AFRA Panel Discussion

R&D Panel: Current Challenges to Improve the Recyclability of the Aircraft and to Reduce Risks for Environment & Human Health

Moderator: Derk-Jan van Heerden, Aircraft End-of-Life Solutions (AELS) BV
Panelist: Patrick Meeremans, Husqvarna Group
Panelist: Dr. Nabil Nasr, Rochester Institute of Technology & REMADE Institute
Panelist: Dale Smith, Boeing Commercial Airplanes
Panelist: Tim Zemanovic, Jet Yard, LLC

Moderator: Derk-Jan van Heerden, CEO and Founder of Aircraft End-of-Life Solutions (AELS) BV

Forming a Research Network

We are in the process of developing a network of research partners, who are invited to participate alongside the R&D Committee to contribute research content and expertise to advance the aircraft end-of-life industry

AFRA
AIRCRAFT FLEET RECYCLING ASSOCIATION

HOCHSCHULE PFORZHEIM

TU Clausthal

Fraunhofer Institute for Chemical Technology

R&D Committee – Overall Goals

- Advance AFRA's strategic goals – namely achieving **greater component recovery and material recycling** for the industry and **promoting innovation in recovery and recycling technology**
- **Support research** that encourages third parties to develop and promote economic incentives for recycling and encourages OEMs to consider recyclability when designing new aircraft
- Position AFRA as the **go-to resource** for industry information

Short-term R&D Committee Goals for 2017

- ❑ 10 organizations to join the AFRA research network
- ❑ 20 articles added to the AFRA library
- ❑ 2 research projects started by the Committee
- ❑ Creation of a AFRA metric to calculate industry performance
- ❑ Committee to conduct a literature review to find out for example which materials are not currently being recycled / or send a questionnaire to the members to ask which materials they specifically would like to find recycling solutions for

Panelist: Patrick Meeremans, Global Product Manager for Special Application at Husqvarna Group

Patrick Meeremans

Global Product Manager Construction Wire
Head of Special Applications team

Wire Sawing of a Boeing 737-300

Topics

- Husqvarna Special Applications
- The Briefing
- The Tool
- The Set Up
- The Cut
- Pro’s & Con’s
- Other precision tools

Q&A

Husqvarna Special Applications

Our Mission:

The Special applications team has a specific mission to develop and test **new possible applications** in existing or emerging situations. We gather experience and knowledge on projects that are out of the blue comfort zone so that in a later stage we can use that experience to help our customers in similar situations.

The team differs from the traditional sawing/cutting business by the size and the complexity of the operations to perform. In most cases there is **no on the shelf solution** available implicating the involvement of a team of devoted specialists that can work out solutions adapted to the constraints of the operation.

Husqvarna Special Applications

Our Mission:

Our field of activities is very wide and goes from oil and gas operations, nuclear interventions to complex underwater cutting situations. The **materials** we handle are also **very different from the conventional** demands.

The Briefing

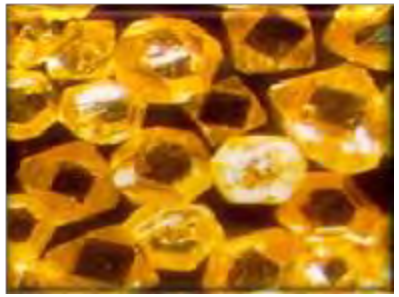
AELS (Woensdrecht, The Netherlands) requested our participation to cut a Boeing 737-300 into pieces so that the remaining fuselage can be used as a fire training device for future crew members.
The overall constraints of the briefing were:

- Precision and accuracy
- Absolute safety for the operator
- Wing removal
- No debris allowed on site
- Recurrent cutting system
- Cutting system that can be implemented globally

The Tool

After analyzing the AELS briefing, the team decided to opt for a diamond wire as most suitable tool for this job. The wire chosen was a Cobra C1200 with 53 beads / meter for optimal cutting speed and life.

As the Cobra bead has an important diamond grid size and the fact that its metal bond is mainly titanium, it fits all technical requirements to cut airplane parts in dry cutting conditions.



The Tool

The wire was chosen as the best possible solution for different reasons:

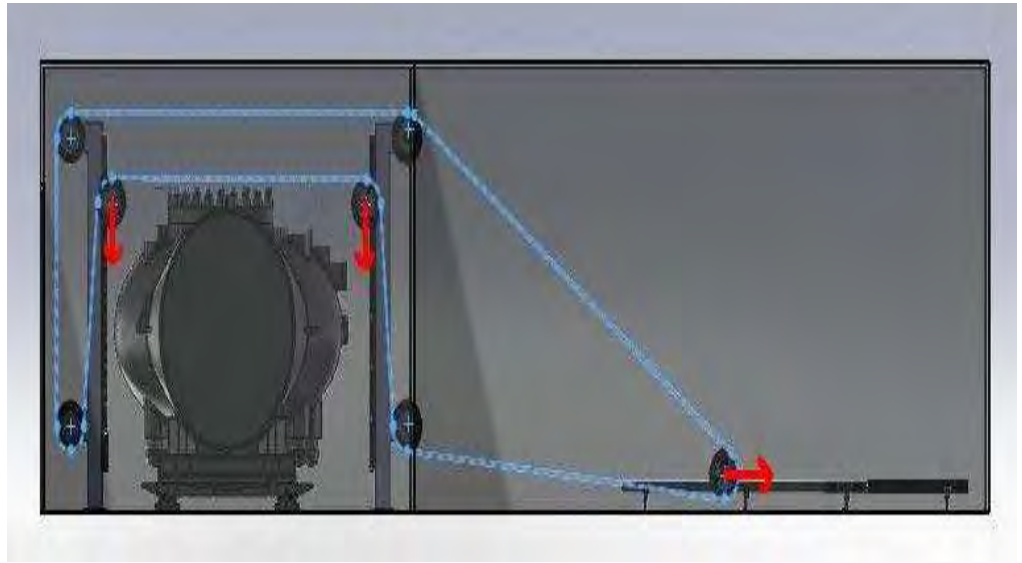
- A wire can cut through objects as large as 7 meters (23 Feet)
- Cavities are not a problem
- A variation of materials is not an issue.
- A wire cut can be really precise and accurate (correct set up)
- There is a very low risk of injuries as the operator is not in the cutting area.
- Low noise emissions
- Speed of the cut
- Possibility to create one tool that can be transported from one site to another at low cost.

The Set Up

Two different approaches:

- The first approach was to have a structure around the plane to cut with open angles. Open angles are important to avoid snapping or jamming of the wire. With this structure it was also possible to direct the wire to make a precise cut.

The Principle



The Execution

The Set Up

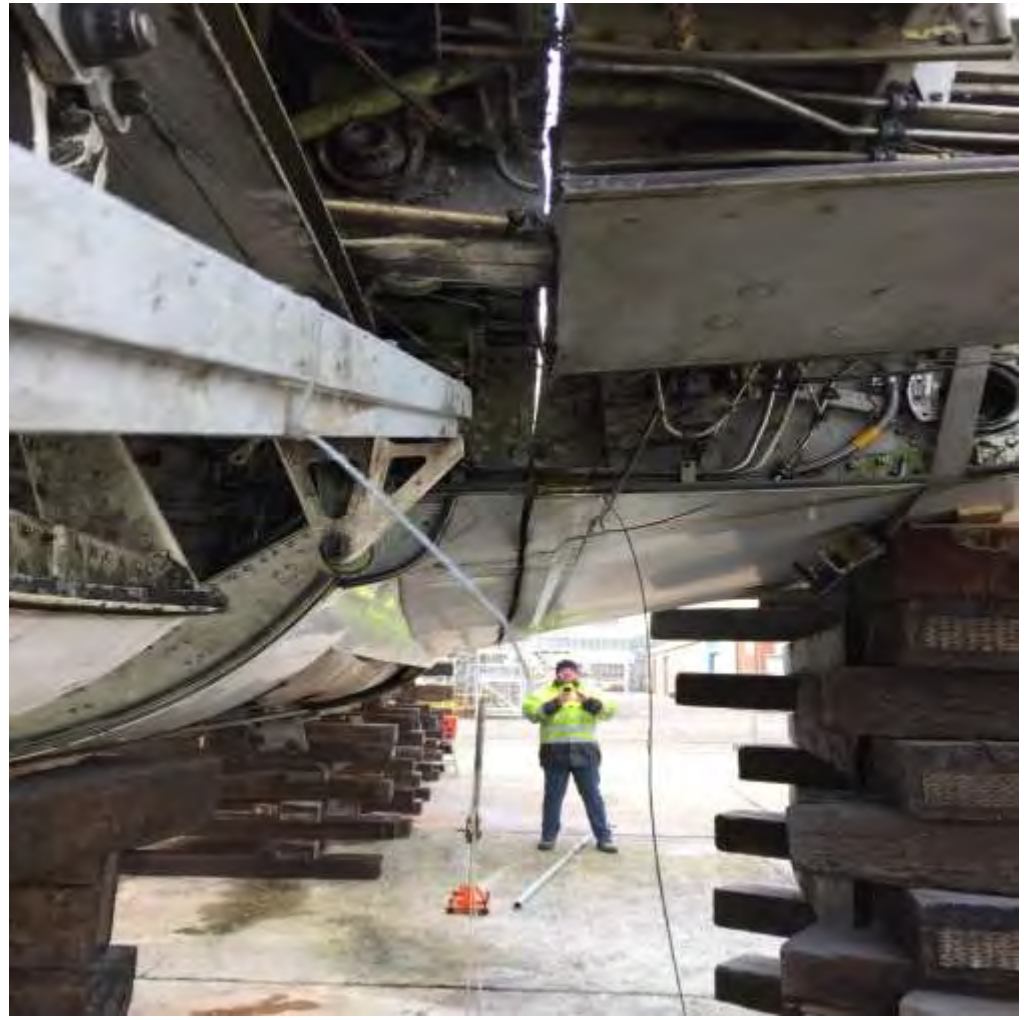
Two different approaches:

- The second approach was to perform the cut without the additional structure. By using a ground pulley in the back of the cut we opened the angle just enough to avoid jamming. Speed was the issue here, not the precision of the cut.

The Set Up

The wings:

For the wing cuts we decided to place one return pulley at cutting height. That allowed us to control the cutting progress and thus the accuracy of the cut.



The Cut

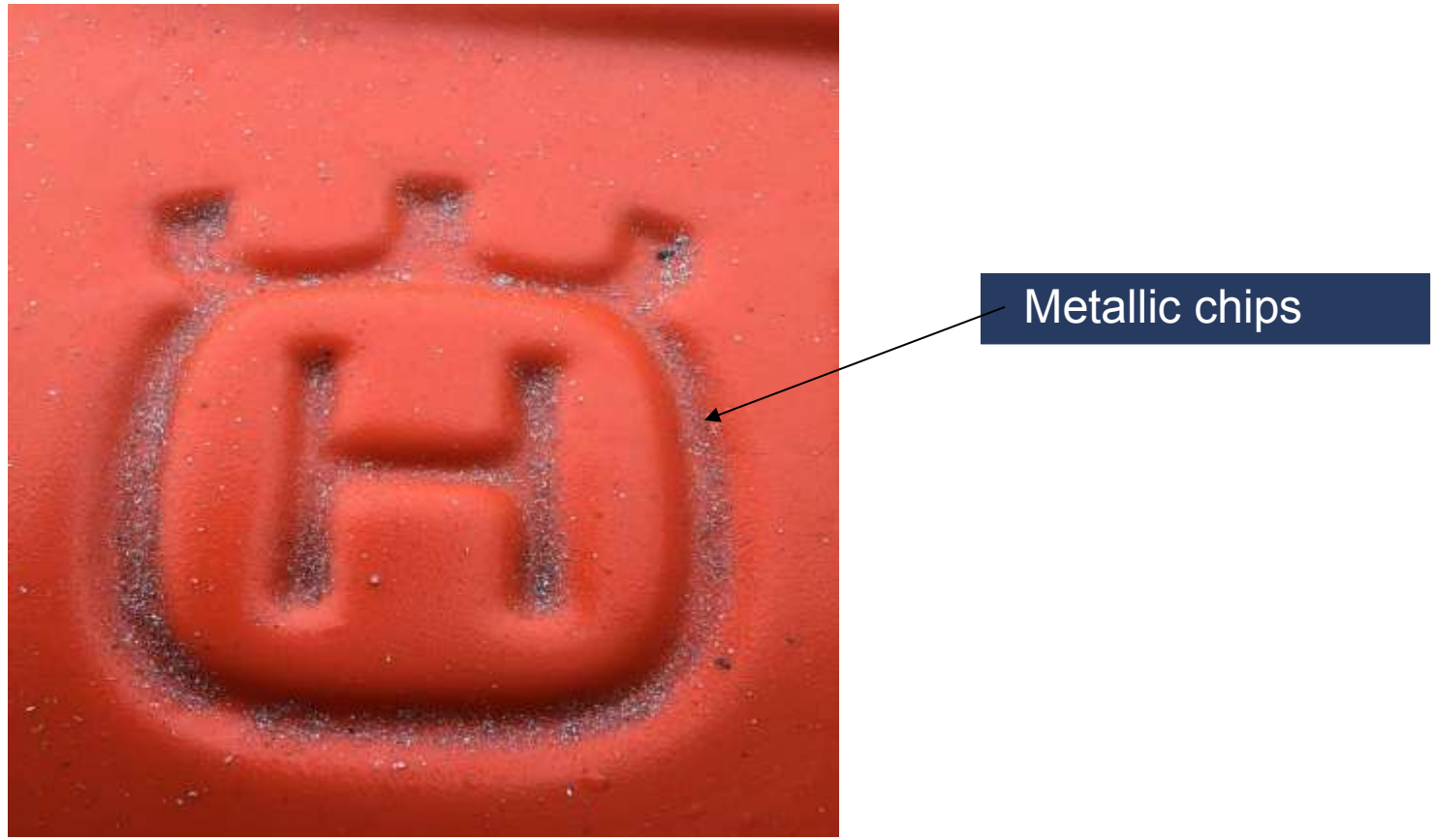
The actual cutting time for the fuselage was less than 15 minutes. For the wings, including the titanium plate, this was less than 2 hours.

We encountered no wire snapping or wire jamming.

Diamond wear after 4 cuts (2 x fuselage and 2 wings) was +/- 3%

The Cut

A very important element of the briefing was to have no debris at all during the cut. Using a diamond wire generates metallic chips of approximately 400 Micron which was fully acceptable for the customer.



Pro’s & Con’s

Pro’s:

- No debris generation on the cutting site. Possible to use without interruption in airport operations.
- Very high cutting speed
- Safety of operator
- Accuracy of the cut
- Easy to built a standard tool to perform cuts in an industrial way.
- Very flexible system easy to transport and install.

Pro’s & Con’s

Con’s:

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- Price of a diamond wire
- Need for a trained operator
- Assembly will wear out before all diamonds are used.

Other Precision Tools

Although the wire is the only precision tool where the operator is not in the cut area, there are other solutions available:

Ring Saw High Frequency

Power cutter Combustion

Ring Saw High Frequency

Cut & Break

www.husqvarnacp.com