# Roll Former Alignment

**Are you experiencing difficulties holding tolerances in length or material straightness of your roll formed product? How about an angular or dimensional cross-sectional problem?**

Roll Former misalignments can be very hard to find. Immediately everyone wants to start by moving the guides, forming roll spacers or adjusting pressures. The proper way to determine where the problems are originating from is to start with a complete footprint of the entire line, from uncoiler to finished product. Every component should be set to a centerline or an offset centerline, then each component needs to be square, parallel, and perpendicular to each other, as well as centered. If the mill has a two piece base it also needs to be level and square.

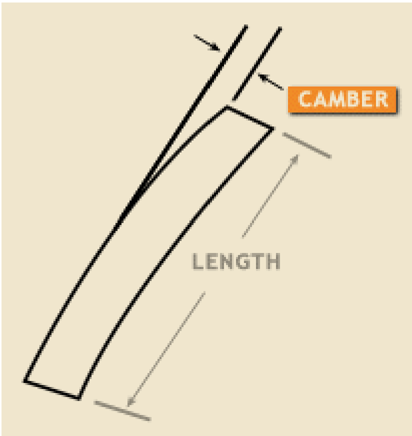
If any of the components are out of square to one another or too far off centers, then it can apply pressure on the product while feeding. It also causes it to rise or warp from one component to the next, which may also be a little misaligned, and by the time it reaches the roll form mill it has pressures applied to it from two or more directions.

The Hamar Laser System enables a complete inspection of the entire line. Once the inspection is complete, you will have a footprint of any and all misalignment's throughout the length of the roll former line. The footprint allows the technician to determine which components are creating the alignment issues and begin making adjustments to correct them.

**Here are some of the problems you may be encountering with the finished product due to misalignment of the Roll Former Line.**

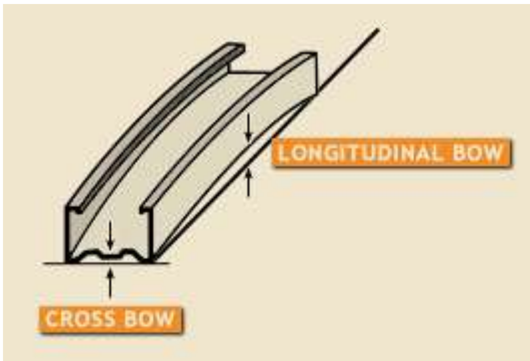
## Camber

Camber is the variation of a gradual deviation from coil stock caused during the edgewise curvature, a lateral strip metal from a straight line. bow, and/or twist in the side edge from a straight line, the straightness of the edge of sheet or slitting operation. Camber is the departure of a side edge of sheet or Extreme camber contributes to curve, finished part.



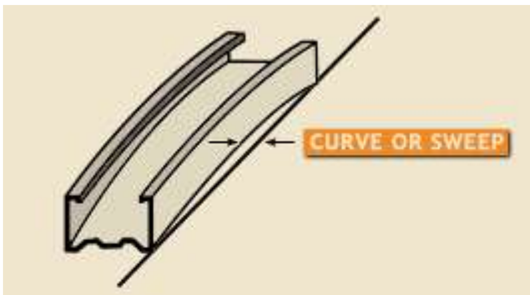

## Bow

Bow is the variation from a straight line in the vertical plane of a roll formed piece. It can be either cross bow or longitudinal bow.




## Curve (also referred to as Sweep)

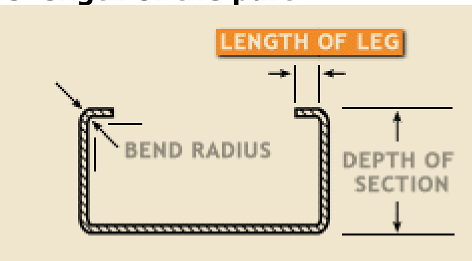
Curve is the variation from a straight line in the horizontal plane measured after the part has been roll formed. Causes of curve included incorrect horizontal roll alignment and uneven forming pressure. See bow, camber, sweep, and twist.



## Twist


Twist is a term used to define parts when they resemble a corkscrew effect. This is often caused by excessive forming pressure in the final formed part. Twist should be less than 5° in 10 feet of roll formed parts. See bow, curve, camber, and sweep.

**Another issue you may be experiencing is the length of leg size being different from one side to the other or the size deteriorates as you go down the length of the part**




leg length

## Leg

The leg is typically a 90% bend that is used for interconnection, mounting, or added structural support of the final product.

## Length of the leg

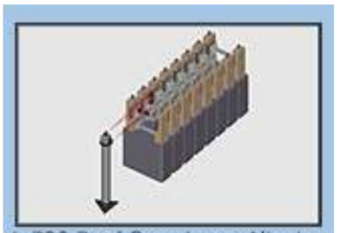
A good rule of thumb is the leg length should be three times the thickness of the material.

**ROLL FORMING ALIGNMENT**

The L-742 Ultra-Precision Dual Scan® Laser is an ideal instrument to quickly and accurately calibrate the geometry of almost all machining centers and is particularly useful for aligning the dies on a roll forming machine.

The L-742 is one of only 2 lasers in the world (the other is the L-732) to offer 2 automatically rotating laser planes that are accurate enough for today's ever-tightening tolerances. This creates a powerful tool that not only FINDS, but also FIXES geometry problems, all in a fraction of the time needed with conventional methods.

**Roll Forming Alignments Dramatically Improved with L-742**



L-722 Dual Scan Laser Aligning a Roll-Forming Machine

Roll forming machines traditionally are very difficult to align. Typically, an upper set of dies not only needs to be aligned to each other, axially, but they also have to be aligned or plumbed to a lower set of dies. With traditional methods like an indicator with alignment bars, the task is very time consuming and fraught with stack up errors.

The L-742 has one vertical and one horizontal rotating laser plane. The vertical laser plane is used to axially align the upper set of rolls to each other and to the lower set of rolls, all with one setup. The horizontal plane is used to align the rolls in the same plane and also check for parallelism to the lower rolls.

**Wireless Targets and Readout Speeds Setup**

With Hamar's new line of wireless targets (A-1519, A-1519HR and A-1520), there is no need to string long extension cords to reference targets. The targets have up to a 1" measuring range, a resolution as low as 0.00002" (0.0005 mm) and can be used up to 100 feet (30.5 meters) from the readout. The new R-1309 readout uses a Cassiopeia PDA, color software and a wireless receiver to display up to 4 targets simultaneously. Other features like electronic zeroing and target averaging help to speed setup and alignment.

**Continuously Sweeping Lasers and Live Data Reduces Downtime**

Continuously sweeping lasers and live data output create a powerful combination to align machinery up to 70% faster than traditional or interferometer methods. Downed machines will be up and running, producing quality parts in record time. HLI's continuously sweeping lasers are far superior to other point-and-shoot laser systems that require time-consuming manual laser rotation and target setup for each point measured. They also allow the use of multiple targets, which is especially helpful for large machinery.

By providing live alignment data, misalignment errors can be quickly and easily fixed without having to change the setup. This is a tremendous benefit, especially if you are used to using an interferometer, where the entire length of an axis must be measured before the straightness or flatness can be determined and the data provided is not even live.

**Squareness Built Into Laser Head**

One of the L-742's greatest features is its built-in squareness (each plane is square to each other to within 1 arc second -- 0.00006"/ft or 0.005 mm/M)). If you have ever tried to set up a cylindrical square or interferometer to check squareness, you will be amazed at how quickly and easily the squareness of not just one axis, but multiple axes can be measured, usually with one setup! Where an interferometer may take hours just to set up a squareness check, the L-742 takes just 15 minutes. And, unlike a cylindrical square, the L-742 can check the entire length of a machine's axis, up to 100 feet (30.5 meters), not just 12" (305 mm) or 24" (610 mm) of it.

**Simultaneously Measure 2 Axes with One Setup**

Another great time saver is the L-742's ability to measure the 2 of the 3 main axes of a machine at the same time. Not only can you measure the flatness and straightness of each axis, but you can also measure the squareness of two axes and also the parallelism of additional axes, like an extending quill or rotary axis.

**L-742 Significantly Reduces Stack Up Errors**

One of the biggest problems with aligning machine tools using conventional methods is that many different alignment tools must be used, requiring a lot of time and increasing stack-up errors. Another problem is that an alignment is only as good as the tools used to perform it. The machinist level is a good example: it has a resolution of .0005" per foot, not very accurate for today's ever-tightening tolerances.

The L-742's laser planes, by contrast, have a flatness of 1/2 an arc second (0.00003"/ft or 0.0025mm/M) in a 180º sweep and 1/4 arc second (0.000015"/ft or 0.001 mm/M) in 90º sweep. The laser planes are square to each other to within 1 arc second (0.00006"/ft or 0.005 mm/M). They further have the advantage of creating a single reference from which to measure machine geometry, significantly reducing stack-up errors.

**Software Quickly Collects and Analyzes Data**

Hamar's new line of alignment software, combined with newly designed computer interfaces, makes collecting and analyzing machining center alignment data faster and easier. All of the software is Windows based and provides large, color graphics. Alignment reports clearly and concisely show the machine's condition. In today's world of ISO 9000 documentation hell, our software will help you submit alignment reports in record time.

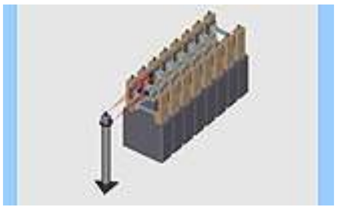
**FEATURES**

- 2 continuously rotating laser planes with operational range of 100' (30.5 meters) in radius..
- Laser planes flat to 1/2 arc seconds (0.00003"/ft or 0.0025mm/M) in 180º sweep and 1/4 arc second (0.000015"/ft or 0.001 mm/M) in 90º sweep.
- Planes are mutually square to 1 arc second (0.00006"/ft or 0.005 mm/M).
- Includes Pitch/Roll/Yaw base with coarse and fine adjustments.
- Standard Targets: A-1519HR Single-Axis, Wireless Target with 1" (24.5 mm) Measuring Range and 0.0001" (0.0025 mm) Resolution.
- Uses A-1520 Single-Axis Wireless Target with .250" Range and 0.5 Micron (.00002") resolution for higher accuracy applications.
- Backlit levels accurate to 1 arc second (0.00006"/ft or 0.005 mm/M).
- Instant on with virtually no warm-up.
- Typical setup time 20 minutes or less.
- Diode lasers 2 times more stable than HeNe based laser systems.
- Battery or AC powered.
- Completely self contained

**HOW IT WORKS**

The critical alignment for a roll-forming machine is to ensure that the shoulders of the dies are in a straight line for both the upper and lower die sections. Flatness and vertical parallelism of the dies to each other are also important.

The L-742 is uniquely qualified to perform both alignments usually with one set up. Using a fixture, three single-axis targets (A-1519, A-1519HR or A-1520) are mounted horizontally on three dies, either on the shoulder or the end. Two of the targets are mounted on the upper section and one on the lower section. The vertical laser is then made parallel, or "bucked in," to them. The rest of the dies, both in the upper and lower sections, can then be checked for axial straightness from the same setup. If they are out of tolerance, the targets can be left on the dies and used for alignment. When the readout reads zero, the die is aligned.



To check the vertical parallelism of the upper set of dies to the lower set, the horizontal laser plane is "bucked in" to the tops of 2 dies (using 3 reference points), usually in the upper section of dies. The single-axis targets can then be moved to other dies in the upper section to check for flatness deviation from the reference dies. To check parallelism, one target is placed on the lower set of dies and adjusted so it reads zero. It can then be moved to other dies on the lower section and any deviations from the reference points are a measure of parallelism.

The L-742 can also be used to check the squareness of the support wall to the machine bed by taking advantage of the L-742's built-in squareness.

A word of caution: If the machine is going to be aligned, rather than just measured, then it is important to put the laser on an instrument stand. If the laser is on the machine bed or table, adjusting it will most likely move the laser and thus affect the setup.

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