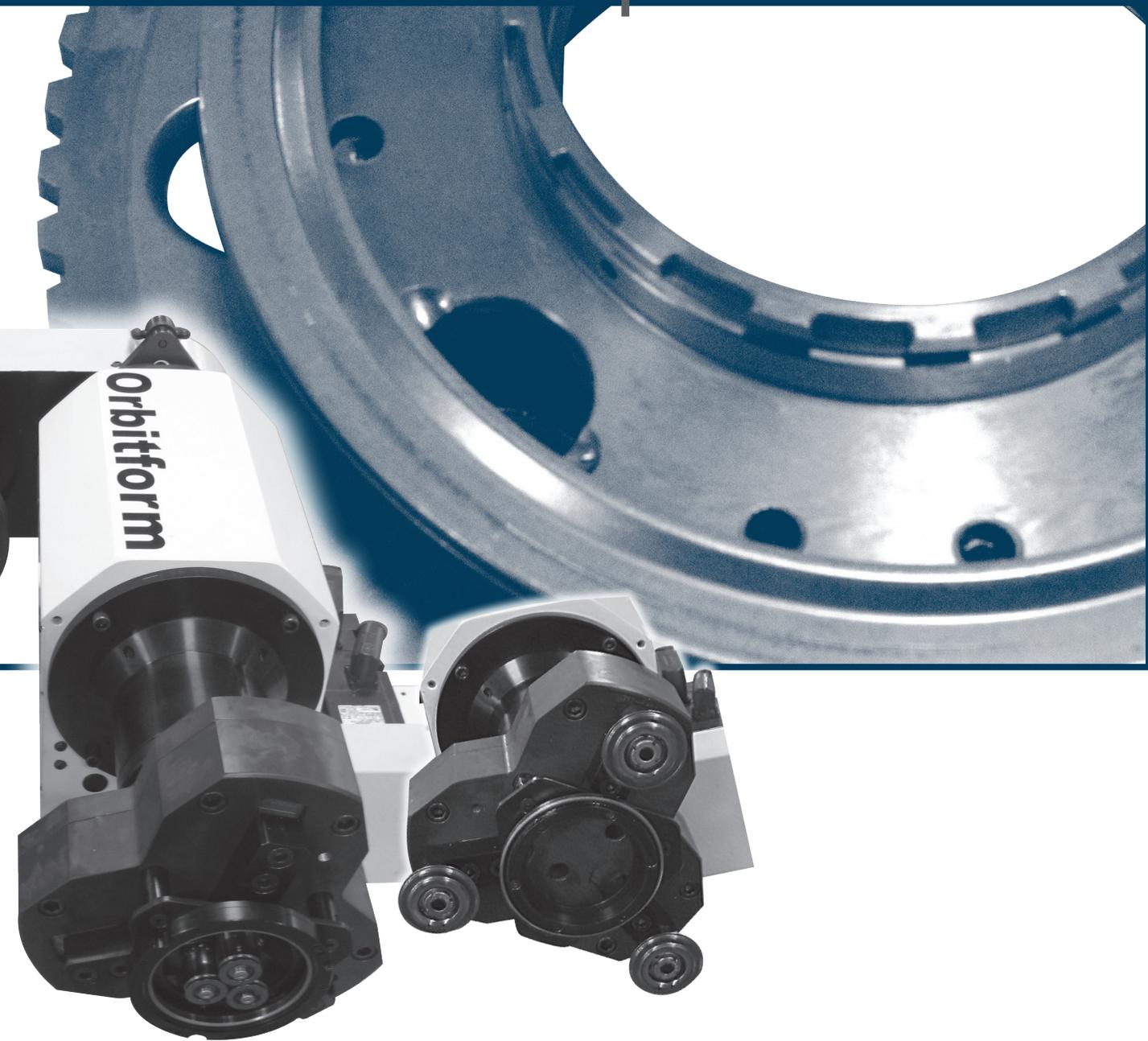




ROLLERFORMINGprocess





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ROLLERFORMING

Rollerforming is a non impact process using a spinning rollerhead with two or more rollers to apply a symmetrical force to form a part. Rollerforming is used for flaring, forming a lip, crimping, or forming a groove in cylindrical parts. Assembly applications range from bearings, ball joints, electrical sensors, and fuses, among others.

KEY FEATURES

Replaces Crimping

Form the end of cylindrical parts with rollerforming. Increase efficiency and accuracy with a process designed to create aesthetically pleasing lips and/or grooves in parts. Eliminate stress cracks by replacing multi-point crimping with 360° of retention.

Can Form a Range of Diameters

Rollerforming can be used to form parts ranging in size from 1/8" to over 10". Form parts large or small and make your prototypes a reality. The team at Orbitform can help determine the right machine for your process.

Fixed Rollers for Lip Forming

Form lips on the end of cylindrical parts with spinning rollers and applied down force. With the use of a seal or gasket, you can create sealed parts with our rollerforming process.

Articulating Rollers for Grooves & Lips

Form from the side with articulating rollers to create grooved parts. Other applications include situations where parts have obstructions that need to be cleared before the rollerhead can begin forming.

Precision Control

Get the most out of your forming process: Reduce ruined parts and scrap with Orbitform's Process Intelligence.

Adjustable Diameter

Rollerheads are available with adjustable center distances, allowing up to a 3" diameter increase along with analog readouts accurate to .001" of an inch. With the proper fixtures, you can run parts with different diameters on the same machine.



STATIC
Rollerforming



ARTICULATING
Rollerforming



PROCESS
Intelligence

Static Rollerforming with Adjustable Center Distance

Static rollerheads use spinning rollers and down-force to create an aesthetically pleasing lip. The non-impact nature of the process, combined with its inherent precision and accuracy, make it possible to form delicate or brittle materials. Static rollerheads provide consistency and efficiency to your forming process. They are available in a variety of roller orientations and bearing configurations to best suit each unique application.

Articulating Rollerforming

Articulating rollerheads come in from the side, and can be used to form a groove in a part, or when there are obstructions to clear in order to form a lip. 360° contact gives consistent action for the duration the part is being formed. Articulating rollerheads can deliver forming forces up to 5,000 lbs. at 100 psi.

Process Intelligence

Used to accurately monitor and/or control the forming force, distance, and stroke during the rollerforming process.



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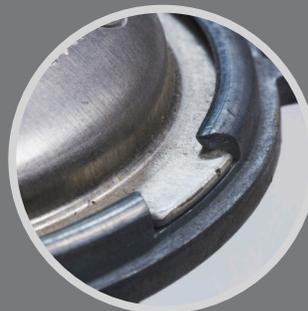
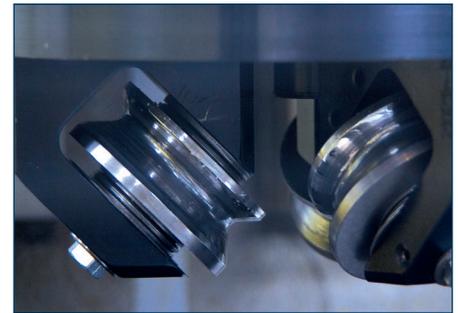
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Rollerforming was developed out of necessity. Before rollerforming, Orbitform was using a peen to form ball joints made of cast material. Forming a part that has a large diameter is difficult, if not impossible with a peen, because of scrubbing or galling issues. For large diameter parts, the corresponding peen diameter used for orbital forming would have to be prohibitively large to keep from breaking under the forces needed to complete the form. Because of debris, galling, and peen breakage, we couldn't form on the outer diameter. Orbitform's solution was the use of three rollers, equally spaced on the tooling head, and a rolling motion, instead of the orbital tool path commonly used with peens. It is easy to design

a rollerhead to the necessary diameter. With multiple points of contact, there is no angular movement, and tool breakage is eliminated. Smooth and even pressure rolls the material with minimal scuffing, because the rollers form around a controlled

diameter, instead of a single focal point. Rollerforming also allows the use of a through spindle pressure pad. This is not possible with orbital forming because the tooling is in the way. Through spindle pressure pads are spring loaded, and can compress material before forming it. They are completely independent of the spinning powerhead. The process can be further refined by adjusting the roller axles to 45°. This reduces scuffing and galling even more.

“Necessity is the mother of invention”





Additionally, inboard/outboard support for the axles is no longer needed, and the possibility of breakage is eliminated. This provides more bearing clearance, reduces stack up, and adds support for the axial support during forming.

Initially, rollerforming was used to form larger diameter cylindrical parts in a way that retains assembly components. However, we saw the potential to form smaller parts, during more delicate applications.



This process works well for very thin walled parts. It is also gentle enough to form anodized aluminum, powder coated material, and Teflon.



As we applied the process to more applications, we discovered novel solutions that were previously impossible. In many situations the area that must be formed has some obstruction in the way.

To overcome this, Orbitform added the ability to articulate the rollers. After refining the process, we discovered we could crimp snap ring grooves instead of cutting them. This is a cost effective way to add an internal retaining feature to cylindrical parts, without the need for additional components.

Quick Case Study 1

A fuel filter required the permanent assembly of a metal cylinder and a castellated plastic end cap, on both an inner and outer diameter. To orbitally form the part would have required at least two operations, with very different sized tooling. Using a custom rollerhead, we were able to form the outer ring and have smaller rollers form the inner ring simultaneously. The standard position roller axes is horizontal, but we found that by positioning them vertically for this application created room for more robust bearings. All of these subtle changes add up to a better machine that stands up to the long term wear and tear of production.





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Advantages

- Can accommodate a through spindle pressure pad to compress material before forming
- Distributes force evenly across a large diameter, and minimizes rocking
- Minimizes scuffing, galling, and material pick up, and allows forming with materials that are powder, zinc, or Teflon coated
- Can form thin walled, large diameter parts, in both inner and outer directions
- Able to clear obstructions
- Allows the use of smaller tooling to form large diameter applications
- Rollerforming requires less force than Orbital Forming

Quick Case Study 2

An industrial company needed a better solution for a ball and socket joint, used in a hydrostatic pump piston, for assembly with a specified end-play range. The company's previous process spun the part and was limited to forming the material in a horizontal direction. The material would flex back and allow too great an end-play tolerance.

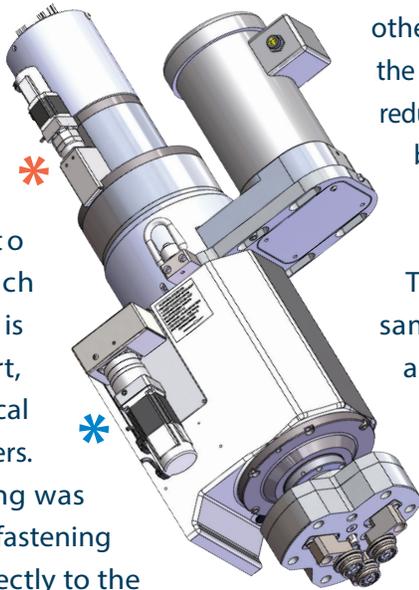
Orbitform's Solution Lab suggested the use of articulating rollerforming in conjunction with a servo powerhead to determine repeatability and forming capabilities. End-play was held to .003" max, as opposed to the previous process, which held end-play to .008" max. The process of articulating rollerforming—where the rollers move to a diameter using an adjustable hard stop—allowed the parts to be formed around an obstacle, as well as forming 38 different part configurations, with one machine, and minimal changeover. Additionally, use of a servo powerhead allows for finite control of speed and the overall forming process, giving greater consistency.





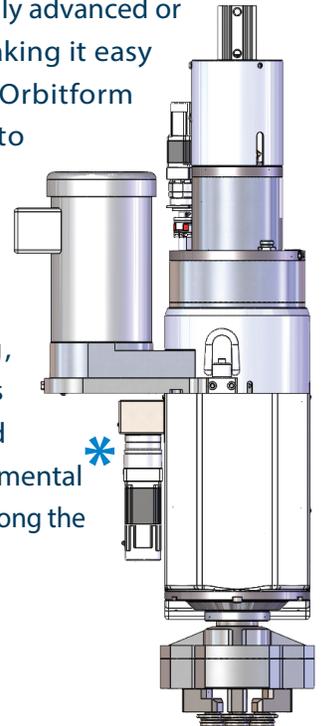
PROCESS MONITORING ARTICULATING ROLLERFORMING

Recently, Orbitform was able to bring a whole new product to market by adding process monitoring to articulating rollerforming. The additional sensing technology can be used to monitor how much compressive force is applied to the part, and also the vertical position of the rollers. Process monitoring was made possible by fastening the rollerhead directly to the main spindle and using a draw bar to control articulation. By mounting



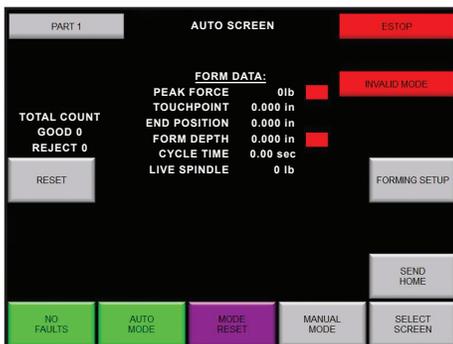
directly to the spindle, rigidity increases, and the overall robustness of the machine is improved over other designs. The size of the overall machine is also reduced by using the draw bar, and removing the rotary air coupler used in previous designs. The bearings are the same bearings used in a standard 500 series powerhead, so spare and replacement parts are readily available. The additional sensors allow the rollerhead to form to a

force (downward or inward), or form to a distance. Micro switches in the rollerhead cylinder signal if the head is fully advanced or retracted, making it easy to integrate Orbitform machines into automated assembly lines. For even further fine tuning, servomotors can be added to make incremental adjustments along the Z and X axes.

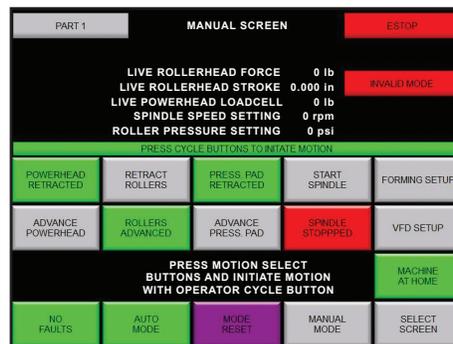


*Servo z-height

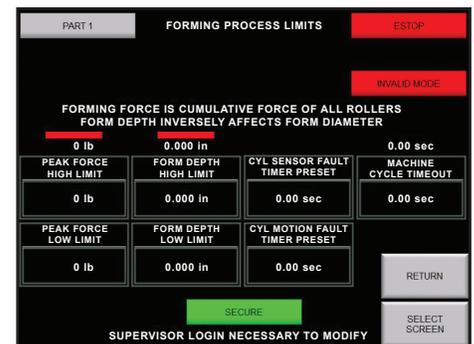
*Servo x-diameter



Auto Screen



Manual Screen



Forming Process Limits Screen



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ORBITAL FORMING



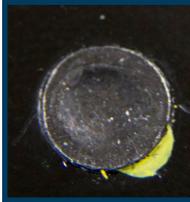
RADIAL FORMING



ROLLERFORMING



IMPACT RIVETING



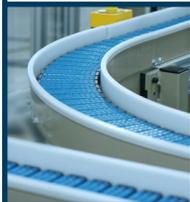
FLUSH SELF-PIERCING RIVETING



HOT UPSET FORMING



AUTOMATION SYSTEMS



CONVEYOR AUTOMATION

