

REDUCING THE SYSTEM COSTS OF FASTENING

Development partnership, modern products and logistic support

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Economical fasteners



Objectives and services

EJOT is a medium-sized group of companies supplying commercial customers with parts used for fixing and assembling. Our customers are the core of our business.

They decide on the success of our group. In finding solutions for the needs and problems of our customers we are assuring our future.

Our products must provide a distinct advantage, particularly with regard to their engineering performance, together with careful assistance at the design stage and logistical back up.

- development partnership
- systematic application engineering
- logistic service
- fast communication
- advanced and efficient range of products
- leading quality

Intelligent purchase...

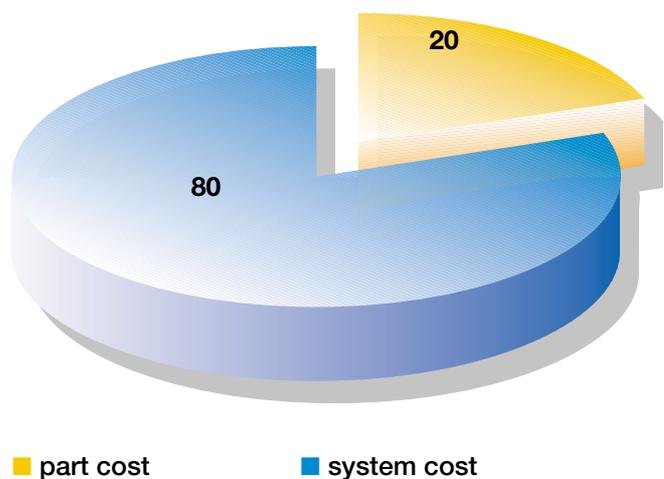
The situation.

Fastening technology basically divides costs into part- and system cost.

Part cost is defined by the cost for the fastening element, for example screw, nut, rivet, etc. The system costs include development of the part, manufacturing of semi-finished goods, treatment, assembly, quality assurance, logistics etc.

The overall joint cost normally consists of 10–20 % part cost and 80–90 % system cost.

This shows that the system costs represent the highest potential for a cost reduction – and not the price of the fastener.



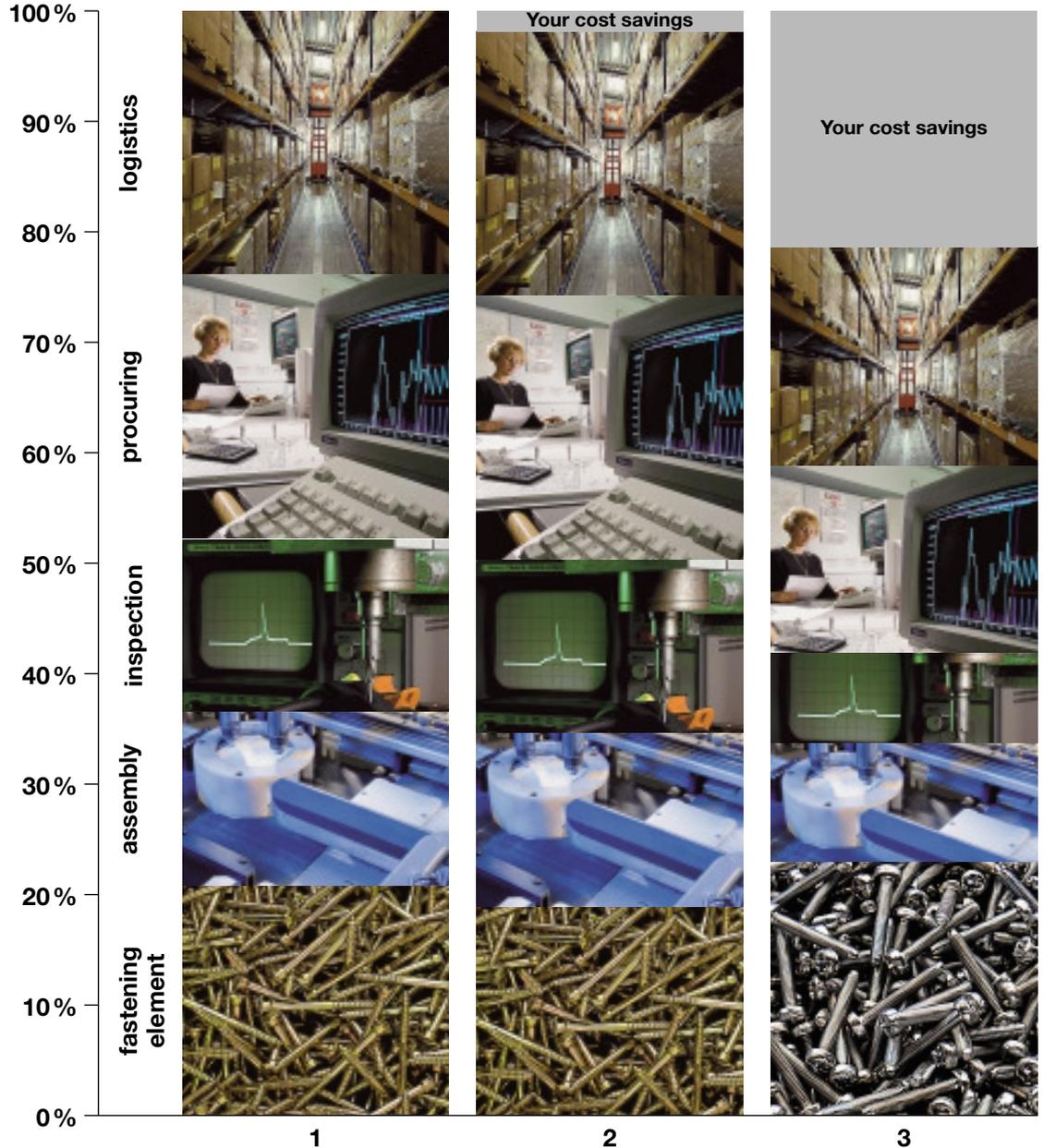
...means favourable production

Reduce the system cost.

The adjacent graph shows the effect of reduced part- and system cost on the overall cost.

Cost savings by an optimal fastening technique through:

- less procuring by standardization
- reduced inspections
- efficient logistics
- bespoke assemblies
- multi-functional fastening elements
- "more intelligent" screws



1
Initial situation of a 20/80 relation of part- to system cost.

2
Effect of a 10 % reduction in the part price. Maximum overall cost reduction of only 2 %.

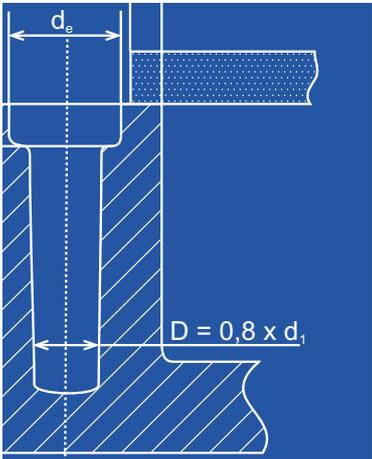
3
This shows where considerable cost savings can be found.



Development partnership

For years we have not only been known as a supplier of high quality fasteners, we are also regarded as a reliable partner with extensive know-how of the industry. Constant pressure to reduce costs has led to the need to look beyond the cost of the fastener itself. In the long term our customers will need a reliable and successful supplier.

Therefore, our partnership needs to start at the development stage as this is the time costs are produced.



80 % of the costs are created during the development

If we are involved during the design and development stage, lifetime costs can be reduced drastically.

For many engineers fasteners are a low cost item and are only considered at

the end of the design and development process. Such a false estimation often results in high costs that will last until the start of a series production or throughout the lifetime of the part.

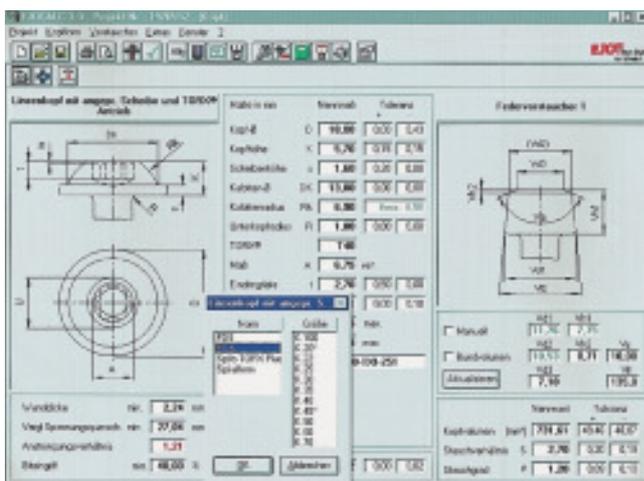
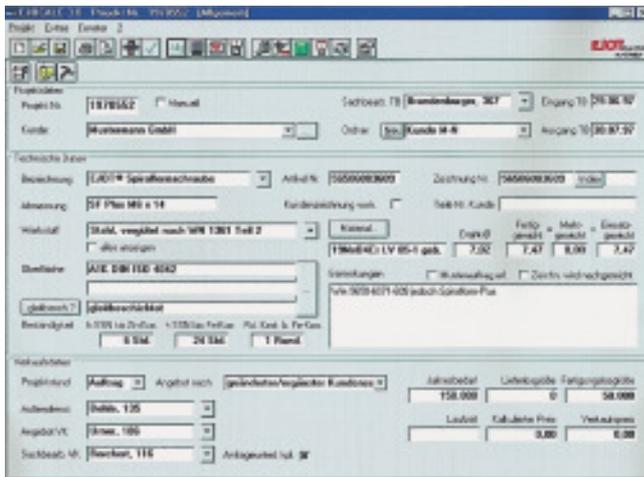
Often it is impossible to meet important requirements and assembly parameters due to installation circumstances. After having completed tools, assembly installations and assembly lines, a high expenditure would be required to change them. Thus, the risk of production losses and recall actions cannot be avoided and one has to make compromises during the whole lifetime of the part. Or, there will be high inspection costs (100 % control) that could have been avoided by using alternative fastener techniques.

with EJOT

A close partnership co-operation and Simultaneous Engineering will help to avoid such problems.



EJOT provides the necessary know-how. Highly qualified engineers and consultants, logistics, metallurgy, QM, in-house research & development and our efficient design department will be of assistance in finding the right solution.



Computer aided design

An early integration of planning and development will reduce the system cost of a joint.



Reducing the system costs of fastening with EJOT

1 In the design stage

The cost structure of a product is mainly influenced at the design stage – more than in any other stage. Basically, the development costs represent 10 % of the overall costs but determine about 80 % of the final product. Therefore the design engineer has a major influence on the cost structure. During the product design he should begin to consider which assembly technique to choose.

It is evident that changing a part once in production will cause more costs than an optimization of the joint at the stage of design. EJOT, therefore, supports our customers during the design stage by comprehensive application engineering services indicating the safety margins of your parts and by giving design recommendations for automated assemblies.



CAD-design engineering

EJOT offers assistance by:

- giving advice in the design stage
- reducing the development cost to the customer through specific technical advice
- a common product and process development
- giving advice how to design the fastening point
- giving advice how to design the fastening element
- providing an easy to assemble design
- training/seminars
- engineering publications



Problem analysis with the Customer as the starting-point for economic system solutions

These services will lead to:

- reliable development and production
- reduced working life costs
- decreased time of development
- reduction in communication
- lower quality costs

2 During the starting process / prototypes

Our well trained application engineers and technical consultants are at your disposal as well as our application laboratory, the EJOT APPLITEC. The APPLITEC team thoroughly analyses our customers' parts.



EJOT APPLITEC
application laboratory

In order to establish and optimize the fastening parameters test, samples can be produced for a particular application. Design guidelines and recommendations will be discussed with the design engineers and can be specified into the assembly requirements.

All test results will be documented in detailed reports.



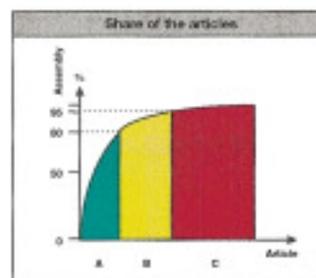
The benefits:

- increased flexibility
- reduced reaction period to customer requests
- less R & D amendments
- shorter development times

Working processes during the series production (item 3–6)

3 Procuring

Fasteners are typical "C Parts" in terms of value and the cost saving potentials can often be overlooked. More effort is put on reducing the cost of "A Parts". As a consequence the procuring costs may exceed the real value of the fastener itself. Basically, a reduced number of suppliers will lead to a cost reduction in the fields of purchase, incoming goods and stock: less orders = less paper = less consignments = less incoming goods- and stock handling. EJOT's comprehensive range of products allows us to offer a wide spectrum.



Logistic characteristics – real	
A	Parts with a planned production <ul style="list-style-type: none"> ▶ high consumption ▶ for one customer or with a high share for one customer ▶ disposed at the finished article stock
B	Parts that are produced repeatedly <ul style="list-style-type: none"> ▶ irregular consumption ▶ for one and more customers ▶ production acc. to order
C	New parts <ul style="list-style-type: none"> ▶ for one customer ▶ depending on the order

The benefits:

- reduction in suppliers
- concentration to the essential points
- one-hand-supply
- reduction of procurement cost

Reducing the system costs of fastening with EJOT

4 Incoming goods

Our demand on quality pays for itself – and for our customers. Our quality management during production means less inspection of incoming goods for you.

The use of bar-codes allows a distinct identification of the consignment.

The integration into KANBAN-systems allows automated feeding systems. Expensive handling, including the related costs for the disposal of packaging is eliminated.

Reliable systems and our know-how will help you.



The benefits:

- easy identification of the consignment
- high efficiency
- safety by quality inspections
- quality documentation, such as FMEA, APQP, etc.

5 Logistics

It is our aim to keep procuring and warehousing costs as low as possible by simultaneously offering product availability and quality.

With respect to simplified procuring processes, EJOT offers a variety of cost reducing procedures and services. The steady analysis of our customers' demands and advanced logistics procedures are leading to high availability of our products. Skeleton contracts and delivery schedules via electronic data interchange facilitate and accelerate the processing times of our products.



The benefits:

- reduced stockage cost
- high availability
- shorter production leadtimes
- optimized supply/logistik cycles may lower overall cost



6 Assembly

For more than a decade companies have recognized the need for automated assemblies, particularly on high volume applications. Due to the high capital costs required for automatic processes this should be considered as the first step of a project, aiming for rationalization of fasteners and assembly methods.

Conventional standard screws have almost exclusively been developed for manual assemblies. Thus, they normally should not be used for automated assemblies. By using “more intelligent” fasteners, the utilization and economic efficiency of the assembly equipment will be considerably influenced. Our products have been advanced following our customer demands.

In order to enable our customers to achieve economical use of their capital-intensive assembly units we have created our EJOMAT® quality. EJOMAT® manufactured fasteners provide a high lot-purity-factor; increasing machine uptimes thus decreasing assembly costs: **Quality that pays dividends.**



The benefits:

- individual and purposive advice
- development partnership with EJOT
- safety for the future by assembly-friendly quality
- sorted parts, such as EJOMAT®, ensure a 20 – 50 ppm rate
- reduced assembly costs

7 Continuous improvement

Should there be a concern you will be in good hands at EJOT. We guarantee a prompt response from our quality department.

Every stage of an order can be traced back 100 %. Thus, we will find the fault and ensure our customers receive correct parts. On the other hand, every concern note will be an incentive for continuous improvement.

Our objective is continuous improvement.



The benefits:

- fast and uncomplicated response
- personal response from our quality department

Lead by quality – The EJOT range of products

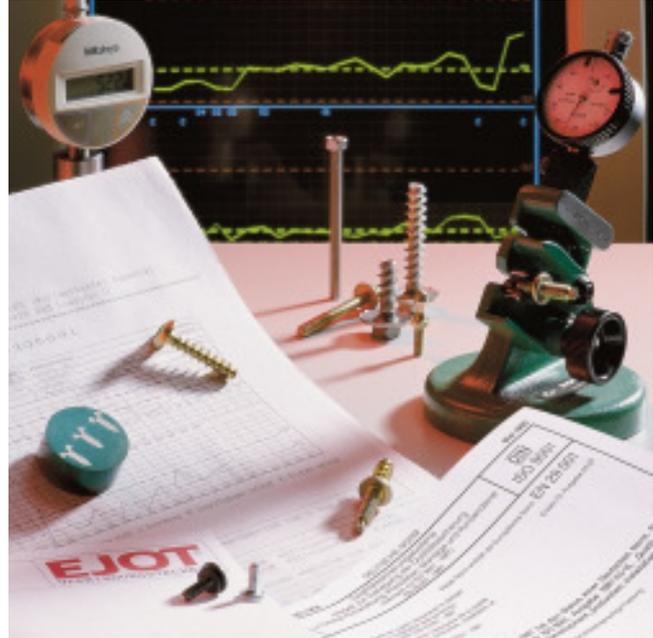
The quality connection

Quality to us is not a one-time occurrence, but an exercise we adhere to because of our customers' requirements.

Quality is the credo of our group – and it is the company objective that only high-quality products shall be associated with the brand name EJOT. Quality means to fulfill customer requirements to their complete satisfaction which is a prerequisite for our success.

Quality starts with advising our customers, continuous with the operational processes and assures that our customers are supplied with technically perfected products.

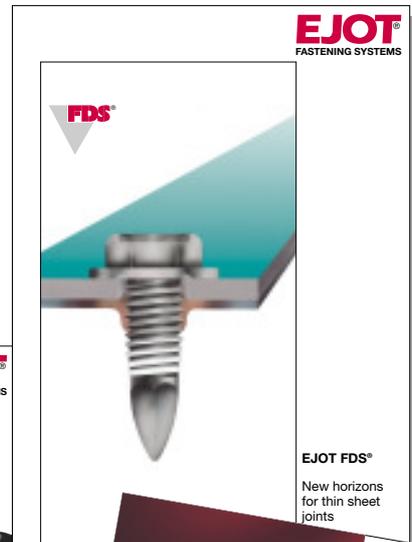
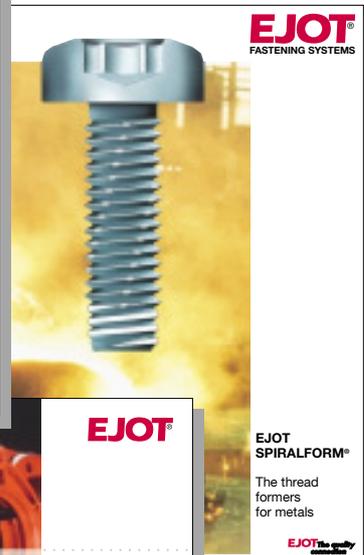
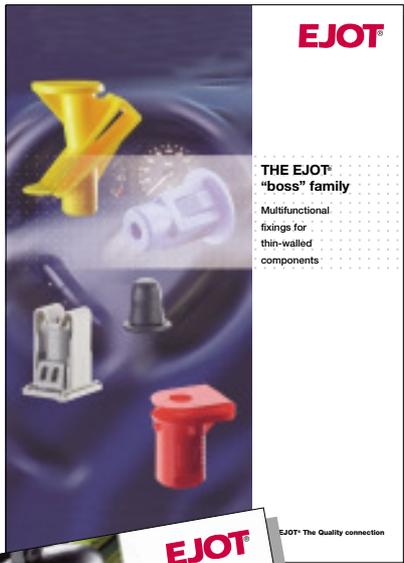
EJOT – The quality connection. This is the top principle of our group binding everyone at EJOT.



Product / material compatibility

	product						
	DELTA PT®	ALtracs®	Duro-PT®	“boss“ family	FDS®	Spiralform®	drill-screws
material							
thermoplastics	●			●			
thermoplastics (high-filled)	●			●			
thermoset plastics			●	■			
thin sheet (0.3–1 mm)				■	●		
sheet metal (> 1 mm)				●	■	●	●
light alloy die castings		●		■		■	

- recommended
- conditionally recommended



EJOT product range:

Plastic fasteners

- DELTA PT® fasteners
- Duro-PT® fasteners

Metal fasteners

- FDS® fasteners
- ALtracs® fasteners
- Spiralform® fasteners
- Drill fasteners

Special fastening elements

- EJOFORM® multi-functional parts
- safety profiles against loosening CONLOK®, VIBRALOK®
- Micro fasteners
- Alusert
- ALupoint®

Others

- "boss" family
- tube attachments EJOT FLLASH®
- Engineering plastic parts
- EJOMAT®

This overview of our product range gives you an idea of the fasteners we produce. Further information is provided in our brochures.

Please find our terms of sale under www.ejot.de or ask for them directly.

Plastic fasteners

EJOT DELTA PT®

Fasteners for thermoplastics

The EJOT DELTA PT® screw is a specially designed fastener for secure and problem-free screw joints in thermoplastic materials. The specific design of the DELTA PT® screw results in a robust fastener, which gives you safety even with a critical design and application.



Benefits of the DELTA PT®:

- minimised radial stress due to small thread flank angle
- optimized material flow
- higher safety from self-loosening due to optimum thread pitch
- substantially increased service life of the screw joint
- high tensile strength
- high torsion strength
- use of shorter fasteners and/or smaller diameters possible compare to ordinary screw joints
- material through hardened steel PT10
- cost effective by use of standardised (WN) parts
- DELTA PT® prognosis software allows a clamp load orientated engineering

EJOT Duro-PT®

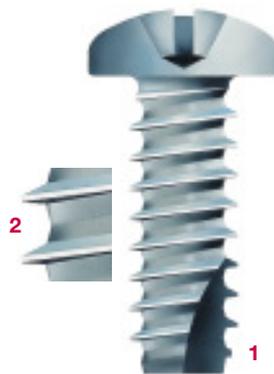
Fasteners for thermosets

The EJOT Duro-PT® fastener was especially designed for assemblies into thermoset plastics to insure consistent and reliable installations and improved long term joint behaviour.

The Duro-PT®'s special thread design lowers radial stress acting on the boss.

EJOT DURO-PT®:

- 1 Special cutting edge design for the displacement of thermosets
- 2 Low installation- and high stripping torques due to asymmetrical thread



Benefits:

- easy-to-handle
- no expensive installation of inserts
- standardized parts
- high load carrying ability and assembly safety by special design

Metal fasteners

EJOT FDS®

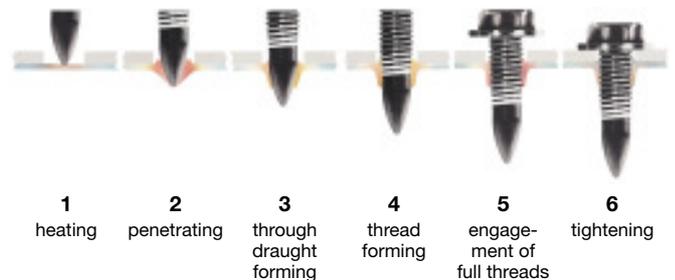
Fasteners for thin sheet metals

By using EJOT FDS® thin sheets can be mounted directly and detached in a new, high quality way. Special preparation of parts such as predrilling or stamping is not necessary. Material waste is avoided since the sheet is formed with a through draught without producing chips.

EJOT FDS® fasteners:

- especially for thin sheets (0.3 – 1.0 mm)
- high hardness of the joint through the tight-fitting engagement of several threads
- cost savings by using thinner sheets with an improved joint quality

Cycles of operation of the FDS® assembly



Benefits:

- no costs for the preparation of parts like predrilling or stamping
- no additional fastening element required for a secure joint
- high economy

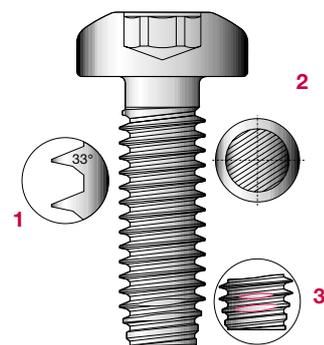
EJOT ALtracs®

The new generation of selftapping fasteners for lightweight metal

EJOT ALtracs® screws are specially developed for high performance-joints. They provide more strength than any other known selftapping screw.

Benefits:

- no rework on casted holes necessary
- compatible to metric thread
- high economy
- no extra safety elements necessary
- high number of repeat assembly possible



EJOT ALtracs®:

- 1 Asymmetric flank angle of 33°
- 2 circular thread cross section
- 3 deformed thread forming zone
- 4 material through hardened steel AT10

Metal fasteners

EJOT Spiralform®

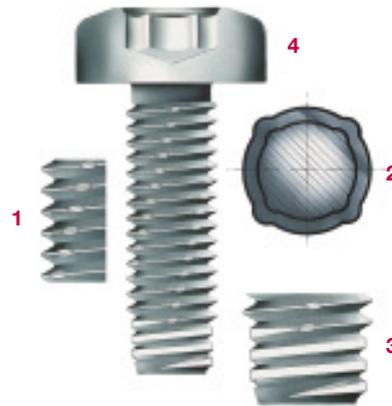
for metallic materials according to DIN 7500

Compared to thread-cutting the thread-forming method is a better solution as thread-forming and installation are done in one single operation resulting in an accurate, tight-fitting female thread.

Thread-forming is also considered to be the best economical solution:

EJOT Spiralform®:

- 1 The formed thread corresponds to the metric ISO-standard thread DIN 13.
- 2 The circular section provides total lapping of the flanks thereby higher strength values are achieved.
- 3 Better start at assembly with the Spiralform Plus point.
- 4 Wide range of materials



Benefits:

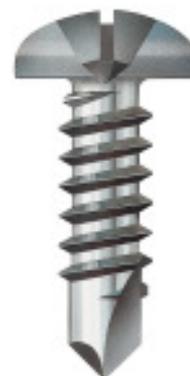
- the process of thread cutting with all additional costs like cleaning and inspection can be omitted
- less rejects and scrap

EJOT® Drill fasteners

EJOT® Drill fasteners form an optimal hole with tight tolerances. An excellent counter thread is formed resulting in a secure joint.

EJOT® Drill fasteners:

- the point of the EJOT Drill fasteners acts like a twist drill.
- the cross-cutting edge allows a fast drilling and prevents the workpiece from skidding off or moving.



Benefits:

- thread forming is the economical solution
- no additional thread cutting costs
- no costs for cutting or punching tools
- no additional safety elements
- high process safety

“boss” family

Multifunctional fixings

EJOT provides standardized, tailored and purposeful solutions regarding direct assembly for example thin-walled components, components that don't allow injection moulded bosses, multi layered assemblies (sandwich) and thin sheet metals.

The idea is “easy”. With EJOT plastic bosses you can fix parts of different materials with various wall thicknesses. In this way, you gain the advantages of modern plastic engineering with regard to design, economically injection moulded parts, and improved long term stability when used in conjunction with the EJOT DELTA PT® screw.

The EJOT® „boss“ family convincing because of:

- little relaxation of clamp load and therefore sufficient clamp force in the screw joint during lifetime
- secure assembly with the EJOT DELTA PT® screw
- long time resistance with EJOT DELTA PT® screw
- safe against loosening without additional safety device
- high loadable in axial direction
- various thicknesses on substructure
- corrosion and media resistant, without additional surface treatment
- recyclable
- repeat assembly possibly in line with VDE
- process safety by different colours
- no jamming and interlocking in case of bulked packed goods
- safe assembly due to definite visibility of part positioning
- integrated sealing function optional
- weight saving compared to metal parts

EJOT EASYboss®

– the standardized version



EJOT EASYboss®

– the individual version



EJOT VARIOboss®

– multifunctional and variable



Specials



Special fastening elements

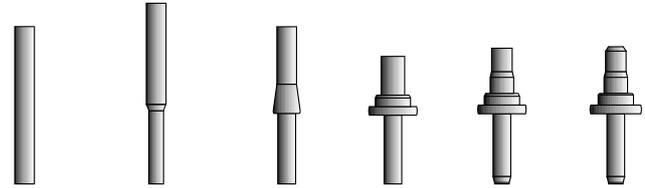
EJOFORM®

multi-functional cold formed parts

EJOFORM® stands for application specific parts which are normally designed to meet specific, bespoke fastening- and clamping requirements.

For the production of multi-functional parts the multi-die process is used as this procedure allows an efficient production of complicated shapes. Tools for multi-station headed parts cannot be obtained “off the shelf”. Instead, they are designed in a way that guarantees an optimum coordination between the best forming and wear conditions in a simultaneous efficient production process. Our application engineers will find the most fitting and efficient solution in cooperation with your design engineering department.

Multi-die process



Benefits:

- **Reduce manufacturing cost**
The cold forming technique allows an essentially higher productivity compared to turning processes.
- **Low material consumption**
The cold forming technique leads to material savings of up to 80 % compared to turning processes.
- **Cost saving solutions**
EJOFORM® parts don't need additional elements like distance bushings, washers and spring washers. Their function is realized in only one part.

EJOFORM® long parts

are manufactured economical in one integrated process

Conventional production methods for parts with a very high length/diameter proportion are becoming unproductiv. The transport of parts can have a negative effect of the quality and tool design is getting more and more complicated and therefore costly. The here used technology allows combination of differential reform-methods and therefore production individual designs.

Technical details

Length: up to **600 mm**
Diameter: up to 8 mm
Threads: all common ones
Materials: through hardened steel, case hardened steel, stainless steel, aluminium



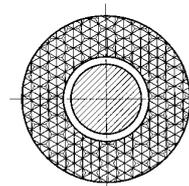
EJOT VIBRALOK® / EJOT CONLOK®

VIBRALOK® and CONLOK® are particular under head serrations for varying requirements.

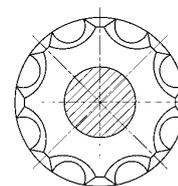
VIBRALOK® offers excellent protection for break loose of the screw by clamp parts made of metal.
CONLOK® is a discontinuous under cut, which could be shaped to fulfill customers needs.

Benefits:

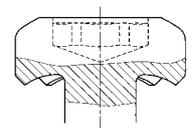
- increased break loose torque
- safe against loosening under vibration
- electrical contact between components possible (earthing)
- plating layers up to 70 microns can be scratched



EJOT VIBRALOK®



EJOT CONLOK®



Special fastening elements

EJOT® Micro fasteners



The tendency towards small diameter screws caused EJOT to design miniature fasteners. EJOT PT® or DELTA PT® fasteners with a nominal diameter of 1.0 mm can be produced for direct screw assemblies into thermoplastics.

These Micro fasteners provide the well-known advantages of the bigger dimensions both for

manual installations and automated feedings in mass production. They are already used in a number of applications in the telecommunications and other market sectors.

Benefits:

- thread forming and direct assembly of small components
- no additional inserts required
- shorter injection moulding cycle times
- assembly in very confined areas
- suitable for automated assemblies

EJOT® ALUSERT

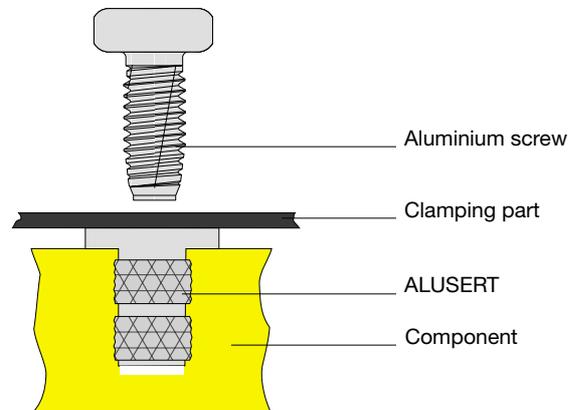
Fastening element for thermoplastics

EJOT® ALUSERT does extend the possibilities for removable screw joints in thermoplastic materials. The system ALUSERT is a combination of a self tapping fastener with a bush, made from Aluminium.

The Aluminium bush has been put in place after the injection moulding process and an Aluminium screw is forming the female thread afterwards during insertion. This system allows little insertion depth by keeping high strength and small relaxation of the screw joint even under temperature loads.

Benefits:

- weight reduction due to use of Aluminium
- coupling of materials with similar properties
- none self loosening of the thread / screw
- stable clamp load after temperature cycles
- small insertion depths
- repeat assembly possible



Acupoint®

Anti-Cross-Threading Feature



During automated assembly of metric screws into tapped female threads the start of inserting out of line is a known problem with the result of a destroyed metric thread. The Acupoint® feature has been developed for

correct guidance of the screw into a straight position when starting assembling.

Benefits:

- resists cross-threading and no-start conditions to reduce assembly problems
- rapid engagement improves productivity
- reduction of cycle time or saving of entire operations
- compensates for off-angle and off-center conditions

Special fastening elements

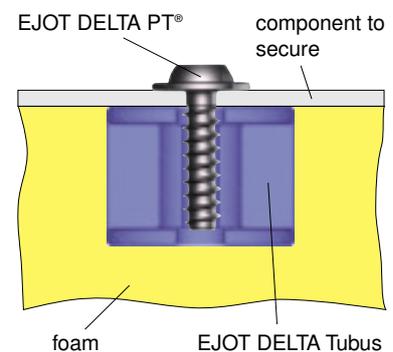
EJOT® Foam-screw

The foam-screw is a product, which has been especially designed to fasten components where EPP (Expanded Polypropylene) parts are used. This screw allows a direct assembly without a pre-cut hole in the foam.



EJOT® DELTA Tubus

The DELTA Tubus is a product specifically designed for use with EPP (Expanded Polypropylene) plastic foam, whose front facing side can be placed flush with the surface and then secured using EPP plastic foam. Additional components can then be securely fastened to the plastic foamed structure with its help.



EJOT FLLASH®

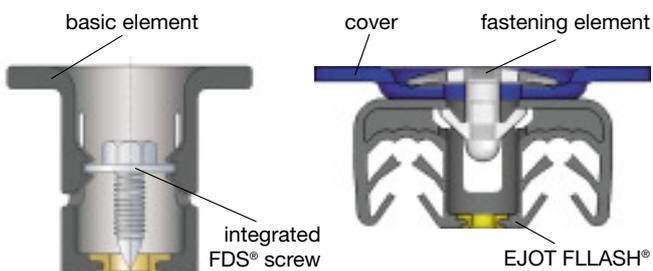
The innovative system for tube and line assembly, e.g. car floor pans

EJOT FLLASH® (FLuid Line Assembly System Holder) the combination of thermoplastic clip and integrated, flowdrilling EJOT FDS® screw.

The assembly system for a safe, chipless and tolerance independent assembly. Expensive punching or stud welding can be omitted.

In addition to applications in the automotive industry there are many other application areas.

Different types of the EJOT FLLASH® can be designed according to the customer demand. The constructive design allows a captive integration of the screw.



In addition to the FLLASH® Product group, EJOT has developed a fastening system in conjunction with the EJOT FLLASH®.

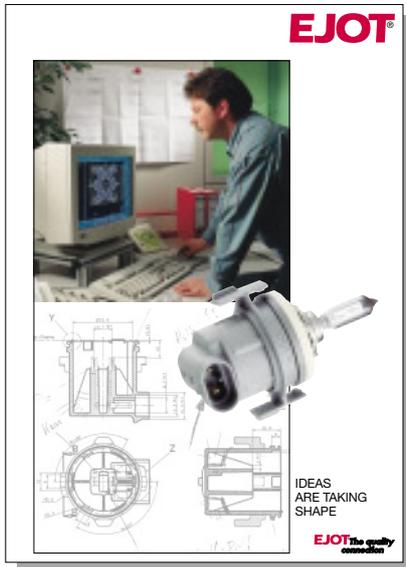
This serves in attaching covers and similar large components. In case of service or repair, this system may be unlocked and locked by completing a simple 90°-turn, enabling easy assembly.



Benefits:

- no pre-punching or weld stud required
- process-safe and chipless assembly
- free positioning, i.e. independent of tolerances
- captive, pre-assembled screw
- self-locking and sealing screw joint
- easy to assemble/disassemble
- suitable for automated assemblies
- low overall assembly cost
- low integration by applying modular basic elements or application-specific solutions

Engineering plastic parts



EJOT offers an extensive range of engineering plastic parts for many different fields of application, e.g. the automotive and supporting industry, the lamp and illumination industry and the electric appliances industry.

requirements on to engineering functional parts and components. The experts of Engineered Plastic Components Division would be glad to discuss your manufacturing possibilities.

Phone +49 2751 5 29-0 · Fax +49 2751 5 29-5 70
Internet: www.ejot.de · e-mail: industrie@ejot.de

We are offering:

- advice in technology
- extensive support
- development up to the series production
- in-house tooling department
- high quality standard

The multitude of products starts with injection moulded parts, 2-component parts, parts with high optical



EJOT International

EJOT Companies

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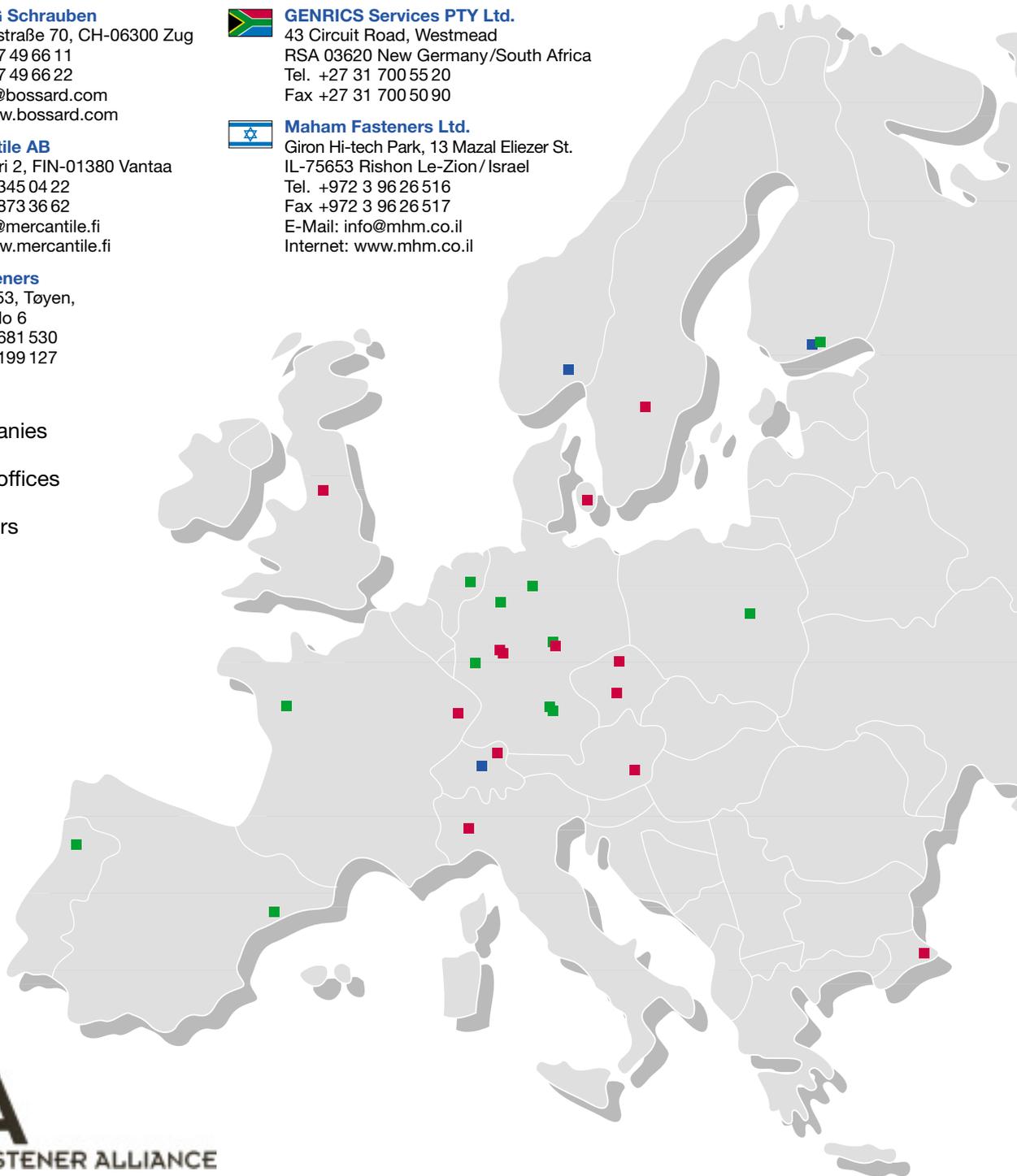
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