Autoliv Tour Minutes
Date: October 9, 2008
Location: Autoliv, Brigham City, Utah

10:30
Arrived at facility and Gathered in Conference Room
• Day's agenda discussed
• Coffee provided

Tour Production Line
• Test bay
  o Testing product
  o Fire pyrotechnic inflator in closed vessel
  o Measure pressure vs. time
  o Test from -40 C to 90 C
• ACH Inflator (cold gas)
  o High pressurized, cold gas
  o ID # given at beginning of process
  o Inertia welded base of part onto vessel
  o Vessel filled with gas (pre weighed so they know how much gas to fill it with)
  o Resistance welded with small bb to keep gas in
  o Post weighed with gas inside
  o Parts sit for 4 hours to allow the helium to escape (via impurities/inclusions)
  o Part is then leak checked
    ▪ If the part passes, certified for 15 year life cycle (in car)
  o 2 diffusers crimped on and part length is measured
  o Electrical circuit checked
  o Weight label added (for external customers to verify)

Pyrotechnics
• One line produces both passenger and driver
• SMART – fires based on size of person in seat
  o Both chambers fire, just not always at the same time
• Inflator ignites fuel
• Fuel burns green tablets
• Tablets produce gas
• Gas diffuses into airbag
• Passenger Inflator:
  o Raw base – oriented in first step of the process
  o First machine applies barcode
  o Projection welding (glorified spot weld)
    ▪ Welding adapter to base
    ▪ Secondary adapter welded on
  o Heat removed – part slides down cooling belt
• Initiator crimped onto adapter
  ▪ O-ring creates hermetic seal
  ▪ Camera takes picture to check if o-ring fails/dislodges
• Igniter tube (press bit operation)
  ▪ Notch is off-centered to control orientation easier
• 2\textsuperscript{nd} stage cup is press fitted around other adapter
  ▪ Different companies request different amounts of fill
• Part is weighed
• Generate is filled
• Part is weighed again to make sure amount of generate is correct
• 2\textsuperscript{nd} stage lid is pressed on
• Main stage loader
  ▪ Filter pressed in
    ▪ Particulates filtered from entering airbag
    ▪ Cools gas so it doesn’t burn bag upon inflation
    ▪ Creates cavity
  ▪ Preweighed and post weighed
  ▪ Lid put on
  ▪ Robot loads part into inertia welder
    ▪ Inertia welds diffuser onto top of part
    ▪ Very uniform weld
  ▪ Loaded onto cooling matrix
  ▪ Leak checked – looking for helium
    ▪ He added in the beginning for this very purpose
  ▪ Caution label added
  ▪ Shorting clip added – electrical connection
• Side Inflator:
  o No welding involved
  o Only cleanliness issue is barcode falling off the outside
  o Mild steel used
  o Rust inhibitor may be issue
    ▪ Not getting rinsed off?
    ▪ Looking at laser etching a 2D barcode instead of sticker
    ▪ Laser could possibly clean entire surface and then etch label
• Process:
  ▪ I operator
  ▪ Z-height measured
  ▪ Filter inserted
  ▪ Orifice loaded (looks like washer)
    ▪ Critical to the inflator
  ▪ Crimp station
  ▪ Welder used is projection welder
    ▪ Welds stud to outside of part for mounting in car
  ▪ Baffle
    ▪ Dropped inside gen-cam
  ▪ Offloaded
- Barcode applied
- Unloaded into new station
- Auto ignition tablets added
  - Ignite at lower temp
  - Allows for deployment and not an explosion
  - Loads 6 tablets
- Preweighed and postweighed after generate is filled
  - Weighed and counted
- Helium injected for future leak checks
- IMI attached
  - Plastic initiator
  - O-ring provides hermetic seal
- IMI is crimped into place
-Leaks checked
  - Sniffs for helium
  - Sometimes gives faulty results due to background helium noise
- Offloaded and complete
  - ASH assembly
    - Uses resistance welds and laser welds

Laser Weld
- Biggest issue
- Susceptible to porosity
  - Due to contamination?
- 6 mm has more problems than 8 mm
- Contaminants from washer
- Leaks sometimes don’t show themselves for days/weeks

Wash Process
- Parts loaded into washer
  - Rotating drum washer
  - But they have a new washer being set up
- 2 wash cycles
- 1 rinse cycle
- 1 dry cycle
- Sometimes it works, sometimes it doesn’t
- Dual drum, single drum, and basket washers in facility
- Wash rotated every day
- Wash chemical – potassium hydroxide
  - Titration test tells concentration
  - 2 times per shift
  - No way to determine if wash is “spent”
  - Parts coming in from all over the way
    - Many different suppliers
    - Weather and climate effect cleanliness
    - Stored in bins inside facility
- Titrations
• HCl with methyl orange indicator
  ▪ Bromophenol blue
• Take population of parts
  o Coat them
  o Wash parts
  o See pattern of cleanliness
  o Uniform, patterned, etc.

Notes:
• Looking for a clean parts standard
• Need to maintain pH of wash
• Optimize wash process
• SMART goals
  o Specific
  o Measureable
  o Ambitious
  o Relevant
  o Timebased

2:00
Conference Discussion after Completed Tour
• Brandon’s idea
  o Determining spent fuel
    ▪ Look at correlation of pH to wash cycle (time)
    ▪ Compare with weld failure and look for correlation
    ▪ Maybe a decrease in pH will define “spent” fuel
      ▪ Also look at elements present/concentration
    ▪ Previously, Autoliv used to check pH
      ▪ For disposal purposes
• Have not yet looked at surfactant
  o Lowers surface tension
  o Helps pull hydrocarbons off surface
• Don’t know current PM on Epic Wash (yet)
  o New basket washer – not yet in service
• When we receive parts what kind of documentation will come with?
  o Wash history?
  o Failure rates/history?
  o We can use serial number to track data
  o They’ll send all the info that they can, but we can request more