Smiths Aerospace Components – Tru-Form leads the industry in material savings applications.

Precision cold rolling and forming operations

Smiths Aerospace is a leading global provider of innovative solutions to builders and operators of military and civil aircraft and engines, from fighters and transport to large civil, regional and business jets.

We are the leading transatlantic aerospace equipment company, with over 9,000 staff and $1.6 billion revenues split between Europe and North America. Our business has a unique range of specializations essential to create affordable integrated aerospace systems, through expertise in electronic and mechanical systems. We supply precision engine components from intake to exhaust.

Smiths Aerospace is backed by Smiths Group plc, a major engineering group and a member of the UK FTSE-100, which operates through four divisions: Aerospace, Detection, Medical and Specialty Engineering.

Smiths Aerospace Components offers customers a global breadth of capability through locations in the UK and North America, as well as new facilities in China and Poland.

The Components business of Smiths Aerospace continues to combine investment in highly skilled people with the latest techniques and equipment to provide our customers with innovative, advanced technology solutions.

In an industry that is safety-critical, we comply with the most stringent quality standards. With our commitment to lean initiatives, we aim to deliver quality products on time, every time, and at a competitive price.

Smiths Aerospace Components businesses are world leaders in gas turbine engine components, supplying every major engine program worldwide. Smiths Aerospace has long-term supply agreements with all leading engine companies and we equip gas turbine engines from intake to exhaust, drawing on key technologies and capabilities. These embrace flash-welded and Tru-Form™ rolled rings, together with fabrications and precision-machined components in complex alloys, where we are recognized for our specialization in advanced materials.
Technology and innovation

Smiths Aerospace Components – Tru-Form is a technical manufacturing facility located in Northeast Pennsylvania. We are an industry leader in near net shape cold rolled and formed engine components supplying major engine programs worldwide.

The Tru-Form™ manufacturing process utilizes flash welded and seamless rings as starting preforms. Tru-Form’s unique cold rolling process enables its products to closely follow finished part configurations. Our facility has been producing near net shaped rings since its inception in 1988. The near net shape ring technology is an accepted process throughout the industry. This innovative rolling and forming technique has significantly improved over the years and coupled with the latest technology offers exceptional savings and value to our customers.

Our products provide our customers with reduced material envelope designs, machining time savings, and part to part consistency.

We specialize in small production runs, keeping our internal lead time in the 2-3 week regime. This has allowed us to be very responsive to changing customer schedules. Our experience with small production runs also allows us to efficiently develop small quantities of prototype parts for engine development applications.

Capabilities
- Axial height to 30”
- Wall thickness 0.030” to 2”
- Wall thickness controlled to +/- 0.007”
- Diameters 5” to 100”
- Diameter tolerances +/- 0.030”
- Roundness 0.030”
- Flatness 0.030” as formed, machined 0.002”

Products
- Combustion chamber liners
- Combustion domes
- Combustion chamber outer cases
- Seal rings
- Nozzle supports
- Turbine cases and supports
- Fan cases
- Structural supports
- Bulkheads

Material applications
- Super Alloys
  - Iron based
  - Nickel based
- Stainless Steels
- Alloy Steels
- Proprietary Alloys

www.smiths-aerospace.com
Smiths Aerospace Components – Tru-Form, is an industry leader in near net shape technology.

**Cold rolled combustion liners**

The Tru-Form™ cold rolling process is a CNC controlled ring rolling process utilizing flash welded and seamless rings. High tonnage rolls apply point contact pressure which transforms starting preforms into highly defined envelopes around a finished part configuration. These configurations are manufactured to exact tolerances. The computer controls produce consistent and repeatable dimensions with wall thickness controlled within +/- 0.007”. The cold working of parts at room temperature enables grain size refinement and the ability to tailor material properties to specific requirements.

The design process begins by building a 0.045 to 0.060” envelope around the finished part geometry. Our modern CAD and finite element analysis technology simulates the manufacturing process prior to production which saves time and avoids trial and error developmental costs.

**Benefits of cold rolling**
- Reduced material input
- Reduced machining times
- Uniform metallurgical structures and mechanical properties
- Grain size refinement; may be tailored to specific requirements
- Improved low cycle fatigue properties
- Consistent, controlled dimensional characteristics
- Excellent surface finish as-rolled
- Outstanding proof test of each rolled component
- Tru-Form saves cost

Grain size prior cold rolling process 100X mag.

Grain size after cold rolling process 100X mag.
Near net shape technology

I.D. and O.D. shape capability offers:
- Reduced material input weight
- Reduced finish machining times
- All benefits of cold rolling technology
- Shape can be put into the I.D., O.D., or both areas
- Rough ring to finished component weight ratio as low as 3 to 1

Heat treating capabilities
- 2 high temperature furnaces
- Water quench
- Air quench
- Rapid air quench

Lean initiatives
Smiths Aerospace Components – Tru-Form, is an industry leader in near net shape technology. This leadership was a result of our commitment to creating a learning organization which uses lean manufacturing and operating principles to meet its customers’ requirements and objectives.
We are committed to providing our customers world-class service and products in today's global market.

**Precision conical forming**

We have developed a mastery of conical ring forming through the use of nozzling, expanding, and flaring techniques. The cold forming process coupled with our computer controlled equipment produces tight controls over dimensional characteristics. The process utilizes flash welded and seamless rolled rings and has allowed us to produce a family of highly complex geometric conical parts.

We have in-house capability to design and manufacture all forming and rolling tools. Our engineering staff designs the forming tools on our CAD system and runs electronic prototypes on our finite element analysis system. This process speeds up development by avoiding trial and error. Our forming capabilities have enabled us to produce shaped flange parts from flash-welded bands through a combination of our rolling and pressing techniques.
Quality

Approvals
Smiths Aerospace Components – Tru-Form holds quality approvals from the following organizations:
- Boeing
- General Electric
- Pratt & Whitney Aircraft
- Pratt & Whitney Canada
- Rolls-Royce
- Honeywell
- MHI
- Snecma
- Avio Group

Business keys to success
- State of the art rolling and forming equipment
- Highly skilled and motivated work force
- Innovative designs and manufacturing processes
- Commitment to quality excellence
- Dedication to customer service