

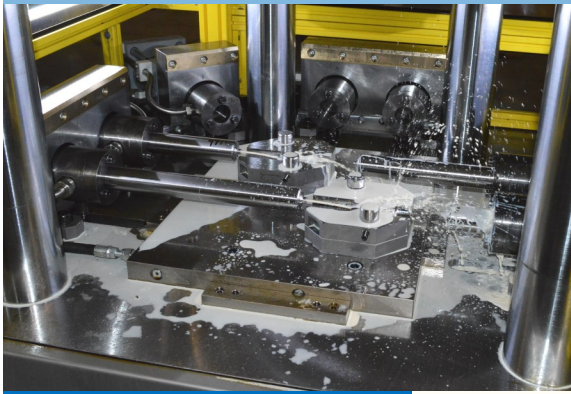
INTERLAKEN TECHNOLOGY

“We’ll make it, or we’ll help you make it.”



Hydroforming Capabilities

Systems & Components



Advantages of the Interlaken System...

- Industrial PC based system
- Built in Ethernet/Internet connectivity capability
- High rate data acquisition
- Real time graphical interface
- Designed automation ready or fully automated.
- Complete independent control of clamp, feeds, and pressure
- Highly repeatable process to maintain tight tolerances
- Custom intensifier pressures and volumes, custom voltages/Hz

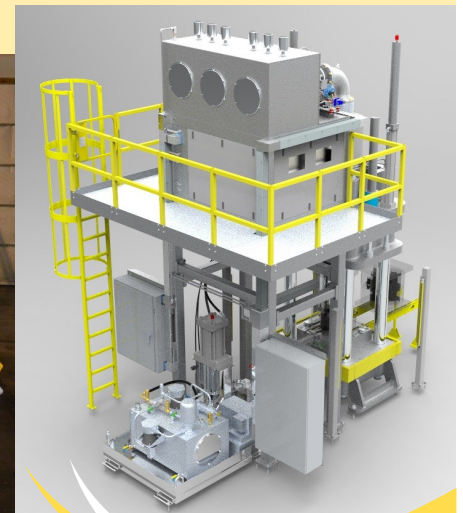
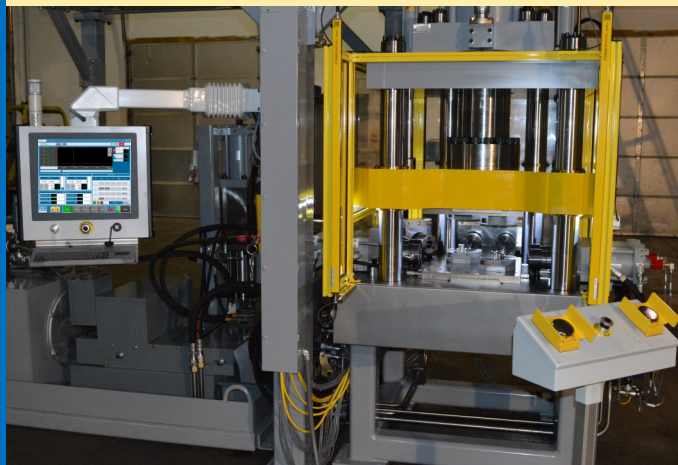
Interlaken specializes in smaller hydroforming presses from 125 to 1000 Ton. ITC presses use closed loop control of forces, motions, and pressures to produce high quality parts that cannot be manufactured by traditional processes.

State-of-the-Art control software allows users to develop intricate recipes that can be both time and event dependent. The system is comprised of five sub-systems:

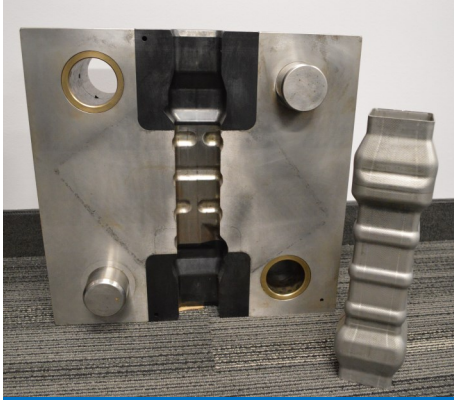
- A single-acting, servo-controlled hydraulic press with in process mode switching.
- Servo-controlled Hydroforming Feed Actuators that are fully integrated.
- A Servo-controlled Pressure Intensifier with pressure control valves. A variety of pressure and flow options are available.
- Interlaken designed tooling with changeable die inserts for differing cavity shapes that can be run with or without end feed.
- A B&R PC/Controller with 3rd generation Intel i7 processor.

| SPECIFICATIONS | THF 0.5 | THF 1.0 | THF 2.0 | THF 3.0 |
|------------------------------------|---|---|---|---|
| Press Clamping Force | 1245 kN/125 Tons | 2224kN/250 Tons | 4448kN/500 Tons | 8896kN/1000 Tons |
| Standard Bed/Bolster | 457mm x 559mm 18 in. W x 22 in. D | 457mm x 559mm 18 in. W x 22 in. D | 2336mm x 1549mm 92 in. W x 61 in. D | 2336mm x 1549mm 92 in. W x 61 in. D |
| Stroke | 363mm/14.3 in. | 363mm/14.3 in. | 508mm/20 in. | 508mm/20 in. |
| Daylight | 472mm/18.6 in. | 472mm/18.6 in. | 1041mm/41 in. | 1041mm/41 in. |
| Feed Actuator Force | 293kN/29.4 Tons | 293kN/29.4 Tons | 667kN/75 Tons | 1023kN/115 Tons |
| Feed Actuator Stroke | 101mm/4 in. | 101mm/4 in. | 203mm/8 in. | 203mm/8 in. |
| Forming Pressure | 137 MPa/ 20,000 psi* | 206 MPa/ 30,000 psi* | 206 MPa/ 30,000 psi* | 206 MPa/ 30,000 psi* |
| Minimum Digital Display for Stroke | 0.01mm / 0.001 in. | 0.01mm / 0.001 in. | 0.01mm / 0.001 in. | 0.01mm / 0.001 in. |
| Minimum Digital Display for Force | 0.01kN / 0.001 tons | 0.01kN / 0.001 tons | 0.01kN / 0.001 tons | 0.01kN / 0.001 tons |
| Power | 200A, 460V, 3 phase 20A, 115V, 1 phase | 200A, 460V, 3 phase 20A, 115V, 1 phase | 200A, 460V, 3 phase 20A, 115V, 1 phase | 200A, 460V, 3 phase 20A, 115V, 1 phase |
| Cooling Water | 15gpm max P @ 70°F | 15gpm max P @ 70°F | 15gpm max P @ 70°F | 15gpm max P @ 70°F |
| Weight | 37,500 lbs. | 37,500 lbs. | 85,000 lbs. | 100,000 lbs. |
| Press Footprint | 22.2' W x 10.9 D x 15.4' tall | 22.2' W x 10.9 D x 15.4' tall | 16'W x 17'D x 17' tall | 16'W x 17'D x 17' tall |

*Additional Pressures Available



Hydroform Components



Collaboration

ITC people possess the skills and abilities to help you achieve your goals. We'll collaborate with you, encouraging you to lean on us. ITC engineers will develop, test, analyze, build samples, and create tailored products. At the same time we'll search for a better and more cost effective way to solve the problem. We're eager to go deeper. We don't just listen; we'll hear you and advise you.

- **The Process**

Hydroforming begins where traditional manufacturing processes end. Hydroform components simply perform better and allow for greater design flexibility. ITC helps you overcome quality issues, reduce cost, and lower component part counts. Our engineers determine the maximum forming pressure necessary and component material thinning. For many applications, hydroforming just makes sense. Tube hydroforming reduces weight and increases strength and stability.



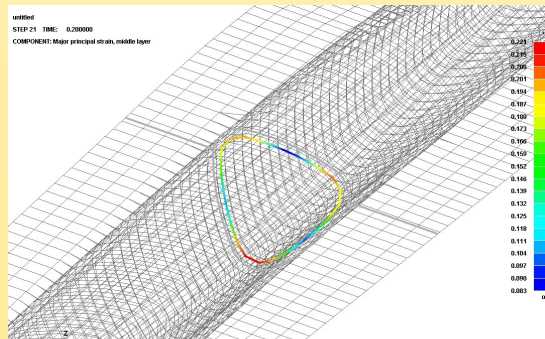
- **The ITC Advantage:**

ITC starts with a Concept Consultation. We work with you to identify needs, wants, and expectations. Then comes metal formability testing, Finite Element Analysis (FEA), tooling design, and prototyping. This is followed by tool creation, and finally, ITC will begin producing your parts.

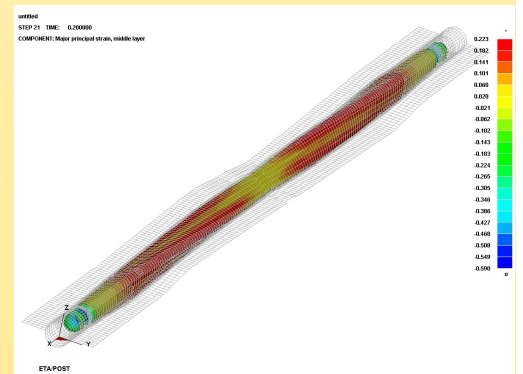


- **The Path to Success:**

At Interlaken success is built on utilizing FEA simulation. FEA is used as a one step process for feasibility assessment. We'll determine the plausibility of using a particular material, wall thickness, and part geometry. We'll learn and develop an understanding of the material behavior, strain states, and thinning. At this point we can make recommendations on possible changes to part geometry to best utilize the hydroforming process. It's all about ensuring that your part meets identified specifications.



Section at high strain location

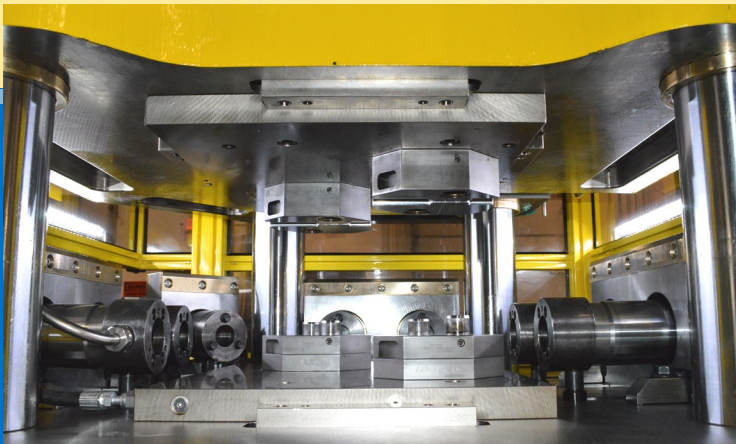


Formed Part - Pressure 15,000psi

ITC's Proven Process...

Whether it be a System or a Component part, ITC will always rely on the following seven steps to realize hydroforming viability:

- 1) Feasibility - We will research and assign a Manufacturing Readiness Level to assess the maturity of a given manufacturing process, technology, or product. This will generate a Feasibility report with recommendations.
- 2) Conceptual Design - The concept solution will be detailed with drawings, estimates and assumptions.
- 3) FEA & Final Design - The concepts and recommendations will now be tested. This will require tools to be modeled and an FEA report will be generated. The system design and tooling design are completed.
- 4) Prototyping & Process Development - ITC will then validate the findings of the FEA. A physical prototype will be substantiated for final shape and wall thickness. A positive net result will provide confirmation of the concept. Design is released to purchasing, a workflow is formalized, and a process recipe is developed.
- 5) FAT/First Article - Factory Acceptance Test to validate system performance. ITC now works with you to determine the First Article criteria for a component .
- 6) Install/PPAP - Interlaken will install your new hydroforming system, provide operator training, and ensure full functionality at your facility. For Component parts, the parts and pre-determined documentation are sent to the customer.
- 7) Customer Feedback - ITC solicits and receives customer survey results to support continual improvement.



Hydroforming Capabilities



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