End-of-Life Aircraft
Aviation: the most circular industry in the world

May 31, 2017
Den Haag, The Netherlands
My journey

Derk-Jan van Heerden (37)

- BSc Aerospace Engineering
- MSc Aerospace Engineering – Aerospace Management and Operations

- End-Thesis research on aircraft recycling
  - KLM and Boeing
  - Best Graduate Award of the NVvL (Dutch Aerospace Society)
  - Prof. mr. dr. ir. S.C. Santema

- Admitted to YES!Delft incubator in 2006
- Admitted EO Accelerator in 2013
- Admitted EO in 2014

- AFRA board member since 2010 currently holding President function

- In the “40 under Forty” of AviationWeek in 2012
AELS

- Globally the first AFRA (dual) and ASA certified company
- Processed 50 aircraft
  - From Fokker F27 to Boeing 747
- 12 aircraft bought
- Example customers:
  - KLM
  - Iberia
  - NATO
  - Hamilton Sundstrand
How many?

Expected to be retired in the coming 20 years:
- 2004: 4,297 (24.8%)
- 2006: 5,561 (24.5%)
- 2007: 6,459 (26.6%)
- 2009: 8,453 (33.8%)
- 2012: 9,880 (35.0%)
- 2013: 12,193 (41.7%)
- 2014: 12,355 (39.4%)
- 2015: 13,100 (40.2%)
- 2016: 12,834 (38.8%)

Source: Airbus GMF2016
Passenger aircraft (>100 seats) and jet freight aircraft (>10 tons)
Content

- Components supply chain
- End-of-Life decision
- Disassembly
- Dismantling
- Recycling
- Innovations/Challenges
Fleet increases

New

Active

Component Warehouse

OEM MRO

Independent MRO

© Aircraft End-of-Life Solutions (AELS) BV
Production stops

Active

Component Warehouse

OEM MRO

Independent MRO

Disassembly
Overview

New

Old

Decision process

Re-Use = Components flow

Recycling = Materials flow

AELS
component management

AELS
disassembly & dismantling

AELS
aerospace material recycling
The end-of-life decision

- Economic decision
  - Aircraft value vs. Parts value
  - Market fitness
- Book value
- Unexpected impact on demand
- Parking cheaper than disassembly and storing of parts
- 10% of global fleet
- Reputation
Disassembly

- Removal of high valued parts
  - Strictly bounded by aviation regulations
  - Serviceable or as-is
  - Removal of components is part of trace
- Value from zero to several millions
Dismantling

- No legislation such as ELV directive.
- More a problem than an opportunity.
- Hazardous Materials
  Fluids, Batteries, Depleted Uranium
- Manual separation of materials (i.e. wiring)
Material Recycling

- Alloys mixed
- Separation at the source
- Separation after shredder
  - Technically possible, economically?
Innovations/Challenges

- CFRP recycling
  - Process, Market, Supply chain
- Organizational innovation
  - Legislation, Industry standards
- Re-use supply chain
  - E-marketplaces, culture change
- Interior Recycling
“Aviation: the most circular industry in the world?”

Yes, but we don’t realize it.
AELS, your partner in total end-of-life solutions and material recycling

Follow us:
- Newsletter
- Facebook
- Twitter
- LinkedIn

Aircraft End-of-Life Solutions (AELS) B.V.
Edelgasstraat 260
2718 TC Zoetermeer
The Netherlands
T: +31(0)88 2357 000
F: +31(0)88 2357 001
E: info@aels.nl
W: www.aels.nl