

NOVEMBER 2023

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Micro-Examiner

Evolution and Advancements of Low-Pressure Cold Spray Technology for Commercial Applications

Cold spray technology, which emerged from the Russian Academy of Sciences in the 1980s, has undergone significant development and commercialization since its introduction in the 2000s. This presentation focuses on the low-pressure downstream injection variant of cold spray, which has proven to be a practical solution for diverse industries. Initially employed for dimensional restoration of heat-sensitive materials, cold spray has evolved into a versatile production tool with applications spanning aerospace, defense, energy, automotive, nuclear, and other sectors. Its commercial implementation has gained momentum, expanding beyond repair and restoration processes. As cold spray technology transitions into high-volume production, it necessitates a new level of capabilities encompassing cost-effectiveness, reliability, repeatability, maintainability, and productivity. This presentation delves into the historical progression and key milestones of downstream injection cold spray technology. Moreover, it examines the present state of the technology in commercial applications, shedding light on equipment advancements, volume production capabilities, and emerging trends.



Speaker
Julio Villafuerte,
PhD, FASM, P.Eng
Corporate
Technology
Strategist
Centerline
Windsor Ltd.



Tech Chair
**Dr. Robert
McCune, FASM**
Ford Motor Co.,
Retired

Bio: Dr. Villafuerte currently holds the position of Corporate Technology Strategist at Centerline Windsor Ltd, a leading North American company specializing in automotive fabrication, welding equipment, and cold spray systems. The company has been recognized with the Windsor-Essex Business Excellence Awards from 2011 to 2016 and the Canada Best Managed Companies Awards from 2013 to 2022. With a Ph.D. and Master's Degrees in Mechanical & Materials Engineering from the University of Waterloo, Canada, Dr. Villafuerte brings over 25 years of experience in materials science and processes. His focus for the past 15 years has been on advancing cold spray technology.

Prior to joining Centerline, Dr. Villafuerte served as the Senior Technical Director for Tregaskiss Ltd and the Director of Technology for the Welding Institute of Canada. He actively participates in professional organizations such as ASM-TSS, International Thermal Spray Association, American Welding Society, Professional Engineers Ontario, and Canadian funding agencies, contributing to various committees and boards.

Dr. Villafuerte has authored over 50 technical publications and frequently presents on advancements in cold spray technology worldwide. He serves as a Technical Reviewer for institutions including the Canada Natural Sciences and Engineering Research Council and Science Foundation Ireland. Additionally, he acts as a referee for several professional magazines in the field of Materials Engineering, Corrosion, and Coatings Technology. As an Adjunct Professor at the University of Waterloo and the University of Windsor, Dr. Villafuerte actively engages in academic and collaborative research activities.

In 2022, Dr. Villafuerte was honored as an ASM Fellow by ASM International, recognizing his contributions to the development and successful commercialization of low-pressure cold spray technology, as well as his leadership in research and development for industry-specific applications.

ASM-Detroit Fellows Night with DWAFS Dinner Meeting

Monday, November 13, 2023 • 5:30 – 8:00 p.m.

Speaker: Dr. Julio Villafuerte – FASM, Centerline

Topic: "Cold Spray History, Technology, and Current Applications"

Location: The Burton Manor, Livonia

Social Hour 5:30 pm • Dinner 6:30 pm • Announcements 7 pm • Speaker 7:15-8 pm

****Special 23-24 Season Rate of \$20pp with a Reservation** (\$5 for Students)**

For reservations e-mail to AsmDetroitChapter@gmail.com before Thursday, November 10th

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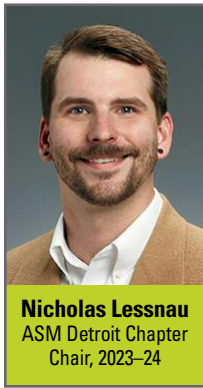
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Nicholas Lessnau
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Chair's Note

It's me again.

We really had a busy October this year.

To kick the month off, we had a great talk from Dr. Rob Mackay from Nemak on the variability between staircase and over-stress probe fatigue test methods in cast aluminum test pieces. Thank you, Dr. Mackay, for sharing your time and work with us.

Shortly thereafter, ASM International and chapter volunteers helped to spread the word about materials engineering to high school students at this year's IMAT conference through our Heat Treat Mini-Camp. Volunteers helped to teach students about lightweighting, metal casting, induction hardening, and much more. Thank you to all the volunteers and to the high schools for letting their students join us for a few hours.

I think my favorite part of events like the Heat Treat Mini-Camp must be the amazement on the faces of students when they walk into such a large expo and realize how much excitement industry can offer. When you pair that with an educational or vocational avenue to a career, you can see the wheels start to turn. If even 15% of the students that came out of this event are now interested in materials engineering, then I would be happy, but I think we were able to drum up more interest than that.

Before we wrap up the fall section of our programming, we will have a visit from Julio Villafuerte. Julio will be talking to us about cold spray technology both past and present. I am hoping to see some new faces at this next event because it deviates from our historically metallurgy-centric lectures. As I have mentioned before, our goal is to progressively touch more and more aspects of materials engineering so that we can offer a greater degree of value to our membership. If there are any topics of interest or things you would like to hear more about, please let us know. We don't know what you want unless you tell us.

Safe hunting and see you on November 13th.

2023-2024 ASM Detroit Chapter Program

November 13, 2023: Fellows Night

DR. JULIO VILLAFUERTE, FASM
Cold Spray History, Technology and Current Applications

February 12, 2024: Membership Night

PROF. ROBERT CRYDERMAN, FASM
"Steelmaking: Then and Now"

March 11, 2024: Woodside Lecture

DR. KATHY HAYRYNEN, FASM

April 8, 2024: Spring Joint ASM/AFS Meeting

ROBERT HILL, Solar Atmospheres
Oil Quenching

May 6, 2024: National Officers Night/ Sustaining Members Night

PRADEEP GOYAL, FASM
ASM International President-Elect (2023-2024)

Three Scholarships Available to College and University Students in Materials

Our chapter is happy to announce that it will be offering three scholarships to students pursuing a degree in materials science and engineering.

The Marion Semchyshen and James A. Mansfield Scholarships will be given as in past years and we are also offering an additional scholarship this year named the Leo and Betty Blazok University Scholarship from a generous donation from the Leo and Betty Blazok Foundation .

The students will be selected for their high scholastic achievement and their activities in the field of materials science or metallurgy. The scholarships are for students that are sophomores, juniors, and first-year seniors.

Each scholarship consists of a \$1,500 cash award and certificate, and will be presented at an ASM-Detroit Chapter meeting in March or April.

If you know of a college or a university student in materials science or metallurgy, please let them know of this opportunity.

The scholarship applications will be mailed to university advisors and posted on the ASM-Detroit website by January 2, 2024. In order to be considered, the applicants need to complete the form and return it to the ASM Detroit Chapter before midnight on Sunday, January 29, 2024.

Take a moment to think of outstanding co-op or student interns you know and encourage them to apply!

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October 9th Meeting Re-cap



October 9, 2023 (From LtoR) – Nicholas Lessnau (23-24 ASM Detroit Chapter Chair), Dr. Robert Mackay, October 9th Speaker, Prof. Robert Cryderman, October 9th Tech Chair, and Jonathan Goettsch (23-24 DWAFA Chair).



We had seven students attend the October 9th Dinner Meeting. Thanks to Fluxtrol for their continued student sponsorship!

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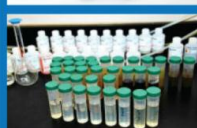
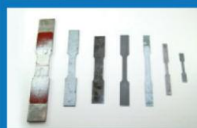
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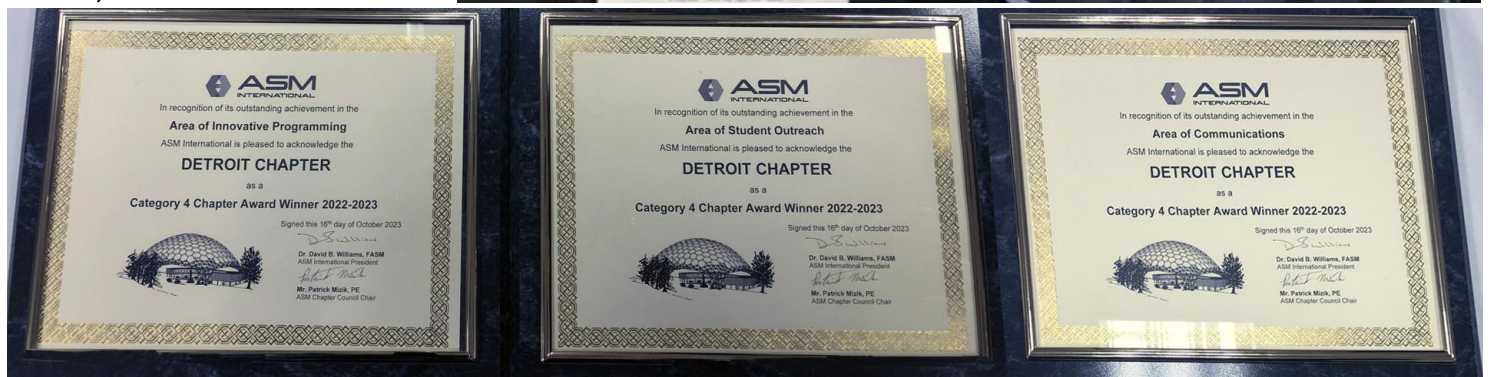
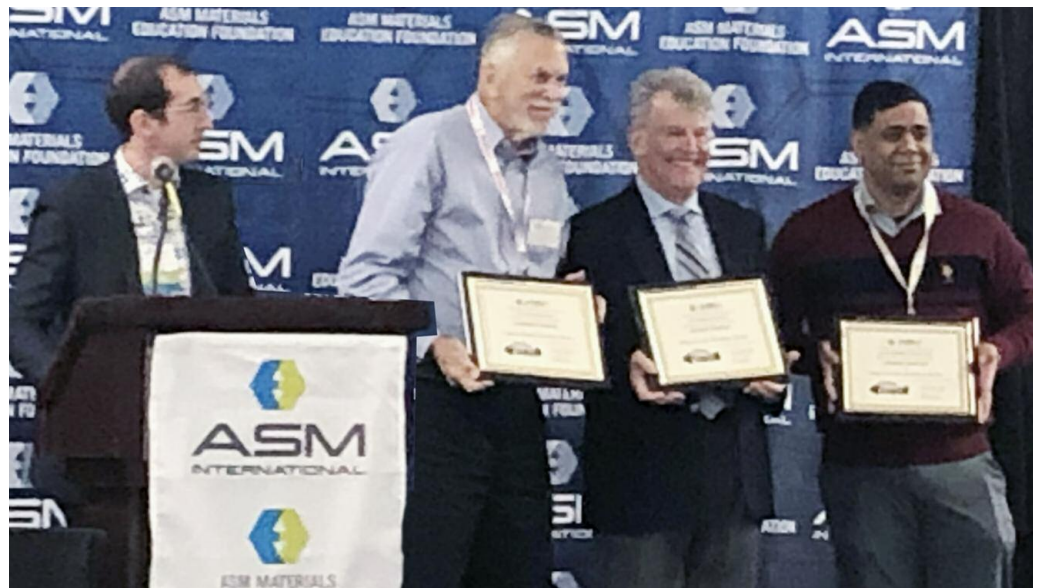
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Essay Awards at IMAT

The ASM Detroit Chapter was awarded three Essay Awards at Leadership Days (during IMAT 2023). The winning categories were communications, student outreach and innovative programming. Each came with a \$500 monetary award which will be allocated toward future student outreach programs. Holding the awards from LtoR, Prof. Robert Cryderman (23-24 ASM Detroit Chapter Paper/Programs Chair), Dr. David Williams, (22-23 ASM International President), and Rajan Bhambroo (23-24 ASM Detroit Chapter Secretary).






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IMAT/Heat Treat 2023 Minicamp at Huntington Place!

The IMAT/Heat Treat 2023 Minicamp was held at the Huntington Place on October 17th and 18th in conjunction with IMAT and Heat Treat 2023. We had a fabulous time demonstrating materials based experiments for over 200 high school students from around Metro Detroit.

The experiments included: Foundry in a Box, Polymer Powders, Induction Heat Treating, Hardness Testing, Nitinol: A Shape Memory Alloy, Brassing a Penny: Solid State Diffusion, Lightweight Design through Materials Engineering Innovations, and Careers in Materials Science and Engineering.

Thanks to our Master Teachers and Industry professionals who volunteered for this event: Rajan Bhambroo, James Boileau, Bob Cryderman, Debbie Goodwin, Zac Hamlet, Mark Harper, Mark Ihm, Jim Keimig, Nicholas Lessnau, Yi Liu, Joe Luellen, Max Mayhew, Manish Mehta, Jesse Newton, Julie Nimer, Lisa Ogiemwonyi, Priscilla Oshikiri, Briana Richardson, Justin Sickles, and Scott Spohler.

We would also like to thank Fluxtrol, Suntec and Tom Prucha for the use of their equipment for the demonstrations and finally, thanks to Jeane Deatherage and the ASM Materials Education foundation for their support and organizing of the event!

