

North America 2015 9th - 11th of Nov

AUTOMOTIVE LIGHTWEIGHT

PROCUREMENT SYMPOSIUM

Cobo Center, Detroit, USA



SYMPOSIUM FOCUS

- Aluminum
- Carbon Fibre
- Composites
- High Strength Steel
- Magnesium

The 3rd Automotive Lightweight Procurement Symposium to be focused on automotive lightweighting, supply / process chain and procurement management, will take place in Detroit from the 9th – 11th of Nov 2015. The symposium is held in the days leading up to the "ALUMINUM USA" exhibition taking place at the Cobo Center, Detroit, Michigan (Walking distance to symposium venue)

ATTENDING COMPANIES:



ORGANIZING PARTNERS & SPONSORS



AluMag®
 Europe 2016 27th - 29th of Nov
 AUTOMOTIVE LIGHTWEIGHT
PROCUREMENT SYMPOSIUM
 Hilton Hotel in Duesseldorf, Germany

AluMag®
 Asia 2016 6th - 8th of July
 AUTOMOTIVE LIGHTWEIGHT
PROCUREMENT SYMPOSIUM
 Jumeirah Himalayas Hotel in Shanghai, China

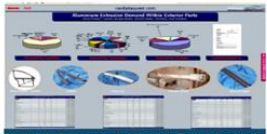
AluMag® offers the four following services - worldwide:



Market Research

- Aluminium Extrusion Customer Database
- Foundry & Tool Maker Database
- Automotive Application, Material & Process Analyses
- Various Industrial Application Research & Analyses

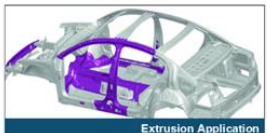
AluMag as your provider of automotive research and forecasting studies, offers you and your business, the market intelligence you need to realize the best strategic decisions



Material - Process - Application Trend Analysis

Large variety of market access, local & global:

- business database with 6,970+ companies and 18.700+ contacts
- 150+ satisfied customers worldwide
- Arranged 20+ roadshows/events since 2008



Extrusion Application

Your Benefits:

- Learn about your [potential] clients and competitors
- Obtain an inside view of the market
- Identify opportunities and threats
- Minimize risk and optimize profits
- Position your company successfully
- Based on data off the shelf, secondary re-research and interviews, AluMag generates validated researches



Market Development

- Analysis & Development of Market Opportunities
- Accelerate Market Penetration
- Manage New Product Launches
- Establish a Sales Force Sales on Demand

AluMag guides and supports your organization globally through the different market development phases until we have successfully launched, implemented or executed your project.



Map of activity - SAMPLES

Manage and integrate each aspect of your organization by initiating, planning, controlling, executing and closing out a new project. AluMag offers liaison management services as an addition to our customer's staff by bringing in the resources that define us.



JATCO Head Quarters Meeting in Japan

Your Benefits

- Analysis and development of Markets
- Realize opportunities
- Accelerate market penetration
- Establish a sales force
- Provide warehousing and distribution services
- Manage new product launches
- Sales on demand



Roadshows / Events

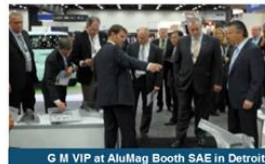
- Organization of Technical & Commercial Roadshows
- Oversea Commercial & Technical Events
- Host In-House Events & Presentation
- Common Technology Booth at Leading Exhibitions

AluMag roadshows, tech-meetings and symposia are the first class events used by exhibitors and guest as a unique benchmark platform.



Daimler Sindelfingen as Roadshow Location

The AluMag think tank events are bringing in decision makers and executives in EUROPE, ASIA and NAFTA.



G M VIP at AluMag Booth SAE in Detroit

Upcoming Events:

- 2015 Nov: Automotive Light-weight Procurement Symposium in Detroit, USA
- 2016 April Common tech- booth at the SAE World Congress in Detroit, USA
- 2016 Jul: Automotive Light-weight Procurement Symposium in Shanghai, China
- 2016 Nov: Automotive Light-weight Procurement Symposium in Duesseldorf, Germany.



Strategic Localization

- Warehousing & Distribution Service
- Supplier & Tie-up Localization
- Identification & Trade-off of new Technology
- Foreign Market Business Cases and whose Realization

AluMag has the global expertise to search, identify, evaluate and validate potential strategic business opportunities for expansions and partnerships that will assist your business growth plans regionally and globally



On-Site Greenfield Planning Meeting

Services for:

- Search, develop and present potential acquisition candidates for regional and global business expansions
- Localization of new manufacturing / service sites for business expansions
- Identification of new technology supplier development related to products, processes and materials
- Search, develop and present potential business partners / suppliers to support regional and/or global supply programs
- Evaluate potential competitor profiles for new or existing business in non-presence geographies
- Evaluate new emerging technologies and processes for business expansions

Are you:

- looking for specific data, information and outlook about product, material, customer, supplier, technologies, ...
- want to discuss your project, increase sales, access new markets, ...
- interested to participate in one of our roadshows / events or organize your customized showcase ...
- looking to localize, expand into new markets, countries, tie-up targets, ...

please contact your AluMag Team to receive a quote or proposal

CONTACTS & PROJECT TEAM



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N. America Automotive Lightweight Procurement Symposium 2015 9th – 11th Nov

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AluMag[®]

Europe ■ India ■ Americas ■ Asia
THE MARKET DEVELOPER

Index

Company Speechs by:

Ford Research and Innovation Center

Carbon War Room and Meritor Headquarters

Striko Westofen America

Kurtz

Bharat Forge Aluminiumtechnik

C.P.C. USA

BOCAR Group

Ford Motor Company

Automotive Insight

EJOT Fastening Systems LP USA

UACJ Corp.

Lightweight Innovations for Tomorrow

Aluminum Blanking Company

Agenda

Agenda: (Is Continuously Being Updated)

Monday The 9th Of November – Cobo Center, Detroit

05:30pm - 07:30pm



Pre-registration and Welcome

Reception

Tuesday The 10th Of November – Cobo Center, Detroit

08:30am – 09:15am



Registration

Morning Coffee / Tea

09:15am – 09:30am



Welcome:

Mr. Jost GAERTNER - Managing Partner At AluMag Automotive GmbH

09:30am – 10:25am



Opening Keynote: Mr. Craig RENNEKER - Chief Engineer, New A/T Programs & Component – Transmission & Driveline Engineering At Ford Research & Innovation Center

Lightweight Transmission & Driveline Components: Practical Challenges

10:25am – 11:00am

Break for Refreshments/Coffee/Tea, Snacks, Networking, Tech Exhibition

11:00am – 11:45am



Paper 1: Mr Mike ROETH – Executive Director At North American Council for Freight Efficiency (NACFE) & Operations Leader – Carbon War Room



Paper 1: Mr. Karl MAYER – Director Product Line Management At Meritor

Lightweighting Heavy Duty Class 8 Tractors and Trailers

11:45am – 01:45pm

Break for Lunch, Refreshments, Networking, Tech Exhibition

01:45pm – 02:25pm



Paper 2: Mr Ryan BROWN – Director Of Sales At StrikoWestofen America

Analysis Of Cost Drivers When Buying Lightweight Solutions / Materials & The Elimination Of These

02:30pm – 03:10pm



Paper 3: Mr. Lothar HARTMANN – Managing Director Foundry Machines & Trimming Presses At Kurtz GmbH

Chassis & Suspension Weight Reduction By LPDC Aluminum With Hollow Cross Sections



Mr. Kevin CROY - NAFTA Sales Manager Foundry Machines & Trimming Presses At Kurtz GmbH

03:15pm – 03:45pm



Paper 4: Mr. Jörg MANTWILL – Director Sales At Bharat Forge Aluminiumtechnik GmbH & Co. KG

HCM And Aluminum Forging – Partnership To Birth Chassis Parts' Safety

03:45pm – 04:15pm

Break for Refreshments/Coffee/Tea, Snacks, Networking, Tech Exhibition

04:15pm – 04:55pm



Paper 5: Mr. Gary F. RUFF - President and Chief Executive Officer, Ruff and Associates, LLC 8/12 - Present

Advanced Counter Pressure Casting Process for Light-Weighting of Auto and Truck Chassis and Suspension Components

05:00pm – 05:55pm



Closing Keynote: Mr. Gilberto SALDIVAR – New Projects Group Manager At Bocar Group

Key Factors To Achieve Mechanical Properties In Lightweight Structural Parts

05:55pm – 06:00pm



Summary:

Mr. Roberto BOEKER – Managing Partner At AluMag Automotive LLC

Agenda

06:00pm - 08:00pm



Dinner Speech:

Mr. Richard KLEIN -
Responsibility Strategic Planning -
Business Development & German
Business At BOCAR

Wednesday The 11th Of Nov – Cobo Center, Detroit

08:15am – 08:55am



Mr. Ali JAMMOUL – Global Director
Body Exterior And Safety Engineering
At Ford

Body Lightweighting

09:00am – 09:40am



Paper 1: Dr. Gerald COLE – President
At Light Weight Strategies LLC

**Light Weighting the Automotive
Industry - The Road to 2025 CAFÉ**

09:45am – 10:25am



Paper 2: Mr. Laurence CLAUS -
President At NMI Training & Consulting
Inc. & Technical Consultant To EJOT
Fastening Systems LP USA

**EJOT Fastening Solutions Enable
Lightweight Body-in-white Assembly**

10:25am – 11:00am

Break for Refreshments/Coffee/
Tea, Snacks, Networking, Tech
Exhibition

11:00am – 11:40am



Paper 3: Dr. Akio NIIKURA - General
Manager R&D Division At UACJ Corp.

**UACJ's Global Strategy And
Approach To The Automotive
Aluminum Market**

11:45am – 12:05pm



Paper 4:
Mr. Lawrence E. BROWN – Executive
Director At Lightweight Innovations For
Tomorrow

**Lightweight Innovations For
Tomorrow!!!!**

12:10pm – 12:40pm



Closing Keynote:
Ms. Laura ANDERSON – CEO At
Aluminum Blanking Company

**The Story Behind Aluminum's
Sourcing Evolution: A North
America Perspective**

12:40pm – 12:45pm



Summary:

Mr. Jost GAERTNER, Managing
Partner At AluMag Automotive
GmbH

12:45 pm – 01:30pm



Reception Speech With Snacks &
Finger Food

Mr. Michael KOEHLER - Industry Vice
President At Reed Exhibitions USA

01:30pm – 05:30pm



Individual Or Guided Visit At The
2015 "Aluminum USA" Exhibition

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TITLE

EJOT Fastening Solutions Enable Lightweight Body-in-white Assembly

ABSTRACT

The 2015 all-aluminum Ford F150 marked a game changing milestone in US automobile design and assembly. Ford's pioneering efforts proved that lightweighting on a large scale could be a practical reality and ushered in a new day where lightweight body structures will be the norm. As with any pioneering innovation, though, other enabling technologies must come alongside. In this case, Ford's challenge was to find new fastening and joining technologies since the traditional methods of joining simply would not work. One of the key Ford engineers in the development of the new F150 even noted that, "we had to completely reinvent the way we put cars together."

One of the ways the new Ford F150 became a reality was with the enabling technology of the EJOT® FDS® Screw. The FDS® is a self-piercing, flow-drilling, thread forming screw which enables the connection of aluminum to aluminum and aluminum to mild steel. This screw is especially advantageous over other connection methods because it can fasten more than two sheets, into thick aluminum cross sections (such as castings and extruded elements), and without tool support from the back side (i.e. one-sided access.)

Additionally exciting, new this year is the release of the EJOT® EJOWELD® friction element welding system. This is the only technology of its kind that can fasten aluminum sheets to ultra-high strength steel sheets with rated strengths of up to 2000MPa. This unique friction welded element is currently enabling the joining of aluminum top sheets to reduced thickness ultra-high strength steel structural components. These connections open doors to high strength body-in-white structures at a fraction of the weight of traditional ones. This technology is currently employed by Audi and under consideration of many other OEMs. These are but two EJOT® fastening technologies enabling automotive body-in-white and assembly engineers to realize their lightweighting goals, solve challenging joining problems, and provide cost effective assembly.

EJOT

Fastening Technology Enabling Light weighting

AluMag® North America 2015

Presented By:

Laurence Claus- EJOT® Fastening Systems LP, USA

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How do you choose joining technology for lightweight automotive body structures that:

- Overcome the engineering challenges?
- Provide efficient, scalable serial production assembly methods?
- Are cost effective?

"You don't get to change the way you build vehicles very often." Amanda Freis- Ford Mechanical Joining Research Engineer



2015 Aluminum Body Ford F150

EJOT Fastening Systems LP USA

Who is EJOT



EJOT is:

- **91 Year Old Family Business**
- **Leading innovator of automotive and construction fastening technology**
- **Globally located, Headquartered in North Rhine-Westphalia, Germany**
- **Global Brand Names include:**
 - **FDS®**
 - **EJOWELD®**
 - **SHEETtracs®**
 - **Delta PT®**
 - **PT®**
 - **Altracs Plus®**



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Automotive and Industrial ~50%

Building Fasteners ~50%

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A history of product innovation

EJOT®



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Global

EJOT®



USA Technical Center Located in Wixom MI

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Traditional View on Costs- Missing the Big Box

- Our Traditional Purchasing systems:
 - Incentivize savings at the component level
 - Often miss the opportunities of getting the "substantial savings" of the Big Box
- Cost of a Fastened Joint
 - Components
 - Preparation (Ex. Holes or tapping)
 - Assembly (Time and system costs)
 - Inefficiencies (Downtime, scrap, rework)
 - Opportunity Cost (What is lost if you choose the wrong method?)
 - Working Capital
 - Administrative



Impact of New Technology

- New Technology Impacts:
 - Opportunity Costs
 - Makes possible a joint combination not previously feasible
 - May allow downsizing or reduction in the number of required joints
 - Provides better method of fastening a joint
 - Assembly
 - Better, faster, simpler
 - Changes/eliminates need for preparation
 - Changes the component costs





Traditional Body-in-White Joining Methods

- Welding
 - Resistance Spot Weld
 - Laser Welding
 - Shielded Arc Welding



- Brazing



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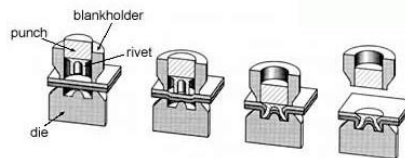
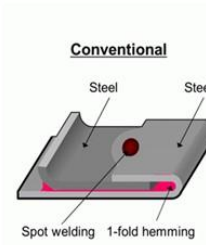
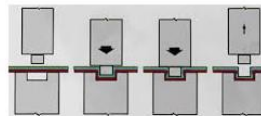


Traditional Body-in-White Joining Methods

- Adhesive Bonding



- Mechanical Fastening
 - Clinch Joining
 - Rivets
 - Screws
 - Hemming
 - Bolt and Nut



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Lightweighting Trends in Body-in-White

- Mixing Materials
 - Aluminum (Weight Savings)
 - Magnesium (Weight Savings)
 - Mild Steel (Strength)
 - Ultra-High Strength Steel (Weight savings and strength)



Challenges Joining with “New” Mixed Material Body-in-white Structures

- Challenges:
 - Mixed structures are difficult or impossible to weld
 - Adhesive bonding alone does not supply enough strength or needs to be fixed to allow time to cure in-place
 - Space, Location, or design does not allow access to both sides
 - Material is too strong to be feasible for joining method
 - Method that can be scaled to production volumes
 - Short assembly cycle time
 - Ability to pierce top sheet without the need for a pilot hole
 - Ability to address multiple sheet stack-ups
 - Galvanic corrosion risk of pairing dissimilar materials
 - Cost effectiveness



EJOT® Solutions

- FDS®
 - Aluminum to Aluminum
 - Aluminum to Mild Steel
- EJOWELD®
 - Aluminum to High-strength and Ultra-High Strength Steel



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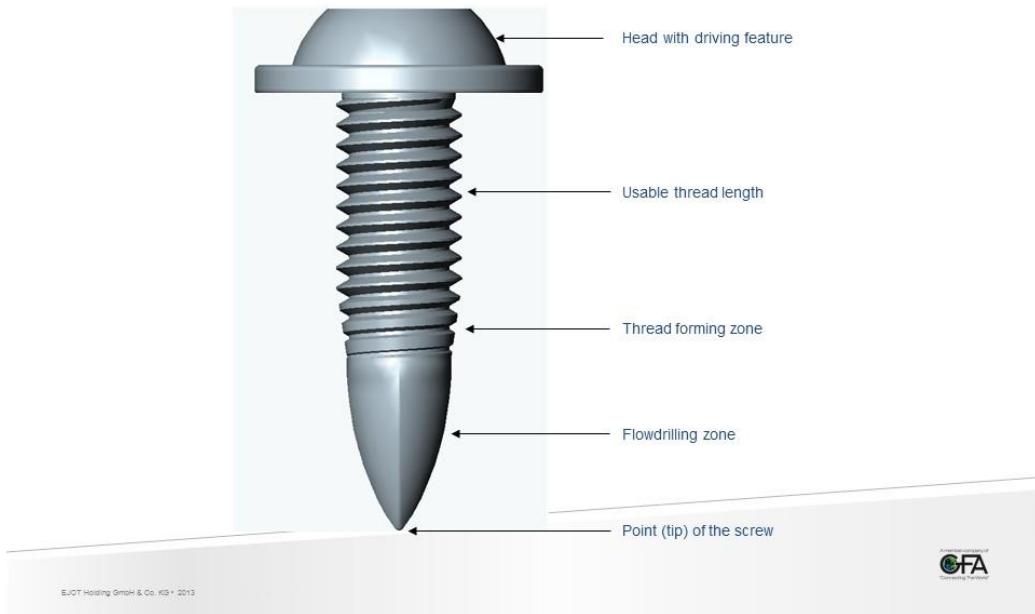


FDS®

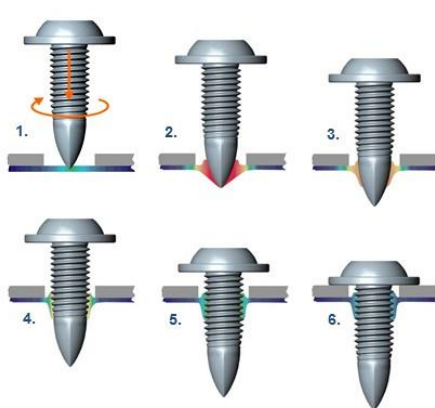


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Anatomy of the FDS[®] Screw



Stages of the FDS[®] Assembly (With Clearance Hole)

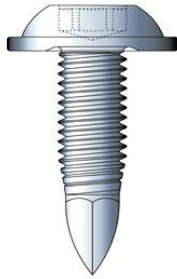


1. Warming up the sheet metal by axial end load and high speed
2. Penetration into the material
3. Forming of the extrusion
4. Chipless forming of a female machine thread
5. Installation
6. Tightening with the pre-set torque



Types of FDS® screws

Standard (sharp point)



- Fastening without clearance holes
- Material thickness limits:
 - Assembly by hand:
 - Steel plate 0.3 – 0.8 mm
 - Aluminum plate 0.3 - 1.2 mm
 - Magnesium plate 1.0 – 1.2 mm
 - Automatic assembly:
 - Steel plate 0.5 – 1.75 mm
 - Aluminum plate 0.8 – 3.5 mm
 - Magnesium plate 1.0 – 3.5 mm
- Eliminates problems with overlapping hole line-up
- Realizes an extrusion height of up to 3 times the initial sheet thickness

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Types of FDS® Screws

PKS (radius point)



dn= nominal screw diameter



- Pilot hole diameter about 0.6 x dn
- Material thickness limits:
 - Assembly by hand:
 - Steel plate 0.3 – 0.8 mm
 - Aluminum plate 0.3 – 1.2 mm
 - Magnesium plate 1.0 – 1.2 mm
 - Automatic assembly:
 - Steel plate 0.5 – 1.75 mm
 - Aluminum plate 0.8 – 2.0 mm
 - Magnesium plate 1.0 – 2.0 mm
- Realizes an extrusion height of about 2 times the initial sheet thickness

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Types of FDS® Screws

BS (drill point)



- Fastening without clearance holes

- Material thickness limits:

Assembly by hand:

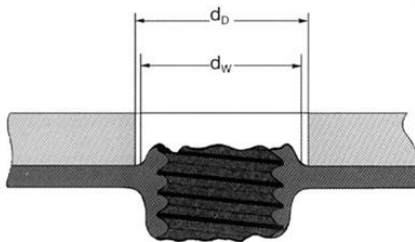
- Steel plate 0.4 – 0.8 mm
- Aluminum plate 0.4 – 1.2 mm
- Magnesium plate 1.0 – 1.2 mm

Automatic assembly:

- Steel plate 0.5 - 1,75 mm
- Aluminum plate 0.8 – 2.0 mm
- Magnesium plate 1.0 – 2.0 mm

- Realizes an extrusion height of about 2 times the initial sheet thickness

Flowdrilling Behavior



d_w → bulge diameter
 d_b → clearance hole

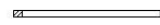
•By flowdrilling, a small portion of the formed part is flowing opposite to the fastening direction and creating a bulge that has to be accommodated by the upper part's clearance-hole or when piercing the top layer, an undercut in the fastener head.

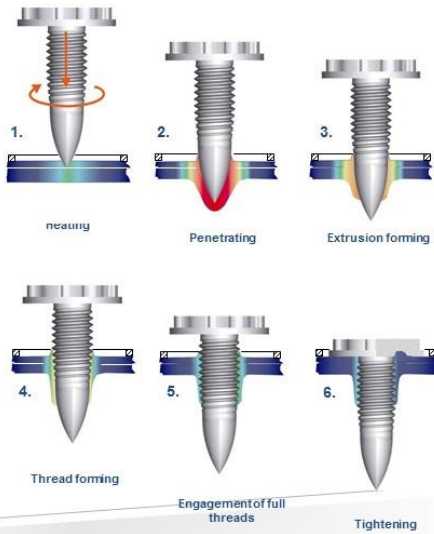
•When piercing the top layer it is important that the material combination is:

- „Thin“ on „Thick“
- „Weak“ on „Hard“



Process steps of FDS[®] Assembly Without a Clearance Hole, i.e. Piercing Top Sheet

 = Hold Down Clamp

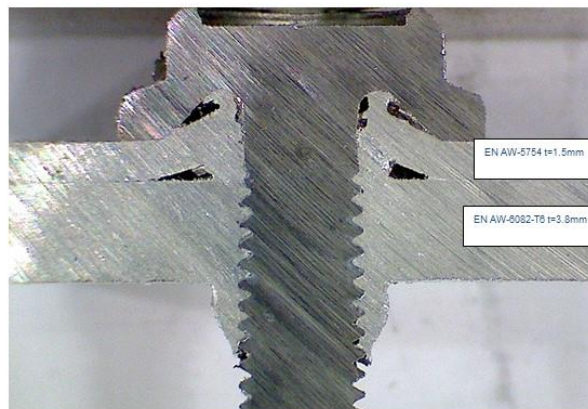


1. Warming up the sheet metal by axial end load and high speed
2. Penetration into the material
3. Forming of the extrusion
4. Chipless forming of a female machine thread
5. Installation
6. Tightening with the pre-set torque

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FDS[®] 2 Sheet Aluminum to Aluminum Joint

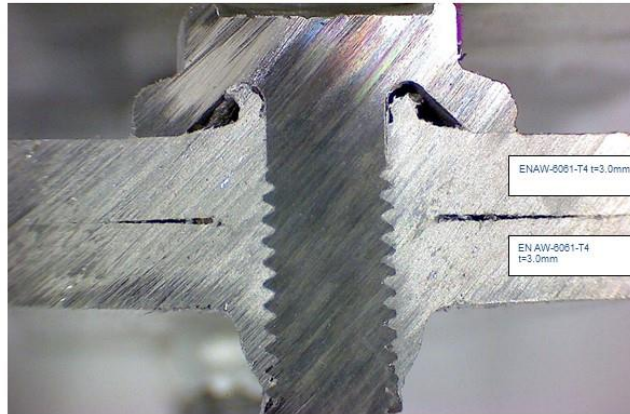


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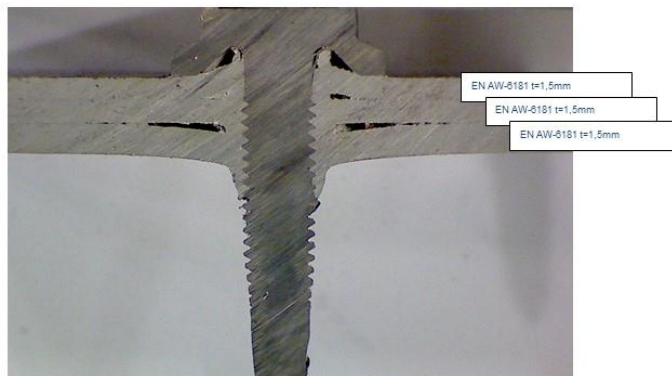
FDS® 2 Sheet Aluminum to Aluminum Joint



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FDS® 3 Sheet Aluminum to Aluminum Joint



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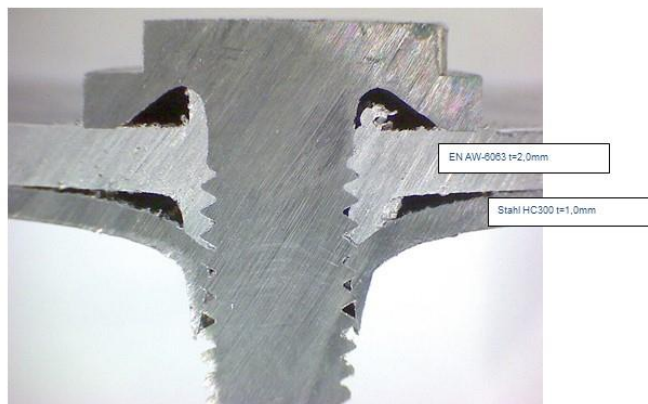
FDS® 4 Sheet Aluminum to Aluminum Joint



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FDS® 2 Sheet Aluminum to Steel Joint



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FDS® 3 Sheet 2 Aluminum to Steel Joint



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System for Fully Automated FDS® Robot-Assembly



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EJOWELD®



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EJOWELD®

EJOWELD®
CFF



Composite Friction Fastener

EJOWELD®
CFP



Composite Friction Pin

EJOWELD®

Equipment Production, Control
Systems, and Service

EJOWELD®

Feeding Systems



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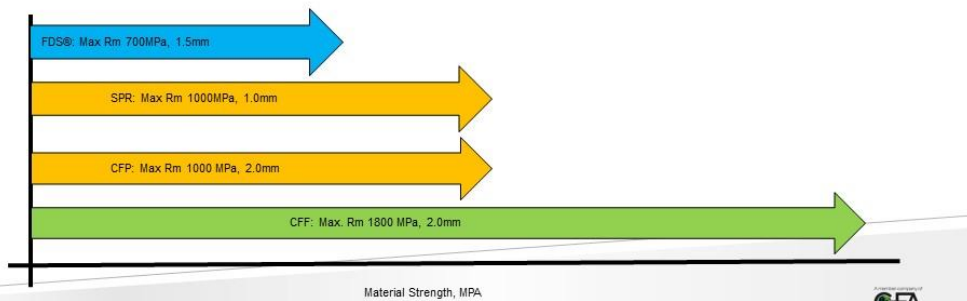
Sheet Strength Limits



No Clearance Hole
One Sided Access



No Clearance Hole
Two Sided Access



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Composite Friction Pin (CFP)

Top Plate Materials:

- Steel Plates Rm < 300 MPa
0.8 – 1.2 mm
- Aluminum (Diecast, Profiles, Sheets)
0.5 – 1.8 mm
- Synthetic (Composite) Material With
Clearance Hole



Lower Sheet Materials:

- Steel Plates Rm < 600 MPa
0.7 – 3.0mm
- High-strength Steel Plates Rm < 1000 MPa
0.7 – 2.0 mm

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CFP Automated Installation Head

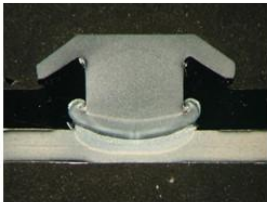


Fastening Element (CFP)

Features:

- Developed for one-sided access
- Robot application capable
- Total weight 80kg
- Slim configuration (max. width 120mm)
- Real time process control

Composite Friction Fastener (CFF)



Top Sheet Materials:

- Aluminum up to 3 mm
- Synthetic (Composite) Material With Clearance Hole

Lower Sheet Materials:

- High-strength and Ultra-High Strength Steel

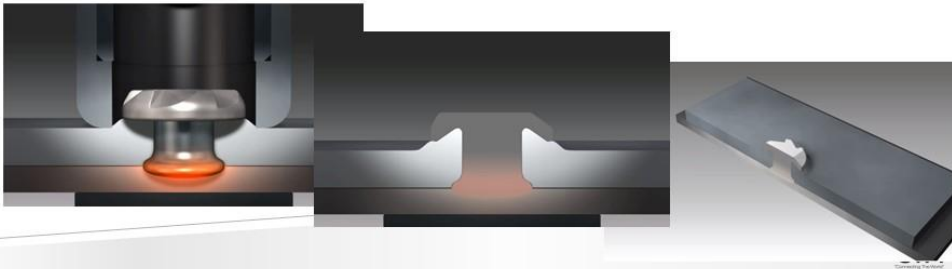
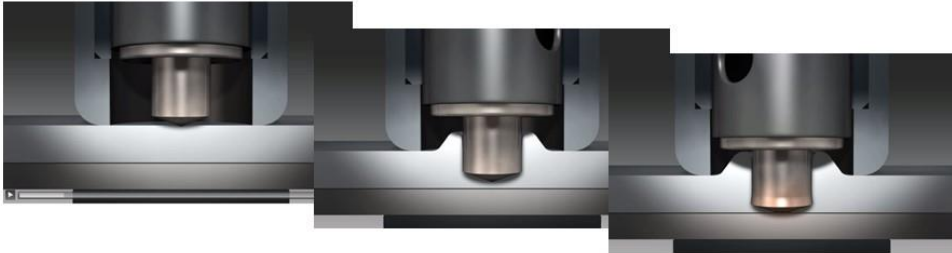
Features:

- Can be used in combination with adhesives
- No pilot hole required
- Steel on steel possible with clearance hole in top sheet





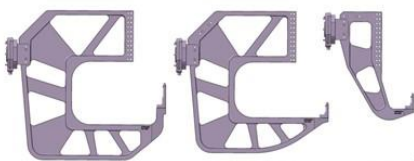
CFF Joining Process



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CFF Automated Installation Head



Sample C-Frame Variations



Fastening Element (CFF)

Features:

- Developed for two-sided access
- Robot application capable
- Total weight 100 to 150kg
- Slim configuration (max. width 120mm)
- Real time process control

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Wrap-up

- EJOT® FDS® and EJOWELD® provide enabling solutions for lightweighting body structures
- Provide joining solutions for bottom sheets that range from ~300MPa to ~2000MPa
- Within limits, provide one-sided access assembly options- opening the door to enabling attachment to aluminum extrusions and hydroformed members
- Production tested- already on multiple production platforms
- FDS capable of fastening together a variety of mixed joints, including aluminum, magnesium, and mild steel
- Can be used in combination with adhesives
- Cost effective

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Thank you for your attention!

To learn more or arrange a visit to our Wixom, MI Technical Center

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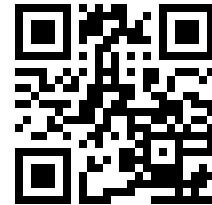
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PROCUREMENT SYMPOSIUM

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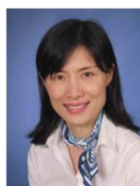
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