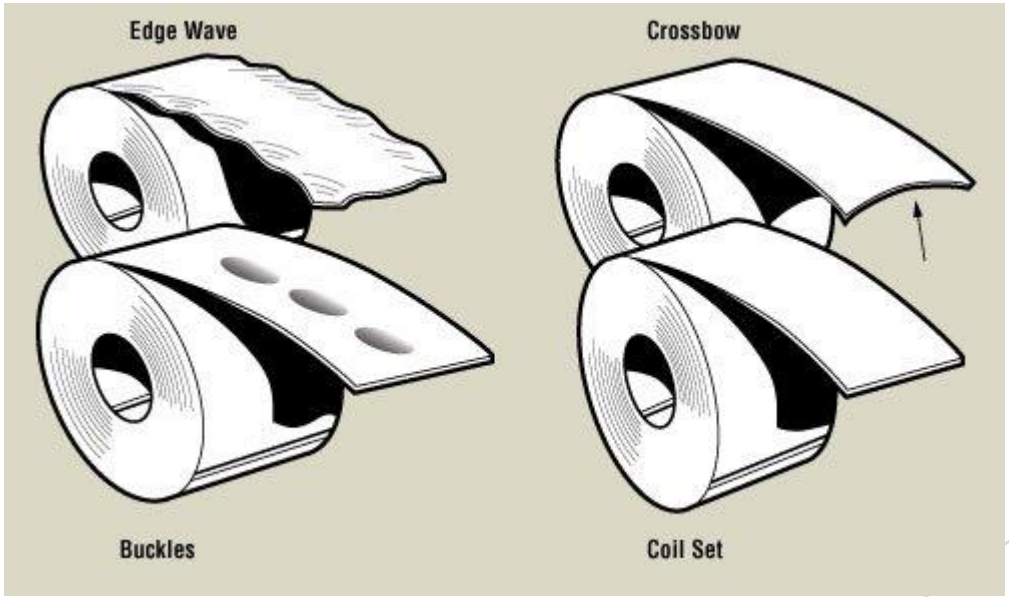
Crop shear between reel and straightener



Crop shear between reel and Flattener

Flattener/Straightener considerations for high yield materials

- Will design effectively yield enough of the material to correct the shape defects?
  - Coil set
  - Cross bow



Flattener versus straightener

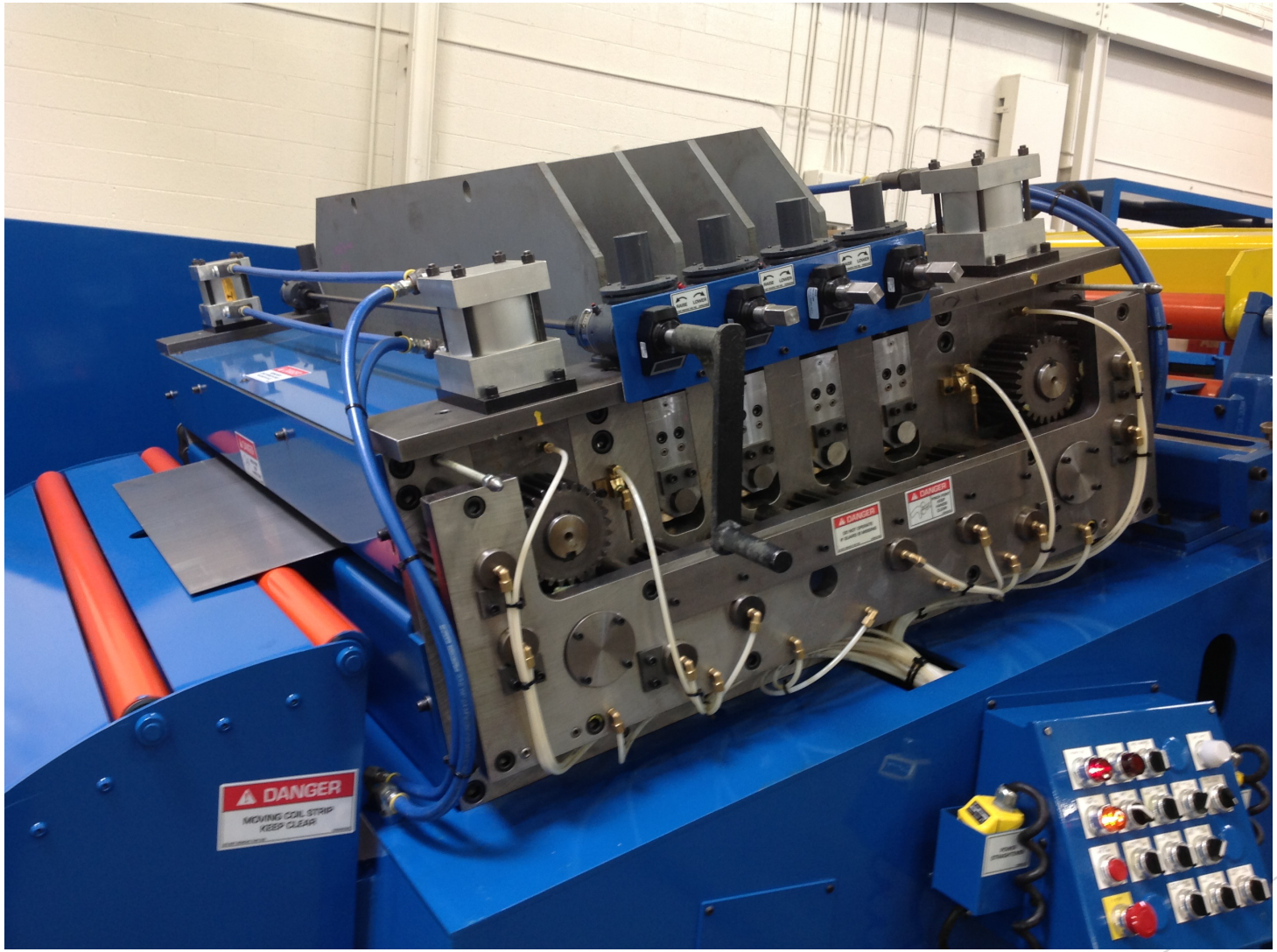
- **Flattener:** uses large diameter rolls, the large diameter is to resist deflection while working the strip to yield material. These rolls are supported only with bearings on each end.

- **Straightener”** uses smaller diameter rolls to put more material cross section in yield but have back up rollers to resist deflection of the rolls working the material

HSLA usually requires a straightener

- Thin HSLA is actually the most difficult.
- A flattener with a small roll to yield the material...
- A flattener with a large enough roll to resist deflection…

Straightener with back up rolls



What is needed besides the ability to resist deflection?

- Roll depth penetration
- Roll center to center distance
- Entry and exit pinch rolls

What to consider to make sure the straightener is fast enough?

- Look deeper than line feet per minute (FPM) capability
  - Look at acceleration and deceleration time used when calculating line FPM.
- Compare torque capacity

Loop considerations

- Loop can start to oscillate back and forth
- A loop pit is the simplest most reliable solution for maximum output
- Loop sensors need to have very rapid response if no loop pit is used and progressions are longer

Feed considerations to support servo press's speed

- Servo press with pendulum stroke mode require much higher than traditional feed acceleration to achieve full potential SPM output

- Don't accept feet per minute (FPM) rating alone – get acceleration capability clearly called out by your supplier

- **Torque** – required to overcome mass of the loop and resistance in the tool

- **Duty cycle** – Factors in both energy required to accel and deccel **and** how frequently it has to do this
  - Stopping the feed is a challenge as well as accelerating
  - Resistor banks are inexpensive and assist achieving higher duty cycles

Mechanical considerations to “hook up” high acceleration and torque capability

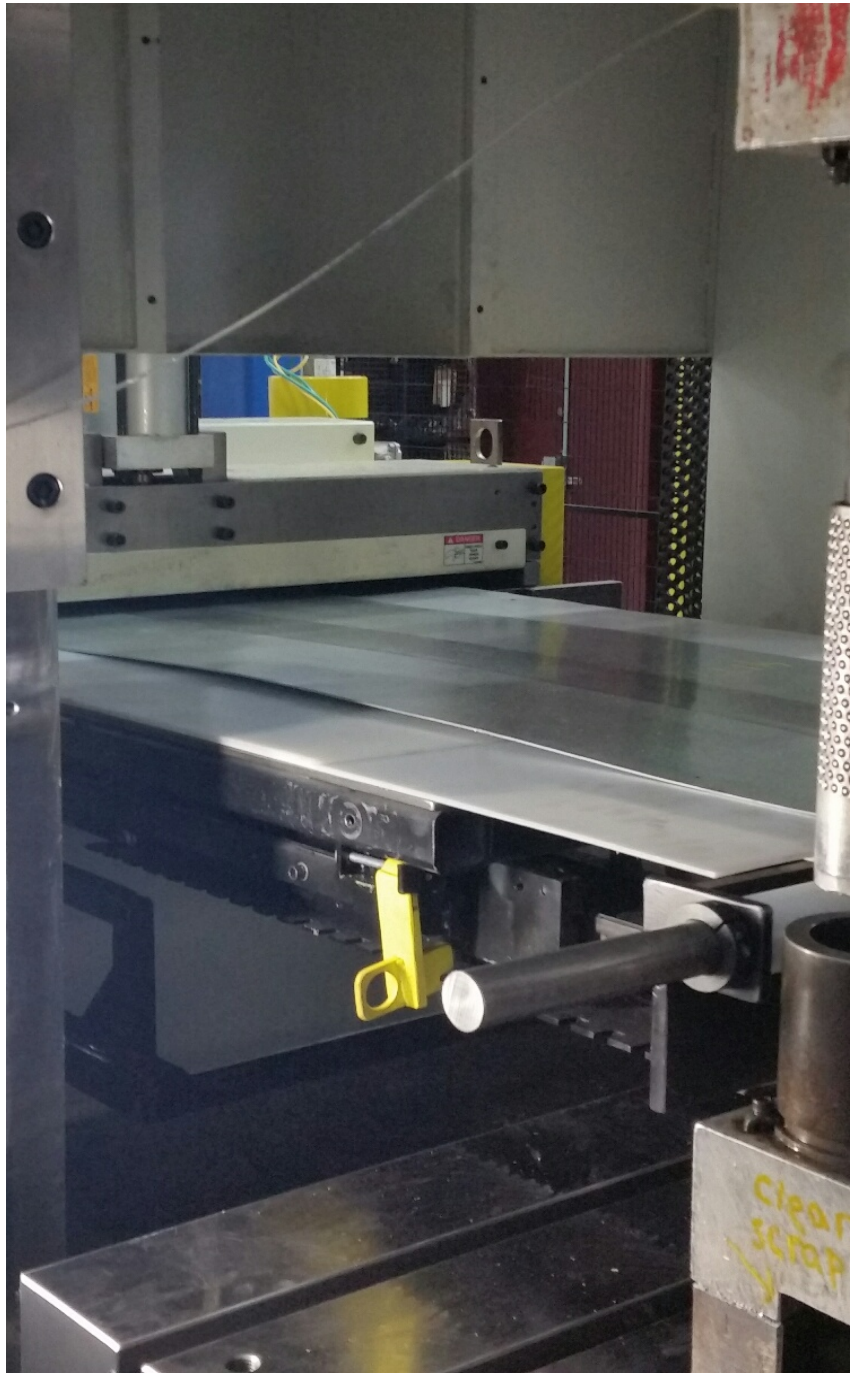
- Large forces are required to close on the strip for more aggressive acceleration
- Roll diameter of the feed must be sufficient to overcome tendency to deflect
  - Excessive feed roll deflection’s impact on feeding

- Crossbow's impact on feeding
  - Delay before you can start feed
  - If feed down force is too low….

Figure 2

Supporting stock to get the most from the feed acceleration ability

- Effective stock support between feed and tool allows greater acceleration without stock buckling
- The stock support should also be quickly adjustable so it does not hinder die changes


Clear
scrap

Feed considerations for more frequent die changes

- Auto feed length/speed/acceleration in recipe
- Auto powered pass line adjustment in recipe
- Auto setting of roll force in recipe
- Auto setting of vertical guide rolls in recipe

The feed line must be optimized to get the most from you servo press investment

- “If you don’t buy a tool you need, you will pay for it but not own it”
- - Henry Ford