Welcome from Michael Davenport, A/SP Executive Director

I am truly excited and honored to welcome our members to the 2022 Auto/Steel Partnership (A/SP) Technology Day on October 25, 2022, 8 a.m. to 5 p.m., at Laurel Manor in Livonia, Mich. It will be the first time we have convened the whole membership in a long time, and I am looking forward to a great day of interaction and presentations. We've added a cocktail hour at the end of the day (4 p.m.) with a short keynote address. I encourage you to stick around for the whole day so we all can have plenty of time to catch up. Please note that to make the very best of this in-person day, we will not be live-streaming the event. Presentations will be available via pre-recorded video after the event.

We've got a good agenda set up for the day, which you can find on the next page. For some projects, such as our focal challenge Liquid Metal Embrittlement, we'll provide an overview of what we've accomplished and where we're headed. Other projects will report on current findings. Every A/SP project is the result of our membership identifying common issues in the manufacturing of Advanced High-Strength Steels that the teams are tackling for the best solutions.

Besides what is being presented on Tech Day, our teams have completed work and developed Project Summaries for 12 projects this year to date, as well. In this issue is a list of Key Accomplishments from many of these projects to help you understand what types of information you can access in each.

We are continually communicating that A/SP work bridges the gap between the lab and the shop floor, and every day we collaborate, together with our members and the best experts in the industry, towards that end. There's a lot to learn from A/SP teamwork, and you'll have an opportunity to ask questions and talk directly with the project teams at Tech Day. I look forward to seeing you!

Michael Davenport

Auto/Steel Partnership Executive Director

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To download this newsletter in a clickable PDF, go to www.a-sp.org/0912news/

2022 A/SP TECHNOLOGY DAY

October 25, 2022, 8 A.M. – 5:00 P.M.

Agenda

7:30 AM Doors Open at Laurel Manor

8:00 AM Welcome, Introduction and Keynote

Michael Davenport, Executive Director, A/SP
John Catterall, A/SP Officer
Keynote Speaker:
Brett Smith, Director Technology, Center for Automotive Research

Awards of Excellence
Michael Davenport, Executive Director, A/SP
John Catterall, A/SP Officer

9:00 AM – Joining

Joining Overview
Hassan Ghassemi-Armaki, GM

Liquid Metal Embrittlement Update
Zhenke (Kevin) Teng, GM

J#07: Fusion Welding Process Modeling & Simulations (I)
Hassan Ghassemi-Armaki, GM

10:20 AM *Break*

10:35 AM GMAW, CFM, Repairability

G#05: Fatigue Characterization & Modeling for Frames (I)
A. K. Khosrovaneh, GM

Constitutive Fracture Modeling – Overview of all projects
Thomas Stoughton, GM

R#05: 3rd Gen 980 (UC/CC) & PHS1800 (C)
Justin Hunt, Stellantis

12:10 PM Steel Testing and Harmonization

STHT#06: Strain and Bake Properties Procedure(I)
Dr. Haea Lee, POSCO

12:35 PM Lunch

1:35 PM Stamping Team

ST#15: 3rd Gen AHSS Press Tonnage and ST#20: S-corner die
Vince Millioto, Martinrea

ST#17:Hybrid Bead Simulation
Chris Roman, GM

ST#18:Enhanced Formability Effect on UHSS
D.J. Zhou, Stellantis

2:50 PM Break

3:05 PM Stamping Tooling Optimization

STO#08.3: Laser Hardening Large Die - Overlap Paths
J. P. Singh, GM

STO#10.2: Die Wear Test (II)
D.J. Zhou, GM

4:00 PM Cocktails and Closing Keynote

Nucor Keynote

Tech Day Location (*In-Person Only*)

Laurel Manor
39000 Schoolcraft Street
Livonia, MI 48150

Please register to attend:

https://www.eventbrite.com/e/asp-technology-day-tickets-411283539137

USE THIS LINK TO INTERACT WITH PRESENTATIONS ON TECH DAY! (link is live on October 25)

Interact with the speakers! Ask your questions, participate in polls and quizzes using our secure online Q&A at Tech Day:

https://pigeonhole.at/TECHDAY22

Go to
pigeonhole.at

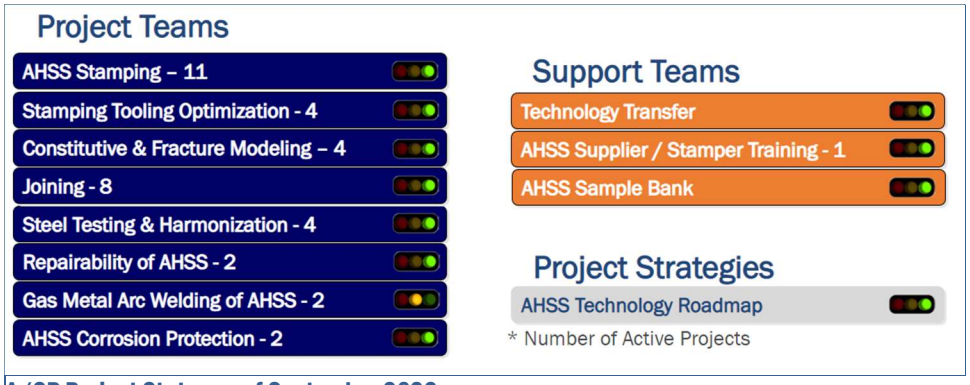
Enter passcode
TECHDAY22

Awards of Excellence at Tech Day

The peer-chosen *Award of Excellence* acknowledges project findings and results by honoring A/SP members and other contributors who have demonstrated outstanding commitment, leadership and innovation in the applications of emerging steels. Award selections are based on project work conducted over the past year and voted on by the A/SP Joint Policy Council. Awards will be presented for the following categories: Individual, Most Valuable Player, Key Collaborator, Project Team.

A/SP Project Status

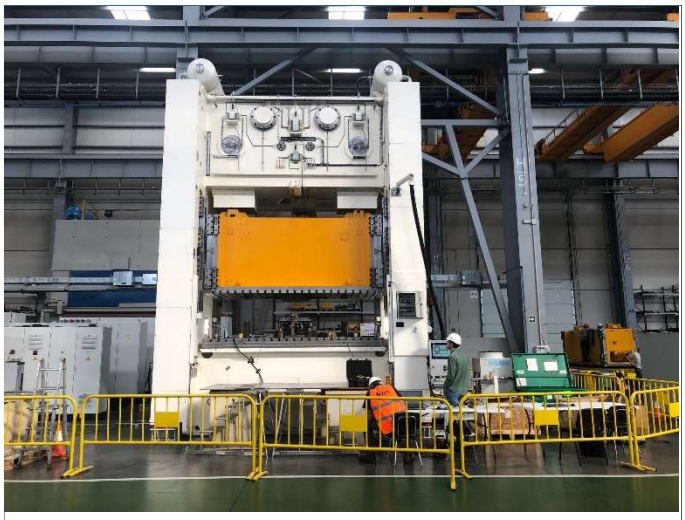
A/SP project teams continue to make good progress on a total of 45 current projects, 32 of which are continuations from 2021 and 13 new for 2022. The Stamping and Gas Metal Arc Welding teams both have a yellow status as some projects have been delayed due to COVID slowdowns. However, in both cases alternative plans have been made to keep progress moving forward.



A/SP Project Status as of September 2022

In-Kind Contributions Support Ongoing Project Efforts

You may have seen our LinkedIn post on a recently completed die trial conducted to better define press tonnage as a function of part quality. Nidec/ ARISA ran the die trial (in-kind contribution) using a Martinrea supplied die (in-kind contribution), which was refurbished by K&T Tool to run high-strength steel. The die trial included several grades of steel ranging from DP980 to 3rd Gen 980. A/SP recognizes and appreciates the contributions made by Martinrea, Nidec/ARISA, and K&T Tool & Die to support the on-going efforts to understand the production concerns with the press tonnage and springback of AHSS and 3rd Gen AHSS. Look for the test results and analysis of the die trial to be presented at A/SP's 2022 Technology Day.



Press used in the die trial. (More images on Linked In!)

PROJECT HIGHLIGHT: Hybrid Bead Design, Development, and Validation for Springback Control

In metal forming, stake beads and draw beads are used to control springback by stretching the part and converting residual stresses in the part from tensile to compressive. Since the sheet metal area engaged by the beads does not contribute to the function of the part, this area is trimmed off before assembly and thereby contributes to scrap. Over the course of several projects, the Stamping Team has been evaluating hybrid beads to control springback but with less offal compared to more traditional springback control mechanisms. The beads resemble, and have a similar function, as stake beads but are up to 90 percent smaller.

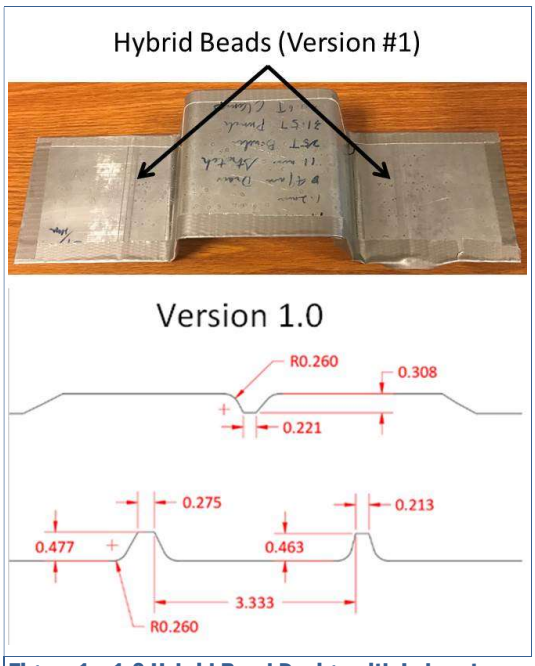


Figure 1: v1.0 Hybrid Bead Design with Laboratory-Scale Hat Section Component

The objective of the work was to develop a viable bead design, validate the design using laboratory and production scale die trials, and verify the ability to model it using commercial software. The work was separated into three interdependent sequential projects: 1) ST#01: *Laboratory-Scale Hybrid Beads;* 2) *S*T#02: *Production-Scale Hybrid Beads*; 3) ST#17: *Hybrid Bead Modeling.*

Simulations were conducted to determine if proposed designs would arrest sheet metal movement at a specific stage of the forming process and induce sufficient sidewall stretch to reduce springback for a laboratory-scale hat-section component shown in Figure 1. Inserts were then manufactured for viable designs and small volume die trials were conducted to assess springback and verify simulations. Hybrid bead designs that performed well in the ST#02 laboratory-scale die trials were then passed on to the ST#03 project to conduct production-scale die trials using an extended hat-section component shown in Figure 2. At various points of the program, forming modeling and simulations were done in ST#17 to determine and/or verify die trial set-up parameters. The program evolved into an iterative process as issues experienced at various stages of the program led to further refinement of the bead designs.

Figure 2: Production Scale Part using v9.0 Hybrid Bead

Background and Results

More than ten hybrid bead designs were evaluated over the life of the program. Validation trials were conducted on six different versions. All versions evaluated in die trials were effective in controlling springback but bead durability, press force needed to arrest sheet metal movement, and occasional sheet metal cracking along the beads were issues that drove continued refinement. The first version, v1.0 shown in Figure 1, performed well in the ST#02 die trial but the bead radii were too hard and small to be reliably machined across a long-tapered insert used in the production-scale die. Despite the machining issues, inserts were made and a ST#03 die trial was conducted. The parts produced had little springback, demonstrating the effectiveness of the beads, but the beads fractured almost immediately. This led to several changes, the first was to upgrade the insert tool steel from D2 to S7 and the second to revise the bead design to be more robust.

A number of versions were entertained trying to balance press force, sheet retention and machinability. v9.0, shown in Figure 3, was eventually selected for validation trials as it performed well in simulations and was expected to be more machinable. The design did well in the laboratory-scale die trial but did not fare well in the production-scale die trial. The beads effectively controlled springback in steels with strengths up to HSLA420. However, the cushion force needed to engage the beads and arrest sheet metal movement exceeded commercially available press capacity. Short-sheeted trials were successful in controlling springback for higher strength AHSS but cracking along the bead was observed, especially for the higher strength AHSS. The Team concluded that the v9.0 bead design had to be optimized to reduce the necessary cushion force.

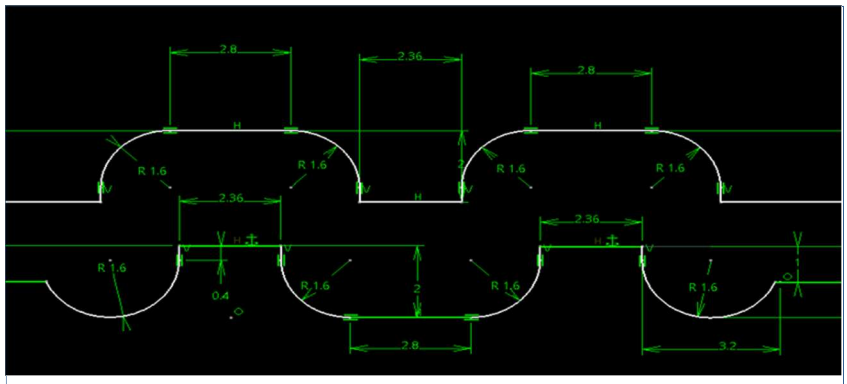


Figure 3: v9.0 Hybrid Bead Design

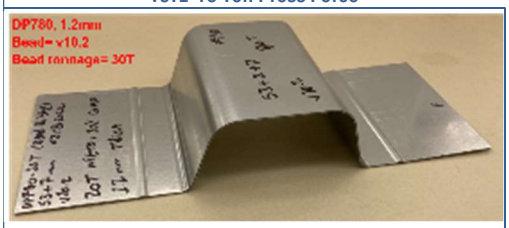
It was estimated that a press force reduction of 30% was needed to be viable for forming AHSS and 3rd Gen AHSS in production. Three new designs were proposed, v9.1, v10.2 and v10.3. Simulations indicated that each would meet the 30% press force reduction target.

- V9.1 bead was a refinement of the v9.0 design, which added a 1 mm radius to the bead radii on the upper and lower inserts.
- V10.2 was a new single bead design with more generous radii, offering reduced cost in insert manufacture with comparable gripping force as its more complex double-bead predecessors.
- V10.3 was a new concept for a segmented bead that was proposed to further advance "zero" scrap initiatives.

A laboratory-scale die trial was conducted to compare the three new bead designs against the baseline v9.0 bead design, as shown in Figure 4. All three showed equivalent performance as the baseline v9.0 design but with a 25 to 40% reduction in press force. Parts made using each of the designs were fully formed and showed minimal springback. Version 10.2 and v10.3 were determined viable and candidates for production-scale die trials, however, the Team has no current plans to do additional production-scale die trials. There is consideration for continuing work on the v10.3 segmented bead design and coupling this with resistance spot welding to make the beads a functional part of the component.

v9.0 40 Ton Press Force

v9.1 40 Ton Press Force



V10.2 30 Ton Press Force

V10.3 30 Ton Press Force

Figure 4: Laboratory-Scale Die Trial of v9.0, v9.1, v10.2 ad v10.3 Hybrid Beads

Table 1: Laboratory-scale minimum press force tonnage for each hybrid bead design

Hybrid Bead Design	v9.0	v9.1	v10.2	v10.3
Press Force Minimum Tonnage (T)	45	40	25	30

Conclusions

Hybrid beads offer opportunities to reduce blank size and scrap compared to more conventional stake beads. Bead designs must consider component design, insert manufacturability, press cushion force, and material strength. The Stamping Team's current position is that hybrid beads are viable for lower strength steels but face challenges with increasing material strength.

Key Project Accomplishments

Are you getting the most out of A/SP project results and data?

Auto/Steel Partnership is all about solving common manufacturing issues and advancing innovation. Hundreds of projects have been conducted over the years that have added to member data and understanding to help improve the forming and joining of Advanced High-Strength Steels.

This year alone, 12 projects or project phases on a variety of topics have been documented in project summaries, the research of which is available to you. Following is a list of key accomplishments completed in the last year with links, where available, to the project summary videos where the key team members review project findings. If you would like both a copy of the project summary presentation as well as the video, you can find them all on Your Membership, categorized by project team here.

Constitutive and Fracture Modeling (CFM) Team

Project: CFM#01 **Digital Image Correlation (DIC)** ***Test Procedure (NIST CRADA)*** developed, "*General A/SP Specifications for Reporting DIC Data in Material Testing*" that was applied to guide supplier selection for Stamping Team projects, ST#15: *3rd Gen AHSS Press Tonnage* and ST#16: *Laser Welded Blanks*. Through A/SP involvement, led Tom Stoughton (GM), with the Industrial Fracture Consortium (IFC), the Swiss Federal Institute of Technology (ETH) also is using the procedure. You can find the test procedure in the CFM Your Membership (YM) group here or by contacting Eric McCarty.

DIC Symposium: On May19, A/SP partnered with the North American Deep Drawing Research Group (NADDRG) to co-sponsor a DIC Symposium in Plymouth, Mich. The all-day event provided opportunities to explore, through speakers and panel discussions, the use of DIC technology for sheet metal characterization for use in forming and fracture modeling. Copies of the presentations at this event can be found in the CFM group on Your Membership or by contacting Eric McCarty.

NUMISHEET 2022: The A/SP CFM and Stamping Teams submitted two simulation benchmarks to NUMISHEET 2022, which is the premier international conference on numerical simulation of sheet metal forming processes held every three years. The first was a forming benchmark based on the springback reduction work by the Stamping Team using a twist beam focal component. The second was a fracture benchmark based on the work being done by the CFM team on damage accumulation modeling. Regretfully, no companies submitted simulations for the latter but five submissions were received for the former, of which AutoForm version R10 performed the best.

Joining Team

Liquid Metal Embrittlement (LME) is a focal challenge and a key topic for research in the Joining and GMAW teams. Following in each team are examples of this work. More information can be found in the June newsletter, which features A/SP Focal Challenges. Project J#1.4: *LME Phase III*, discussed below, is one of the completed Joining Team projects working on the LME focal challenge.

Project: J#1.4: LME Phase III, completed earlier this year. The project sought to extend the resistance spot weld (RSW) Rapid LME test developed in Phase II (see "*A/SP Procedure for Rapid LME Testing V#2*") from two thickness (2t) homogenous weld combination to 2t and 3t heterogenous weld combinations. Due to differences in electrical resistivity, the procedure was unable to obtain sufficient weld penetration in heterogeneous stack-ups. The Team concluded that the Rapid LME test procedure was an effective method for assessing material susceptibility for LME but that the LME lobe test was better for qualifying heterogeneous stack-ups.

J#1.4 Project Summary recording (weblink)

Project: J#4.1 Alternative Joining Project 4 Phase I. The Joining Team developed performance data for multiple alternative joining technologies for advanced high-strength steels compared to baseline RSW steel joints. The technologies included were, Thermally-Assisted Mechanical Clinching (TAC),

KEY PROJECT ACCOMPLISHMENTS CONTINUED – JOINING

Mechanical Clinching (MCL), Self-Piecing Rivet (SSP), Thermally-Assisted Self Piercing Rivet (TAR) and Thermally-Assisted Mechanical Clinching (TAC). All four technologies along with the baseline RSW process were evaluated with and without adhesive. Follow-on project will assess durability of these joining alternatives.
J#1.4.1 Project Summary recording (weblink)

Gas Metal Arc Welding Team

Project: G#3: 3RD Gas Metal Arc Welding (GMAW) – LME through project testing qualified that the RSW rapid LME test is a low cost yet reliable test that successfully identifies LME susceptibility. As a consequence, it is recommended for use to classify Retained Austenite (RA) steel materials for both RSW and GMAW processes.
G#3 Project Summary recording (weblink)

Repairability

Project: R#5: 980 3rd Gen & PHS 1800AlSi purpose was to evaluate various weld repair processes on 980 3rd Gen AHSS and PHS1800, providing joint inspection and test data for use by OEMs in determining appropriate repair strategies. The project results assist OEMs for the tested materials as well as correlate for comparison with A/SP Joining and Repairability projects testing other AHSS grades.
R#5 Project Summary recording (weblink)

Stamping Team

Springback also is an A/SP Focal Challenge. Project ST#14, discussed below, is one of the completed Stamping Team projects pursuing this focal challenge. More information can be found in the June newsletter, which also features this Focal Challenge.

Project: ST#14 Spring Back – Friction. The ability to model and predict springback is essential for cost effective implementation of AHSS and 3rd Gen AHSS in automotive components and assemblies. Over several years, the project team developed and validated material models to accurately represent material behavior with respect to formability and springback. During this phase of work, the Team developed more comprehensive friction models, enabling an evaluation of the factors influencing friction and providing an experimental means to validate forming model predictions.
ST#14 Project Summary recording (weblink)

Project: ST#18: Enhanced Formability Effect on UHSS. Prior work nearly 20 years ago revealed that steels experienced enhanced formability after bending and unbending, such as when sheet metal passed over and around draw beads. This effect was noted for steels ranging from mild steel to advanced high-strength steels up to 590 MPa tensile strength. The Stamping Team initiated this project to determine if this enhanced formability effect could be extrapolated to higher strength steels. Using a draw bead simulator test developed as a part of the project, it was found that the enhanced formability effect can be extrapolated to higher strength steels ranging from 590 to 1180 MPa tensile strength. This indicates that the bead correction factor developed in previous work is applicable to higher strength AHSS and enables increased design options for AHSS and 3rd Gen AHSS.
ST#18 Project Summary recording (weblink)

Steel Testing & Harmonization Team (STHT)

Project: STHT #05: OEM Material Testing Procedures completed a study of the new material testing procedures used by two OEM member companies, identifying 56 tests; many of the tests, but not all, were common across the OEMs.
STHT#05 Project Summary recording (weblink)

Steel Sample Bank (SSB). In 2021, SSB received 15 new materials and shipped out 76 materials to support the needs of our various project teams. So far this year, the Sample Bank has received four new materials and shipped out 42 materials. The steel sample bank houses over 35 tons of steel. See the chart on Page 8.

Stamping Tooling Optimization Team (STO)

Project: STO#8.2 Laser Hardening of Stamping Die 2 demonstrated the potential for die makers to achieve a more consistent case hardening result with laser hardening in a shorter time and reasonable cost.
STO#8.2 Project Summary recording (weblink)

KEY PROJECT ACCOMPLISHMENTS CONTINUED - STO

Project: STO #10.1 Die Wear Tester Baseline Repeatability & Sop Development compared and calibrated test results with die wear simulated sliding energy calculations, as well as the relationship of wear vs. sliding energy density for 3rd Gen AHSS stampings. The Team completed a repeatability study to prove confidence in sliding wear machines.
STO#10.1 Project Summary recording (weblink)

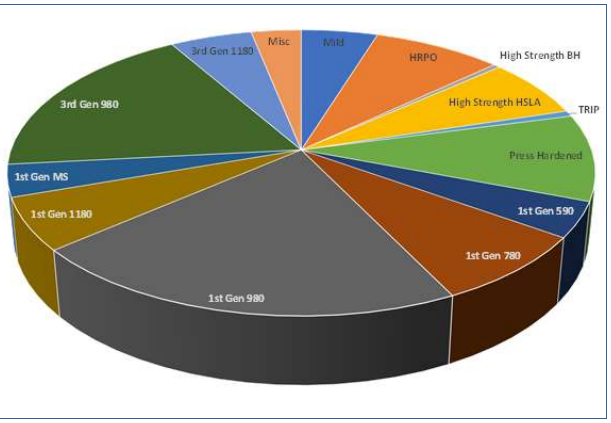
Project: STO#12 Additive Metals Die Testing explored the capabilities and limitations of metal additive manufacturing (AM) as a fabrication method for small die inserts such as flange steels, trim steels and restrike steels. A/SP initiated this project to help OEMs better understand the durability of of small die inserts fabricated using AM. This project successfully developed inserts using AM and stamped acceptable parts from it in a laboratory setting. AM offers the opportunity to significantly decrease the time and cost to produce die inserts and repair dies.
STO#12 Project Summary recording (weblink)

Project: STO#13 Caldie – Cast & Wrought Durability published its findings in an SAE paper "A Comparative Study on Fatigue Damage of Caldie from Different Manufacturing Routes," which was delivered at the 2022 SAE WCX.
STO#13 Project Summary recording (weblink)

Steel Sample Bank Scorecard

The sample Bank currently includes 117 different materials in 14 steel types as show in the chart below.

Steel Type	Count	Tons	Pct%	Last 30 Days		CYTD	
				IN	OUT	IN	OUT
Mild	5	1.7	4.9%	1	1	1	2
HRPO	2	2.9	8.3%				
High Strength BH	1	0.2	0.4%				2
High Strength HSLA	6	2.4	6.7%				
TRIP	2	0.2	0.6%				
Press Hardened	9	3.5	9.8%				2
1st Gen 590	8	1.4	4.0%		1		2
1st Gen 780	10	2.8	7.9%		1		4
1st Gen 980	26	7.5	21.2%				7
1st Gen 1180	5	2.1	5.9%				2
1st Gen MS	8	1.3	3.6%				4
3rd Gen 980	18	6.4	18.1%		2		7
3rd Gen 1180	12	1.9	5.3%		2	1	6
Misc	5	1.1	3.2%		1	2	4
Total	**117**	**35.5**	**100.0%**	**1**	**8**	**4**	**42**



Steel Sample Bank Inventory as of August 31, 2022

TRAINING

A/SP has reached nearly 1150 people this year and over 2500 people in the last three years with the AHSS Metallurgy and AHSS Formability courses. We are in the process of completing a joining course as well adding new content to existing courses.

#	Date	Class	Who	Attendees	NPS	NPS Global Std.	Totals	
1	4/28/2020	Formability Course	Members	235	70	World Class		
2	5/1/2020	Formability Course	Suppliers	286	50.8	Excellent		
3	6/3/2020	Metallurgy Course	Members	89	58.3	Excellent	2020 Total:	849
4	9/2/2020	Formability Course	FCA	37	76.9	World Class		
5	9/21/2020	Metallurgy Course	Ford	118	64.6	Excellent		
6	9/21/2020	Formability Course	Ford	84	68.1	Excellent		
7	6/10/2021	Metallurgy Course	Members/Suppliers	165	62.5	Excellent		
8	6/11/2021	Formability Course	Members/Suppliers	149	61.2	Excellent	2021 Total:	535
9	10/15/2021	Metallurgy Course	Stellantis	124	64.1	Excellent		
10	11/5/2021	Formability Course	Stellantis	97	68.3	Excellent		
11	3/24/2022	Metallurgy Course	Members/Suppliers	220	64.5	Excellent		
12	5/9/2022	Metallurgy Course	Stellantis	57	87.0	World Class		
13	5/26/2022	Formability Course	Members/Suppliers	204	73.5	World Class		
14	6/16/2022	Metallurgy Course	Members/Suppliers	224	73.0	World Class		
15	6/23/2022	Metallurgy Course	GM	100	55.8	Excellent	2022 YTD:	1148
16	7/21/2022	Formability Course	Members/Suppliers	200	65.1	Excellent		
17	9/9/2022	Metallurgy Course	Members/Suppliers	143				
18	10/4/2022	Formability Course	Stellantis					
19	tbd Fall	Formability Course	GM					

A/SP Training with Net Promoter Score (NPS)

Member Highlight

Kate Namola, Toyota Motor North America

Kate Namola is a Welding Engineer in the Joining Innovation group for Toyota North America. A lifelong lover of working with her hands and innovative technology, Kate earned both Bachelor and Master of Science degrees in Welding Engineering from the Ohio State University. She started her career at EWI as an intern where she worked through her entire Welding Engineering college career, working as a full-time engineer during her graduate education. This gave her the opportunity to gain practical experience with a wide range of resistance and friction joining processes. The research for her Master degree focused on resistance spot welding of 3rd Generation advanced high-strength steels. Kate joined Toyota in November of 2020 to work on the development of welding practices for new model vehicles – which also feeds into that desire to engage innovative technologies in a hands-on way. At A/SP, Kate is lending her considerable expertise to lead a Joining Team project, J#8: Welding Techniques to Overcome High Thickness Ratio. Under her leadership the team defined the goals, objectives and approach for the project and have engaged the University of Waterloo to conduct the work.

A/SP Around the Industry

International Auto Body Conference

September 28-29, Laurel Manor, Livonia, Mich.

This year's IABC will include an A/SP presentation, entitled, "A Comparative Study on Fatigue Damage of Tool Steels from Different Manufacturing Routes", presented by Michael White, A/SP, and Pengyan Lu, PhD, Wayne State University.

EWI's Advanced Sheet Metal Forming Technology Workshop

October 20, OSU Fawcett Center, Columbus, Ohio

Michael Davenport, A/SP Executive Director, is speaking EWI's annual workshop which brings together OEMs, stampers, material producers and others to discuss issues related to current practice and advancement of sheet forming technology.

POSCO Green Materials Forum 2022

October 31 – November 2, Incheon, Republic of Korea

Michael Davenport has been invited to present at a POSCO customer appreciation event. In his presentation, Mike will explore how AHSS can be exploited in electric vehicles. He also will talk about how innovative teams can, not only survive but thrive during this time of massive change.

Member Company Visit: Ternium

November 7, Monterrey, Mexico

A/SP Officer John Catterall and Project Manager Eric McCarty have been cordially invited to conduct a workshop for Ternium staff to update on projects and findings. Ternium also has organized a tour and meeting with nearby automotive tier supplier Metalsa.

Alacero Summit 2022

November 16-17, Monterrey, Mexico

The steel industry is convening in Monterrey, Mexico in their annual summit, organized by Asociación Latinoamericana del Acero (Alacero). Automakers and steel manufacturers will come together to discuss megatrends in the use of steel and the important topic of sustainability. Silvia Pieretti and Máximo Vedoya at Ternium will participate in several of the conference panels.

UPCOMING A/P MEETINGS	
Joint Policy Council (7:30 – 10:30 a.m.)	
September 14	November 16
October 12	December 14
Board of Directors & Joint Policy Board	
October 19, 1 – 4 p.m.	

Project Summaries

A/SP Technology Transfer Team developed the Project Summary initiative to officially close out projects and enhance technology transfer of project results among A/SP member companies. Project Summaries are presented at a Tech Transfer Team meeting, recorded, and posted to the dedicated Your Membership page. They are the first place to go to better understand project findings. Following is a list of summaries completed so far this year:

Questions about project teams and results? Contact the team's project manager. You can find a list below. Need access to Your Membership? Contact Kate Hickey.

As of September 2022:

- G#3 GMAW Liquid Metal Embrittlement
- J#1.4 Liquid Metal Embrittlement Phase III
- J#4 Alternative Joining Project 4 Phase I
- Repairabilty#5 - 980 3rd Gen, C UC, PHS 1800 AlSi
- ST#14 Spring Back
- ST#18 Enhanced Formability Effect on UHSS
- STHT#5 OEM Material Testing Procedures
- STO#8.2 Laser Hardening -Phase II
- STO# 8.3 Laser Hardening Gap-Overlap Optimization
- STO#10.2 Die Wear – Phase II (GI & EG Coated)
- STO #12 Additive Metals Die Testing
- STO#13 Caldie – cast & wrought durability

Now available on YM:
https://members.steel.org/members/group_content_view.asp?group=226818&id=858432

Project Summaries completed in 2022 as of September, 2022

Staff Contacts

Staff Contacts	Responsibilities
Michael Davenport mdavenport@steel.org	A/SP Executive Director • AHSS Training Team
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