



**NORMA  
GROUP**

*Customer Value  
through Innovation*



## **Advanced parts and components for fluid and gas systems.**

NORMA Group helps you stay up-to-date with new demands by optimizing fluid and gas systems so that they have fewer parts, take less time to install and make you more competitive.



For over a century, NORMA Group has been developing joining technology solutions that are the standard in many industries.

Our customers are in the aviation, train, vehicle, manufacturing and construction industries. We are headquartered near Frankfurt, Germany with manufacturing, commercial, technical and distribution facilities located around the world. The NORMA Group is a market leader in the production of engineered joining technology. This includes plastic tubings, metal and plastic connectors and a variety of clamps and sealing products in different materials. In addition, we offer several value added options depending on the requirements of the customer application. The NORMA Group is listed on the German Stock Exchange.

Our core technologies and services include:

- Full-service Engineering Capabilities for Design, Testing and Prototyping
- Automated manufacturing and assembly of engineered metal and plastic parts and systems
- Stamping & Forming

At NORMA Group, we support our customers with a wide array of engineering, product development and prototyping services that compress development cycles and improve quality and functionality. We provide engineering services from concept to prototyping and pre-production to serial production.



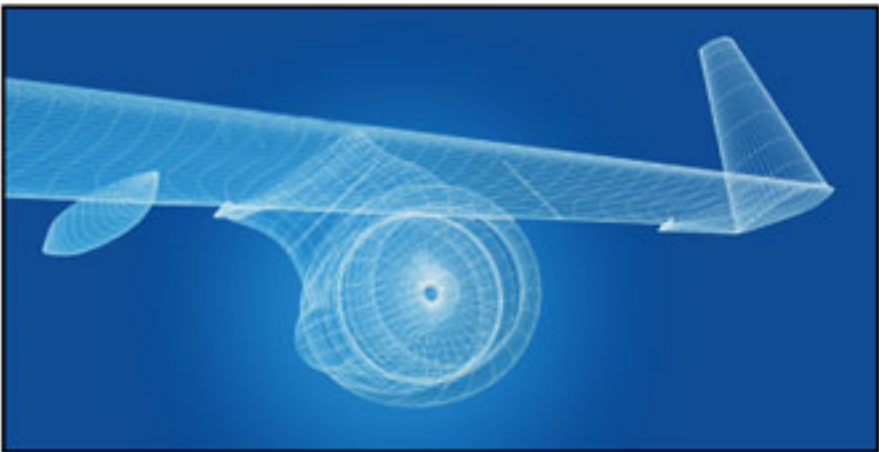


# Samples of NORMA Group's Aviation Product Innovations: Simplifying installation while providing better and lighter solutions to improve the final product.

NORMA Group is a leader in the development of joining liquid and gas fluid connection systems including thermoplastic tubing, clamps, and injection molded parts. We collaborate closely with our customers when developing new products, sharing our over sixty years of collective experience.

We create customer value through:

- System knowledge
- Engineering capability
- Innovative connector systems
- Material know how
- Cost effective solutions



We utilize the latest software and technology to quickly go from idea to prototype, testing and production.

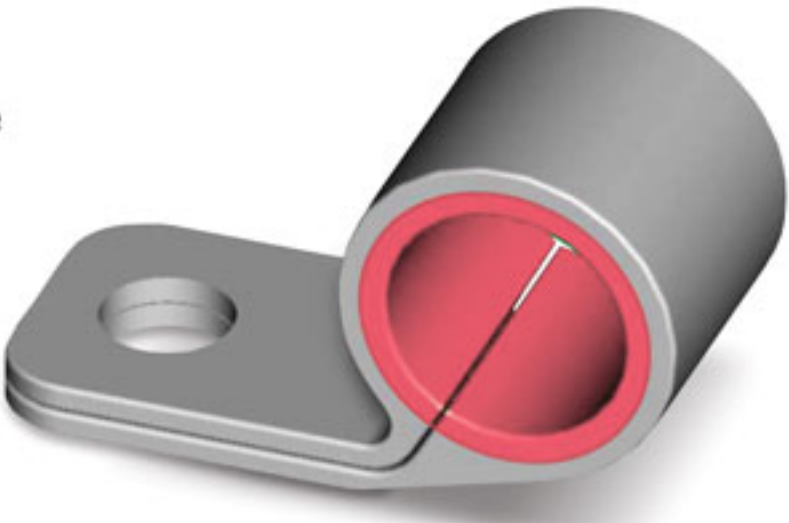
## NORMA's New Red Grip clamp

NORMA Group's new Red Grip lightweight aviation retaining clamp was specifically developed to meet new requirements from the aviation industry for stronger, lighter and easier to install parts. This clamp includes a cushion that absorbs vibrations, reduces wear on hoses and cables, and is able to withstand extreme temperature fluctuations, vibrations and various chemicals.



### Advantages

- Light weight
- Easy to install
- Requires less space
- Durable



NORMA Group's Red Grip clamp saves considerable weight and can be made for many different applications for any sized airplane.



## The New NORMA Heated SCR Lines.

NORMA Group has developed a new lightweight and easy to install hose system that controls the temperature of liquid and gas with substantially lower energy consumption compared to similar systems. The tubing system can be set up to monitor correct temperature, pressure and flow when installed together with sensors and controllers. The system was initially developed to inject a fluid into the exhaust gases to lower NOx concentration in the exhaust emission from diesel engines but can be used for a variety of applications. The temperature can be adapted with heating or cooling on the inside of the hose which means fewer parts, better durability and easier assembly.

### Advantages

- Less energy consuming system
- Easier assembly process, plug and play
- Less crimps, less components, more robust
- Considerably less weight



## NORMA Twist Coupling Technology

NORMA Group has developed a variety of special designs for twist coupling systems to satisfy customers need for leak proof connections that are not much wider than the hose or the tube and easy to assemble on the line. The connection therefore requires no extra space and can be twisted in a single hand operation. The couplings can be made of different materials to withstand specific chemicals, temperature and high pressure demands.



### Advantages

- Secure lock with rapid installation and de-installation
- Requires less space - No protruding parts
- Fewer components less failure sources
- Withstands high pressure due to unique locking mechanism



## Quick Connectors

NORMA Group offers quick connector systems for air duct, fuel lines and fuel hoses to ensure safe joints that require less space. High flow properties combined with small outer diameter create an exceptionally small connector. The connector can be integrated or combined with plastic or steel tubes and can be made for different pressure applications.

We create customer value through:

- Innovative joining systems
- Engineering capability
- System knowledge
- Material know how

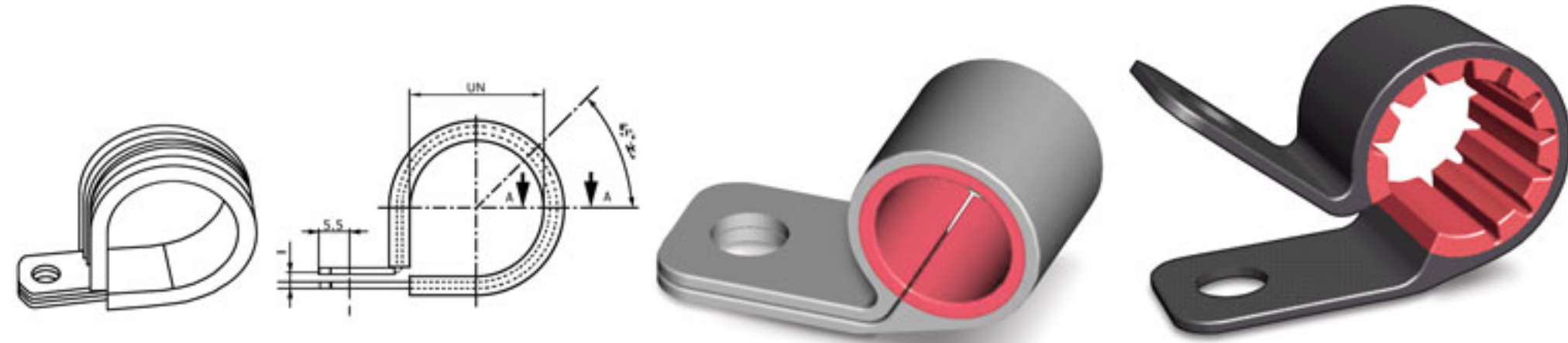




**NORMA Group offers the aviation industry new engineered products and development services that make stronger, lighter and easier to install parts and components for joining systems.**







At NORMA Group, we increase our customer's competitiveness by providing better solutions for the connection of media transporting systems.

At the NORMA Group, we deliver customer value by providing better products and systems by combining our expertise in manufacturing with our client's needs and expectations. Our solutions provide many advantages:

- Lighter weight
- More durable parts
- Better functionality and fewer parts
- Enhanced system design
- Reduced costs through easier installation assembly
- Reduced maintenance costs
- Global support
- Reduced risk
- Joint research and development

NORMA Group is a parts developer and manufacturer as well as an engineering company with the goal of exceeding your expectations.

Our solutions perform more effectively because we have experience developing parts and systems that efficiently transport media under extreme conditions. New instrumentation development allows us to measure the flow of fluids and gases to offer solutions that reduce energy consumption and minimize environmental damages. We understand our customer's markets and we work hard to fulfill all expectations and needs.

NORMA Group has a fully equipped quality and testing department to ensure optimal product performance.

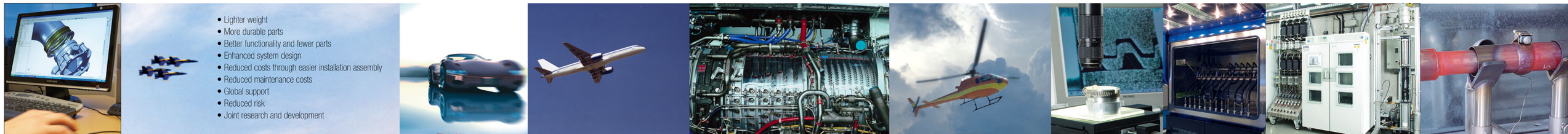
NORMA Group is able to test designs and materials under extreme conditions to make sure that our customers receive parts and systems that do not fail and that meet your demands in terms of accuracy and consistency. We provide our customers with valuable solutions for leak-free connections when it comes to flow, pressure, extreme temperature fluctuations, corrosion, chemical influence on the Engineered Joining Technology's material, and hose and container materials. In short, we provide reliable solutions for the connection and transportation of fluid and gas in any system.

NORMA Group's design solutions increase product quality by engineering the best solutions for their requirements.

NORMA Group's new product development step-by-step process ensures exceptional product quality.



- 1. Definition**  
Together with the client, we define the project and decide on a timeline that suits their new product development needs.
- 2. Feasibility**  
Through research and testing, we examine various directions for the best possible solution for client's needs. Several versions are presented for discussion with client.
- 3. Validation + Release**  
The best solution is determined and made into a prototype for testing and re-evaluation in a simulated real life application. Design refinements are developed and tested.
- 4. Production Readiness**  
The best solution is prepared for production. Machine tools are designed and made for the best manufacturing method.
- 5. Product Launch**  
Products are brought to production.
- 6. Completion**  
Delivery of produced parts to client, final review of project and ongoing support



#### Certifications

The NORMA Group is certified to ISO 9100, ISO 9001, ISO/TS 16949, and ANSI/ISO 14001 in the USA. We are also currently certified according to the Nadcap standard. Moreover, NORMA Group has been certified according to numerous further industry and engineering certifications.





We manufacture more than 30,000 different products used to connect leak free gas and fluid systems in all types of equipment.

NORMA Group's products are delivered to the aerospace, train, vehicle, machinery and construction markets. We have a global distribution network serving more than 10,000 customers worldwide. Our innovative joining technology is considered the standard in many of our markets and we strive to expand the usage of our engineering know-how into every area where leak free connections are needed for making higher quality and more efficient systems.

Ordering parts or systems from the NORMA Group brings with it all of the benefits you expect from a global supplier: quality, worldwide distribution, field support and customer service. We ensure that your part or system performs to your specifications. When you add shortened lead times and efficient shipping, you know that you have the right supplier and the right product delivered when and where you need it.



Our engineering expertise and manufacturing capabilities form the base of what we offer.

Our people are one of our greatest assets. The work they do brings value to your business. Our research and development teams, application engineers, and system solution specialists are highly skillful and able to supply the optimal solution for your joining technology application. We use the latest computer-aided manufacturing technology to meet and exceed your stringent demands for quality and delivery. We continue to invest in both people and manufacturing technology, providing innovative solutions at the quality level you require.

Advantages:

- More durable parts
- Better functionality and fewer parts
- Enhanced system design
- Reduced installation costs through easier installations
- Reduced maintenance costs
- Global support
- Reduced risk
- Research and development





Many of NORMA Group's products are already used as standard equipment for both military and civilian airliners.

The NORMA Group of companies are accredited and maintain the latest versions of Quality Management Systems available. We have complete documentation of our chain of suppliers and other applicable specifications in regard to the aerospace industry. NORMA Group maintains quality management systems certified by ISO 9001 and AS/EN/JISQ9100.



**Quick Release Clamp**  
Our Quick Release Clamp is easy to install and remove without any tool. Perfect for applications where frequent assembly or disassembly is required. Comes standard in stainless steel; bandwidth 18 mm; thickness: 0.8 mm.



**Aviation Worm Drive Hose Clamp**  
We offer a variety of hose clamps engineered specifically for the aviation industry. The clamps are exceptionally light due to the perforated band. The thread is engineered to be vibration proof and easy to install when needed. Optional with hole for locking wire.



**V-Band Couplings**  
NORMA supplies a variety of custom made V-Band Couplings for use in high pressure and temperature joints. Good for exhaust and heavy duty applications.



**Special Design Clamps**  
We develop and manufacture new clamps and retainers for any application and use.



**P-Clamps**  
Due to the inside corrugation, these clamps are mainly used for attachment of spiral coiled sleeves. Clamps are available in a variety of materials.



**Saddle Clamp**  
Mainly used for aerospace pipe assemblies and electrical cables. Optional with rubber cushion. Can be supplied in a variety of sizes.



**Delta Washer**  
The Delta washer is engineered to distribute the load of fasteners in tight areas and are designed to speed up installation. Can be provided in a variety of materials, sizes and thicknesses. High precision guarantees perfect fit every time.







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