

# Advanced manufacturing systems for defense



Munitions



Land systems



Naval systems



Aerospace systems

# Advanced manufacturing systems for defense

## MUNITIONS

For manufacturing small, medium and large caliber munitions, Schuler has solutions to help improve your manufacturing capabilities – better quality, better reliability, better output.

### Opportunities:

- High speed production equipment
- Cold, warm and hot forging
- Repair and rebuild of existing equipment

### SMALL CALIBER MUNITIONS

#### Technology for new equipment

High-speed production of cups, cartridge cases and projectiles in steel and brass. Benefits:

- Reduced manufacturing stages
- Reduced floor space
- Fully-integrated system from one source

#### Technical services for legacy equipment

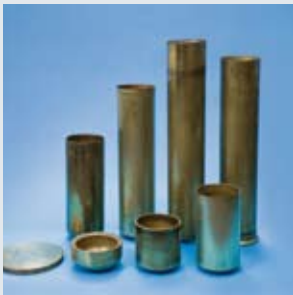
We support all Bliss ammunition equipment.

### MEDIUM AND LARGE CALIBER MUNITIONS

#### Precision forging for durable and near net shape products

Schuler is a leading global supplier of cold, warm and hot forging systems for precision manufacturing of canisters, cartridges and housings. Our process experts can support an entire turnkey solution from process development including dies through full system installation and start-up. Benefits:

- Controlled process
- Output flexibility
- Higher productivity
- Variety of materials (steel, brass)



## LAND SYSTEMS

We have innovative solutions to meet the requirements of modern vehicle design. Whether metal forming, stamping, forging, hydroforming and working with high strength steels, we have experienced.

### Opportunities:

- Increase structural rigidity
- Improve strength
- Reduce weight
- Process high-tech materials
- Fewer components within an assembly

### VEHICLE WEIGHT REDUCTIONS

#### New approach to vehicle structures and structural fittings

Hydroforming hollow tubular components allow a freedom of design for vehicle structures and also structural fittings. Advances in die designs now make this process more attractive for lower volume production.

### ADVANCED COMPONENT STRENGTH

#### New possibilities to process advanced materials

In a variety of applications including developing ultra-high strength steel in the die, processing advanced composite materials, and drawing complex and deep metal designs, our hydraulic press technology has proven high quality for maximum productivity.

#### PCH – Pressure Controlled Hardening

Ultra high strength steel properties are achieved when products are heated and then formed with controlled cooling in the die.

This higher strength can improve component design to achieve lighter weights.



## NAVAL SYSTEMS

Creative design solutions can provide benefits for piping and structures within naval and marine system designs.

### Opportunities:

- Multiple connection interfaces in one-piece design
- Improve strength
- Fewer components within an assembly
- Reduce weight

### STREAMLINED DESIGN

#### Improve piping design through reduced assembly and welding

Hydroforming improves shapes for compact designs. Complex multiple-connection fittings can be formed with hollow tubes. This reduces the number of components in an assembly and removes welds from piping systems (eliminates welding certifications). With a high degree of design freedom, precious space can be saved with complex curves and bends using hydroformed pipe.

#### Full scale serial composite panel production

Fiber reinforced plastic panel designs can be produced in serial production using our reliable and economical hydraulic press solution.



## AEROSPACE SYSTEMS

Our advanced manufacturing solutions can provide benefits for turbine components, canisters, panels and structures as well as composite forming.

### Opportunities:

- Reduce weight
- Increase component strength
- Reduce part complexity and manufacturing stages

### HIGH PERFORMANCE COMPONENTS

#### Near net shape with precision forging

Forging produces products with durability to withstand high loads and reduced weight. Our systems are able to form various materials including titanium with reduced manufacturing stages.

### LIGHT WEIGHT COMPONENTS

#### Improve designs with complex tubular shapes

Hydroforming allows freedom of design for unique shapes to reduce components in structural designs and provides more structural rigidity, resulting in lighter weight components and assemblies. As a full service provider, we offer hydroform part design, prototyping and production.

#### Consistent production for composites

Fiber reinforced plastics also offer light weight solutions with freedom of design. Our hydraulic press systems are flexible, reliable and founded in experience.



## LEGACY EQUIPMENT

### Keep a good thing going

We support all Bliss brand ammunition equipment... and more. We can bring your equipment up to date with the latest components and technology for a safe and productive manufacturing process. Our technical experts can provide services from basic repair and component upgrades to full repair and refurbishment including:

- Controls upgrades
- Clutch & brake systems
- Lubrication systems
- Modern and standardized shelf components
- Component refurbishment
- Updated safety systems



## TURN-KEY SOLUTIONS FROM A SINGLE SOURCE

### From concept to series production – success based upon partnership

The time between the first meeting and the start of production on a new system in your company is very important. During this period, we remain in close contact with your planners, as well as with your diemaking, production management, maintenance and purchasing departments. In this way, we prepare the groundwork for production to start on schedule together.

Whether the hurdle to your goal relates to component development, diemaking, press technology or automation systems – together we will find the appropriate solution.



## OVERVIEW: MANUFACTURING PROCESS EXPERTISE

**Precision forging** – Cold, warm and hot processes for all shapes/sizes, including canisters, with near-net shape final products.

**High-speed processes** – advanced designs for cartridge and bullet production provide quality and productivity.

**Hydroforming** – A full-service provider of hydroform part design, prototyping and production. The opportunities for complex tubular forms are plentiful, offering reduced components in structural design, lighter weight options and freedom of design.

**Advanced forming systems** – transmission roller die technology, press hardening for ultra-high strength steel parts, forming advanced materials, automation systems, and laser systems are paving the way for new products.

**Life Cycle Management** – mechanical, hydraulic and controls engineering and services to upgrade and modernize existing bullet assembly equipment and any/or other metal forming equipment – with turn key project management.

### ADVANCED MANUFACTURING SYSTEMS AND SUPPORT

	MUNITIONS	LAND SYSTEMS	NAVAL SYSTEMS	AEROSPACE SYSTEMS
<b>Precision forging</b>	■	■	■	■
<b>High-speed Processes</b>	■			
<b>Hydroforming</b>		■	■	■
<b>Advanced forming systems</b>	■	■	■	■
<b>Composite forming</b>		■	■	■
<b>Pressure Controlled Hardening (PCH)</b>		■		
<b>Life Cycle Management</b>	■	■	■	■

# Manufacturing solutions for the defense industry

Schuler supplies machines, production lines, dies, process know-how and services for metal and composite forming manufacturing. Founded more than 170 years ago, the company is a technological and global leader, employs over 5,000 people and is represented by its own facilities and sales offices in forty nations around the world. Whether metal forming, stamping, forging, hydroforming or working with advanced materials, our goal is to provide a cost-effective solution based upon our extensive process knowledge.

We offer complete turn-key systems with a collaborative approach, often starting from original part concept and offering services such as project management, production start-up and support.

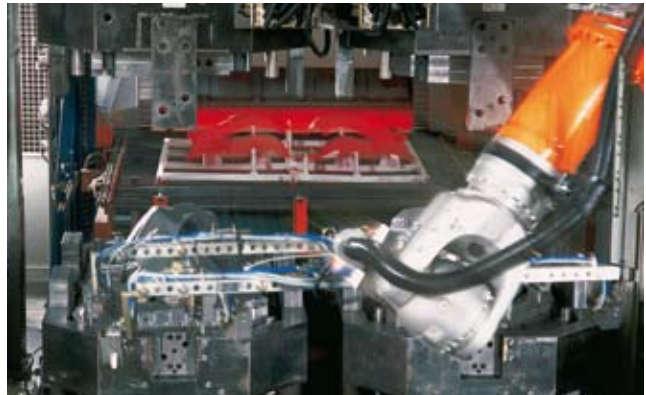
## CONTRACT OPPORTUNITIES

- Manufacturing process development
- Advanced manufacturing systems
- Engineering and technical services
- Modernizations and refurbishments
- Consulting for part development
- Hydroforming prototyping and production

## ACHIEVE RESULTS

**Benefit from the individual and expert advice of Schuler's forming specialists and achieve:**

- Consistent quality and performance
- Improved product designs
- Production flexibility
- Advanced materials
- Increased output
- Equipment/process rationalization
- Improved process control
- Equipment standardization



## More. Service from Schuler.

### Technical service

- Maintenance and servicing
- Machine inspection
- Safety inspection
- Preventive maintenance
- Energy checks
- Teleservice
- Overhaul
- Machine relocation
- Machine installations

### Performance enhancement

- Optimization
- Modernization
- Die and process technology

### Training

- Schuler Academy
- Production start-up support

### Used equipment



### Service worldwide:

- Germany • France • Great Britain • Italy •  
Switzerland • Slovakia • Spain • Czech Republic •  
Russia • USA • Mexico • Brazil • China • India



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