



LIGHTWEIGHT INNOVATIONS
FOR TOMORROW

Operated by *ALMMII*



Technology Project Successes





LIGHTWEIGHTING IN AUTOMOTIVE

DUCTILE IRON CASTINGS

- Weight Reduced by 40%
- Wall thickness reduced by 50%



PRODUCT, PROCESS AND MATERIAL DEVELOPMENT:

- Part redesign based on performance needs
- Alloy optimized for strength
- Process developed for material flow
- Trials poured and evaluated

OUTCOMES INCLUDED:

- New ductile iron alloy
- Cast prototype parts
- As-cast and machined wall thickness reductions
- Weight reduction

IMPACTING SHIPBUILDING

Welding Distortion Control

Welding lightweight plates leads to more distortion and buckling

Product, process and material development:

Team taking approach of “inside out”
construction approach similar to automotive

Outcomes:

- Reduced distortion by 30%
- Reduced cost by 13%
- Huntington Ingalls implementing process in shipbuilding going forward



INVESTING IN OUR MILITARY

Optimizing ABS and Electronic Stability Control Systems:

Reduce fatal rollovers for our U.S. military members

Product, process, and material development:

Conduct studies for light weighting components

Component Redesign

Lightweight prototype development

Outcomes:

- Systems available for purchase by military units worldwide
- Expected to reduce fatal rollovers by up to 74%
- Can reduce stopping distance by 8 truck lengths



SUPPORTING OUR FIRST RESPONDERS

Machined and prototyped couplers for Lifeline Firehose product:

Hose delivers air to firefighters in the same hose system as it delivers water to a fire

Product, process, and material development:

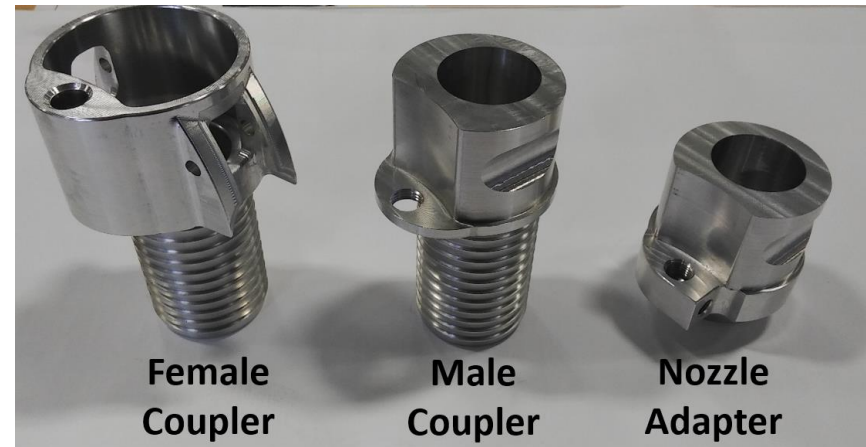
Machined pieces at LIFT's Detroit facility

Optimized coupler design

Two sets made available to Lifeline

Outcomes:

- System installed on Grand Ledge, Michigan fire truck
- Working towards higher levels of production through die casting



LIGHTWEIGHT SOLUTIONS THROUGH INCREMENTAL FORMING

State-of-art sheet metal forming technology

Enables more flexibility in part geometry and cost efficiency compared to conventional processes

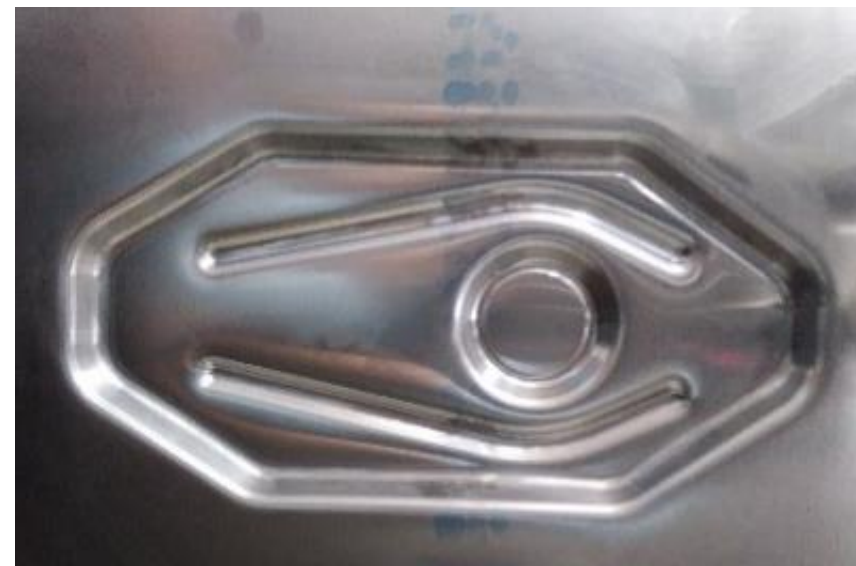
Product, process, and material development:

Baseline established by forming a cone and a pyramid

Benchmark used to study the effect of different process parameters and tool paths on the structural properties, fatigue and dimensional accuracy of the component

Outcomes:

- Formed “heart-shape” test component using die assisted two-point incremental forming (TPIF).
- Demonstrated ability to form same shape with no die single-point forming (SPIF).
- Delivered prototype to customer.



No die –Single Point Forming Strategy



Base die – Two-Point Incremental Forming Strategy