

Flash® Processed Steel for Automotive Applications

DE-EE0007877 – Phase III Project Period: April 2017 – October 2018

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Overview

Timeline

SBIR - Phase III

- Award issued April 2017
- End date September 2018
- Project 80% complete

Budget

	FY 17 Costs	FY 18 Costs	Total Planned Funding (FY 18- Project End Date)
DOE Funded Phase III	1.0 M	0.3 M	1.3M
Project Cost Share		0.1 M	0.1M

Barriers

The Key barriers to increased penetration of Flash technology are:

- Developing induction heating methods for Flash Processing in wider format that duplicates what Auto OEM testing has shown
- Proving that Flash technology can be consistently performed across the width of a steel coil for the length of the coil with consistent properties

Partners

In Phase III, Flash has worked with:

- Steel Equipment Specialists (SES) to construct material handling aspects
- Ajax TOCCO to develop induction heating equipment tailored to high volume Flash Processing
- Fluxtrol for induction heating coil design

Project Objectives



Done: Cold-stamped 1500 MPa B-pillar

The Problem:

- Flash processing has been proven to produce high strength, cold stampable sheet for game-changing weight reduction in cars. *This is the Holy Grail for automakers.*
- But the lab scale system could only process small sheets. Automakers and metal suppliers need to know this will work at scale, and provide consistent strength levels coil to coil.
- Private investment was stalled. No one would ante up without proof!

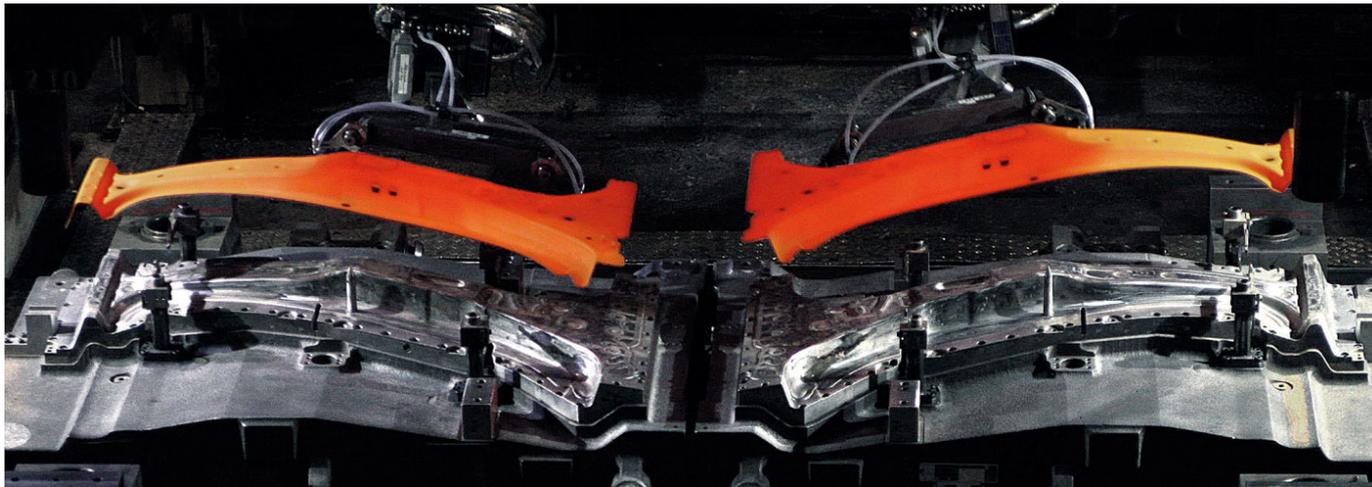
The Solution:

- SBIR Phase III Pilot line to process 20,000-lb coils for automaker evaluations. Induction heating coil design and line speed will be optimized for product uniformity and productivity.
- Automotive lightweighting: 50% weight reduction for individual components. Energy savings $\sim 2\%$ /car/year = ~ 0.18 Quads/year
- Aligned with AMO's MYPP goals: New process for advanced materials

Technical Innovation

High Strength Steel Today:

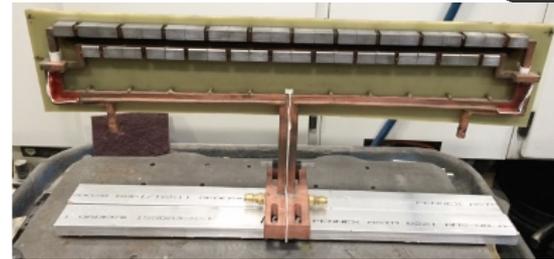
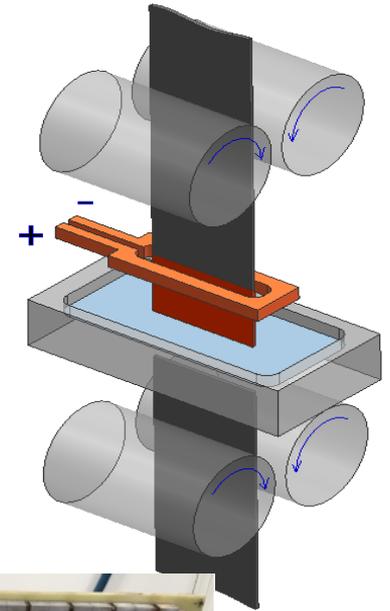
- Automakers use expensive boronized steel for high strength
- But the parts must be hot stamped
- They not only have to pay more for the steel (e.g., 57¢/lb vs. 35¢/lb.) but it's more expensive to stamp!
- This limits use in vehicles



Technical Innovation

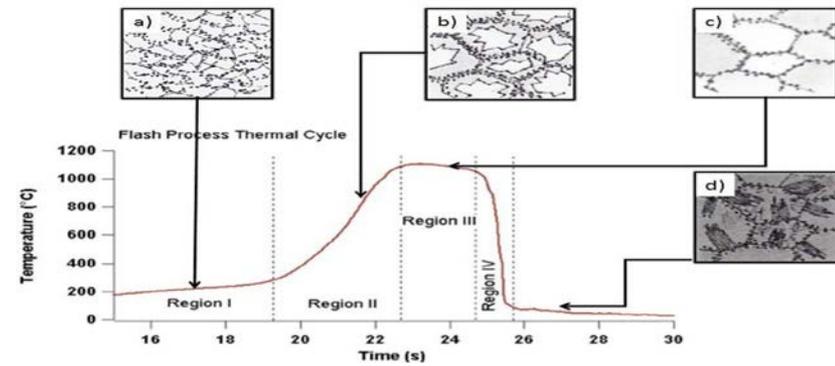
Solution: Flash Processing is a radical new way to heat treat steel

- Thin sheet induction heated in a few seconds, low energy; No long hold, just quench, and don't have to temper
- Continuous process
- Tensile strength of 1500 MPa⁺, 2X – 3X that of high strength low alloy steels
- Uses plain carbon (off-the-shelf 1020) steel
- Costs about 35¢/lb. vs. 57¢/lb for DP1180
- Low capital equipment costs
- Excellent cold stamping performance
- Good weldability



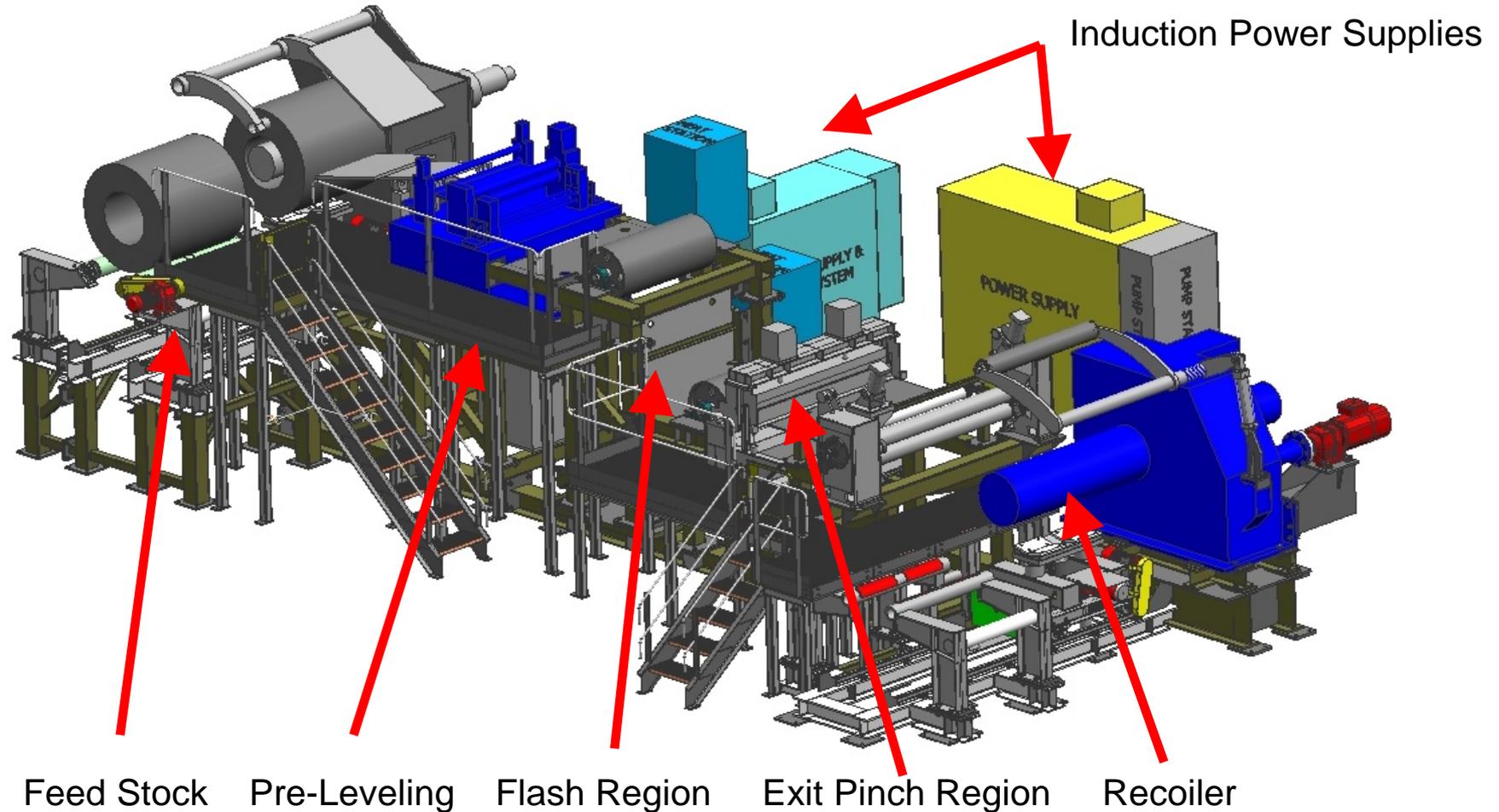
Technical Risk

- Still don't fully understand scientific basis for improved formability
- High speed processing may not yield the same properties



Technical Approach

Flash® Bainite MRL-5 Processing Line Design



Technical Approach

Capacity: 20,000 lb coils, 36" wide, 8 feet/minute



Technical Approach

Flash® Bainite continuous line
Custom-designed 1.6 Megawatt Induction Units,
New coil designs for temperature uniformity



Results and Accomplishments

- Project is 80% complete.
- Steel Equipment Specialists has completed the construction of the material handling aspects of the Flash Coil line. The equipment has demonstrated the material handling aspect of coil to coil operation and is ready for the installation of the induction heating station.
- Ajax TOCCO has completed the construction of the 1.2 megawatt and 400 kilowatt induction heating units. Both units have passed quality control inspection and are being integrated into the Flash Coil line
- Fluxtrol has completed the design of the induction heating coil and coil build is underway.

Transition (beyond DOE assistance)

- Commercialization will occur via Pilot Line development ultimately resulting in OEM/Tier 1 adoption/licensing of the technology at the manufacturing center itself.
- In discussion with multiple U.S. automakers, some of whom have already evaluated specific parts.
- Multiple steel mills are evaluating Flash[®] Processing for potential adoption.
- Steel warehouses and re-rollers could readily install Flash[®] Processing lines.

Questions?



SBIR/STTR Small Business of the Year