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Award-Winning 1937 Alfa Romeo Gets a Boost with Cold Spray

By Julio Villafuerte

The 1937 Alfa Romeo 8C 2900B Touring Berlinetta won the 2018 Best of Show award at the Pebble Beach Concours d’Elegance. (David and Ginny Sydorick, Beverly Hills, Calif. Copyright Kimball Studios / Courtesy of Pebble Beach Concours d’Elegance.)
Although less powerful than its predecessors, the Alfa Romeo 8C 2900B Touring Berlinetta was exclusively designed for select customers of the automaker. It later became an attractive vintage item to avid international automotive collectors. The car is believed to have been kept in Germany through World War II and into the 1950s. In 1956, the vehicle was purchased by an American collector and imported into the United States for the first time. Initially restored in the 1990s, it spent time on both sides of the Atlantic over the years before finally joining the collection of David and Ginny Sydorick. In 2001, an early production of the vehicle won the Most Elegant Closed Car award at the Pebble Beach Concours d’Elegance. The automotive event is an annual display of historic and beautiful cars and considered to be the world’s most prestigious. In 2018, the Sydorick car, fresh from its recent restoration, won the ultimate prize Best of Show at the renowned car show. It also received two other awards at the show, the Charles A. Chayne Trophy and the J. B. & Dorothy Nethercutt Most Elegant Closed Car.

Challenges during Restoration

In trying to restore the car to its original condition under the hood, many challenges were faced. Corrosion, tear, and wear had damaged both the aesthetics and functionality of the cast aluminum oil pan. There were visible cracks on the inside, unacceptable aesthetics on the outside, and multiple oil leaks during operation — Fig. 1. The aluminum cast alloys used to fabricate these components were all heat treated, making them quite sensitive to thermal repair processes such as welding or conventional thermal spray, for degraded mechanical properties and distortion. Replacing the old part with a new one wasn’t an option because these components went out of production a long time ago. Attempts had been made to dimensionally repair these defects by special welding methods, which still rendered poor performance results and worsened the aesthetic appearance. Consequently, the restoration professionals made an effort to search for modern repair techniques that would restore functionality while not compromising mechanical integrity and improving aesthetics.

The Cold Spray Choice

Cold spray is a solid-state metal consolidation process that uses a high-speed gas jet to propel metal and other powder particles against a substrate where particles plastically deform and consolidate upon impact. The term “cold spray” refers to the relatively low temperature involved in the process, which is typically much lower than the melting point of the spray material and substrate. Since adhesion of the metal powder to the substrate and deposited material is achieved in the solid state, the characteristics of cold spray deposits are quite unique, making cold spray suitable for depositing well-bonded, low-porosity, oxide-free deposits. These attributes make cold spray uniquely suitable for depositing a range of temperature-sensitive materials in this application.

Portable cold spray equipment offered an economically viable option to conduct the repair using nitrogen as a propellant and aluminum-based powder as the repair material — Fig. 2. After low-temperature dimensional restoration of the area, the new consolidated material was effectively machined back to tolerance using standard machining techniques.

The Procedure

The cold spray processes began with surface preparation, which consisted of cleaning, pre-machining for suitable deposition, and grit blasting. Then, an SST™ Series P machine was utilized to manually fill in all repair areas, using the spray parameters depicted in Table 1. The sprayed component was finally machined to desired dimensional tolerances — Fig. 3. The vehicle was then reassembled by a professional restoration shop (Ref. 1) to its original functionality and aesthetics — Fig. 4.
Conclusion

After several attempts in the quest for appropriate repair technologies, the professional restorer was able to salvage and restore the irreplaceable oil pan back to its original condition thanks to the use of cold spray.

References


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- How brazing can make the repair process more efficient and robust
- Fundamental Science of Brazing
- Metallurgical Aspects of Brazing

Practical Application
- Preparing parts for braze
- Alloy Systems
- Braze Applications
- Applying Braze
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Cold Spray vs. Thermal Spray: From Dimensional Restoration to Additive Manufacturing

By Victor K. Champagne Jr. and Aaron Nardi

Cold spray is often compared to traditional thermal spray processes. Although there are certain similarities, it is important to recognize the fundamental differences between the two techniques to determine which is best suited for various combinations of substrate and coating materials, as well as for the application.

Cold spray technology is the logical choice for dimensional restoration of a variety of engineering materials and applications where the high temperatures associated with conventional thermal spray technology can result in undesirable metallurgical transformations, including grain growth, as well as oxidation, that can have detrimental effects on bond strength and porosity and/or damage the underlying substrate. Substrates that are sensitive to high temperatures may preclude the use of thermal spray and would include magnesium, composites, and other low-melting alloys. Magnesium readily reacts with molten metal deposited by thermal spray and oxidizes, causing poor adhesion (Ref. 1). Cold spray incorporates very high particle velocities (300–1500 m/s) to achieve consolidation, and gas temperatures can be adjusted to avoid undesirable transformations of the feedstock powder, the resultant deposit, and the substrate, yielding a deposit with low porosity, plus high bond and increased cohesive strength — Fig. 1.

One of the most deleterious effects of depositing materials at high temperatures is the tensile residual stresses that develop, especially at the substrate-coating interface, which is the result of the thermal contraction of the molten particles upon solidification (Refs. 2, 3, 4, 5). This can become a particular concern in an application requiring a relatively thick deposit because these stresses often cause delamination and often limit the maximum deposit thickness that can be achieved. This problem is compounded when the substrate material is different from the coating material in terms of hardness and density, and there is a significant variation in the coefficient of thermal expansion.

In contrast, there is very little thermally-induced dimensional change of the cold spray material since consolidation of the particles takes place in the solid state. Also, the significantly high impact velocities of the solid particulates are very effective at peening the underlying material and producing deposits, which are typically in a state of compressive stress below a certain thickness range (Refs. 6, 7). In addition, interfacial instability due to differing viscosities, along with the resulting interfacial roll-ups and vortices, promote interfacial bonding by increasing the interfacial area, giving rise to material mixing at the interface and providing mechanical interlocking between the two materials (Ref. 8). Adhesion of thermal spray coatings relies primarily upon the surface finish referred to as the anchor tooth profile of the substrate. The molten particles or ‘splats,’ which are propelled onto the substrate penetrate and subsequently solidify, lock themselves mechanically within the valleys of the surface profile.

In comparison with conventional thermal spray techniques, the materials produced by cold spray are typically less porous, with higher hardness and conductivity, and lower oxide concentration. Good corrosion protection is also achieved by dense, impermeable, cold sprayed coatings. Sometimes thermal spray can result in particles imbedded in the microstructure that solidified during flight, prior to impacting the substrate, and have a distinctive oxide layer surrounding them (Ref. 9).

Except for some of the high-velocity oxyfuel (HVOF) coatings that contain carbides or extremely hard particles, there is a significant difference between the bonding mechanism of thermal spray and cold spray. Shear strength test results for a series of 6061 aluminum (Al) cold spray deposits on ZE41A-T5 Mg have been reported by Champagne III et al. in their investigation of joining cast ZE41A-Mg to wrought 6061 Al by the cold spray process and friction stir welding (Ref. 10) using MIL-J-24445A. The average ultimate tensile strength (UTS) obtained was 163 ± 3.8 MPa, and values as high as 184 MPa (26.7 ksi) were achieved, which was equivalent to that of the magnesium substrate and was significantly higher than thermal spray. The cold spray coating remained adhered to the ZE41A magnesium substrate and did not become detached subsequent to shear testing. Figure 2 shows the 6061 Al cold spray coating was so strong the failure occurred in the ZE41A magnesium substrate. Chunks of the magnesium substrate can be seen in Fig. 2.

Plasma and HVOF thermal spray have been investigated for deposition of aluminum for dimensional restoration of magnesium aerospace components, but the results have generally been unsatisfactory due to inconsistent coating integrity. Poor adhesion and delamination of the coatings are typically the cause for high rejection rates because both of these processes involve the use of high thermal energy to melt or partially melt the coating material before it is propelled against the surface of the substrate. The tiny molten or partially...
melted particles rapidly solidify upon impact with the substrate and contract forming tensile residual stresses in plasma spray coatings. This is not always the case with the HVOF process because the particles are accelerated at high velocity and have been known to form coatings that are in compression. Regardless, coating failures can occur because the plasma and HVOF processes can generate excessive heat, causing the formation of an oxide on the magnesium that is detrimental to adhesion. Additionally, during solidification of the sprayed aluminum particles, tensile stresses form in the coating while the underlying substrate material contains compressive stresses. The deleterious tensile stresses in the coating can weaken the bond to the substrate and can lead to delamination (Ref. 9). Finally, from a sprayer’s perspective, the thermal spray pattern is very wide so that it would be difficult to apply the coatings to localized areas requiring repair or significant dimensional restoration without the use of masking, which can be time consuming and costly.

The Young’s moduli of cold sprayed deposits were reported years ago to be greater than 80% of bulk values (Ref. 11). The Army Research Lab (ARL), in collaboration with United Technologies Research Center (UTRC), has developed cold spray processes for depositing aluminum alloys, including 6061 Al that has a UTS, yield point, and Young’s modulus greater than what has been reported in literature for wrought in the hardened 6061-T6 condition. It is important to note that the properties measured for the cold spray were taken from tensile specimens machined from an actual block of material in the as-sprayed condition, whereas those reported for the wrought alloy were subsequent to being solutionized, quenched, and tempered. More recently, ARL and UTRC have developed a process for depositing 5056 Al by cold spray, which has achieved a combination of high strength and ductility (UTS reported to be 58 ksi with a corresponding elongation of 22%) in the as-sprayed condition, equal to that of fully worked wrought material (Ref. 12).

In the past decade, significant improvements have been made in the production of high-strength materials via cold spray with customizable properties desirable across many industries. Major areas of development, aside from process optimization, have been in the processing of feedstock aluminum and aluminum alloy powders as well as the synthesis of new feedstock powders for the replacement of conventional chrome and nickel electroplating. These advancements have been accomplished through a materials-by-design approach, where specific requirements were taken into account and engineered into the concepts for new powders and processes. Therefore, cold spray materials have been improved significantly. Table 1 contains tensile data showing cold spray 2024 aluminum in the as-sprayed condition to be comparable to that of its wrought counterpart.

Advancements in feedstock powder processing, in combination with improved hardware and process optimization and controls, have also enabled these improvements. Additionally, because the feedstock powder is not melted, it is less susceptible to oxidation, and high-velocity impact can create dense, well-consolidated deposits in many engineering materials.

The superior qualities of cold sprayed materials are required by many applications. The ability to deposit materials at high rates and produce thick deposits make it suitable for not only dimensional restoration of common engineering materials, but for near-net forming. The decision to utilize the cold spray process either to produce a near-net-shaped part or to repair a component does not necessarily rely solely on the economics of the process. Other factors must be considered, as follows:

1. Availability of spare parts, whereas the downtime associated with long lead times to procure a new part adversely affects delivery dates or readiness (as in the case of the military), and

2. Obsolescence, which occurs when items that were produced many years ago are no longer sold commercially (either the original vendor(s) are not in business anymore or the technical data package containing pertinent engineering drawings of the part and the information required to fabricate it are no longer available).

A representative special case is presented, where a replacement part could not be obtained in time to allow the delivery of a Patriot missile launcher. Therefore, availability was the driving force for the decision to produce the part by the cold spray process. The electronic switch

<table>
<thead>
<tr>
<th>Material</th>
<th>UTS (MPa-ksi)</th>
<th>YS (MPa-ksi)</th>
<th>% Elongation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold Spray</td>
<td>446 MPa (64.7 ksi)</td>
<td>305 MPa (44.3 ksi)</td>
<td>9.5 %</td>
</tr>
<tr>
<td>2024-T351</td>
<td>395 MPa (57.3 ksi)</td>
<td>260 MPa (37.7 ksi)</td>
<td>10 %</td>
</tr>
<tr>
<td>2024-T3</td>
<td>440 MPa (63.8 ksi)</td>
<td>290 MPa (42.1 ksi)</td>
<td>10 %</td>
</tr>
<tr>
<td>2024-Al-T6</td>
<td>415 MPa (60.2 ksi)</td>
<td>315 MPa (45.7 ksi)</td>
<td>5 %</td>
</tr>
</tbody>
</table>

Table 1 — Tensile Properties of Cold Spray 2024 Aluminum Compared to Wrought (Ref. 27)
housing was normally produced from 2024 aluminum in the T351 condition, which involves solution treating, cold working, and natural aging to produce a material having an approximate UTS of 395 MPa with a corresponding yield strength of 260 MPa and an elongation of 10% (Table 1).

Figure 3 shows the finished part after final machining. Extra material was produced alongside the part during the cold spray operation, such that a series of tensile specimens could be obtained and tested to verify the material properties of the finished component. Table 1 lists the properties of the cold spray material alongside that of wrought material taken from the MatWeb online materials information resource (Ref. 13). Note that in the as-sprayed condition, the cold spray material compares favorably, and in some instances, superior to that of heat-treated wrought. No heat treatment or post processing was performed on the cold spray material.

References


Victor K. Champagne Jr. and Aaron Nardi are with the U.S. Army Research Laboratory, ARL Northeast, Mass.
Industry News

Attend ITSA’s Upcoming Symposium

The International Thermal Spray Association’s (ITSA’s) 3rd Annual Advanced Coatings Symposium (Aerospace) & Annual Membership Meeting will take place October 7-10 at the MGM – Springfield in Springfield, Mass.

During the event, the latest technology in aerospace repair will be covered, along with high-temperature, wear-resistant, and clearance-control coatings.

The keynote speaker, Brian Hazel, is a technical fellow with the coatings in materials and process engineering group at Pratt & Whitney. He has 19 years of experience in gas turbine material development, including work in thermal barrier coatings, environmental barrier coatings, bond/corrosion-resistant coatings, and single crystal superalloys. Among his accomplishments are more than 40 patents in the area of high-temperature coatings, with emphasis on thermal and environmental barrier coatings, as well as corrosion-resistant systems.

Additional speakers, along with their companies and presentation topics, are as follows:

- Shalaka Shinde, Stony Brook, segmentation crack formation dynamics in atmospheric plasma spraying coatings
- Edward Gildersleeve, Stony Brook, effect of geometry on durability of plasma sprayed thermal barrier coatings
- Brad Lutz, Honeywell, next generation low thermal conductivity thermal barrier coating
- Chin Ma, Curtiss-Wright, development of durable and affordable thermal barrier coating with low thermal conductivity superiority
- Ben Nagaraj, GE, evolution of thermal sprayed thermal barrier coating systems for aircraft gas turbine applications
- Jim Harrison, CWST, the application of using laser peening as a tool to repair aircraft structure for sustainment and life extension
- Scott Wilson, Oerlikon, overview of turbomachinery sealing applications and challenges
- Tom Menke and Lew Temples (authors) (presented by Dick Mason), Powder Alloy Corp., low temperature abradable coating materials
- Winnie Tan, Siemens, high temperature compressor abradable coatings for gas turbine applications
- Andrea Scrivani, Höganäs, development of advanced thermal barrier coating for improving gas turbine components lifetime
- Eric Jordan, UConn, damage under the gradual application of heterogeneous calcium-magnesium-aluminosilicates
- Rogerio Lima, NRC, increasing deposition efficiency and maintaining the high temperature performance of yttria-stabilized zirconia thermal barrier coatings: changing from Ar-H2 to N2-H2 plasma in legacy atmospheric plasma spraying torches
- David Wright, Accuwright, practical advancements of cold gas dynamic spray
- Vic Champagne, CIV U.S. Army Futures Command (USA), advancements in cold spray technology
- Christopher Berndt, SEAM (Surface Engineering for Advanced Materials), thermal spray coatings for sub- and supersonic applications
- David Furrer, ASM president, Pratt & Whitney, opportunities for materials modeling and data analytics
- Christian Moreau, Concordia Institute for Aerospace Design and Innovation, suspension thermal spraying: innovations and applications
- Andrew Ang, SEAM (Surface Engineering for Advanced Materials), turning science into products - coating solutions for hydraulic components
- Menno Zwetsloot, Flame Spray Technologies, eGun™, ethanol based liquid fueled-high-velocity oxyfuel new sustainable fuel, new opportunities and markets
- Bill Jarosinski, Praxair, advancing clearance control coatings for next generation engines.

Attending this symposium offers an opportunity to network with industry leaders as they deliver the latest coatings research related to the aerospace industry. For more information or to register, visit thermalspray.org/itsa-annual-meeting.
AWS Introduces Content Resource, Commercial

The American Welding Society (AWS), Miami, Fla., to which the International Thermal Spray Association is a Standing Committee of, has not only launched a new content resource but also a commercial and video.

The AWS’s Welding Digest content resource debuted on Engineering360.com, powered by IEEE GlobalSpec, Albany, N.Y., a provider of data-driven industrial marketing solutions to help companies grow their businesses. This site, accessible at weldingdigest.com as well, is designed to expand the Society’s message.

Users have access to a host of welding-related content, information, and insight. Additionally, searching for thermal spray under the “all” category yields products and services, suppliers by name, a standards library, news and analysis, product announcements, and so on. The site further features professional development information, including a calendar of upcoming events and career guidance.

On April 4th and 7th, the AWS commercial aired nationally on the Fox Business Network during prime-time TV. Regional airings also took place in the top 100 markets across the United States on various networks between April 15th and 30th.

“Often unseen, welders are the skilled men and women dedicated to working on all types of industrial, manufacturing, and construction applications,” the 1-min segment starts. Action shots and details about AWS are provided.

The 6-min, 15-s AWS video The World Needs More Welders covers the importance of welding and much more. It features enticing interviews with John Jones of Workshops For Warriors, Shanen L. Aranmó of Weld Like A Girl, and AWS Vice President Dennis Eck, just to name a few. The video aired on public TV, beginning at the end of April on the show On Demand with Rob Lowe, which plays in between regular programming.

The commercial and video may be viewed through the AWS’s YouTube channel.

This laptop, displays weldingdigest.com.

This image shows the start of the AWS’s commercial, which is on the organization’s YouTube channel.

Höganäs Replaces H. C. Starck Brand

As of June 1, Höganäs Group of Sweden and H. C. Starck Surface Technology & Ceramic Powders act under the same brand and name on the market as Höganäs.

“Together, we are a leading provider for all surface and joining technologies, including thermal spraying, hard facing, brazing, and welding. As one Höganäs organization, we utilize our joint forces to invent better solutions for our customers’ current needs and future challenges,” said Hans Keller, president, product area surface and joining technologies at Höganäs.

In March 2018, the company acquired the STC division from H. C. Starck and its two production units in Goslar and Laufenburg, Germany. The name change marks the final milestone on the integration journey.

“Now that we are truly one company, Höganäs is one of the largest players in the premium segment of the surface coating market, servicing a broad range of industries, but focusing on automotive, oil and gas, mining and construction, energy, and aviation,” added Keller.

Höganäs aims to make surface coating into a new business segment as well.

Canada’s Best Managed Companies Honors CenterLine

CenterLine (Windsor) Limited has been recognized for overall business performance and sustained growth with Canada’s Best Managed Companies gold standard requalified winner designation. The corporation specializes in advanced automation processes and technologies meeting resistance welding, metal forming, and cold spray application needs.

The 2019 award winners are among the best-in-class of Canadian owned and managed companies, with revenues more than $15 million, demonstrating strategy, capability, and commitment to achieve sustainable growth. The company’s growth, record of developing innovative products/processes, and commitment to creating a supportive work environment have helped in its requalification of this award.

“CenterLine is very proud of this award because it recognizes the hard work, dedication, and skill of our staff along with the strength and consistency of our business strategies, systems, and corporate values,” said Michael Beneteau, CEO.
KTA Celebrates 70th Anniversary

KTA-Tator Inc., Pittsburgh, Pa., founded in 1949 as a sole proprietorship, marks its 70th anniversary this year. The company was launched by Kenneth Tator to assist users in selecting coating systems for protecting their plant’s infrastructure and equipment while increasing the life expectancy of the coatings and reducing life-cycle costs. This was accomplished by conducting comparative testing of coating systems on specially designed and painted steel composite test panels installed in user’s facilities. Now an employee-owned company, it has expanded into a full-service consulting, inspection, and testing firm.

KTA has developed new concepts in the coatings and corrosion industry while expanding third party independent inspection services for shop and field coating application, as well as steel and concrete fabrication. It has also developed physical and analytical testing laboratories, an inspection instrument sales department, and an instrument calibration and service department. The company provides coatings specification development and failure analysis services; environmental health and safety consultation and compliance programs; coating condition assessments and painting cost estimates; and much more. It employs more than 300 full-time employees.

During its 70th year, the company will be breaking ground on a 48,000-sq-ft corporate headquarters building and laboratory in Pittsburgh. Visit kta.com for more details.

Ecospeed Wins Award; Ecoshield Protects Vessels

Subsea Industries, Antwerp, Belgium, has won the Arctic Innovation Award 2019 for its Ecospeed nontoxic hull coating. This was announced during the Arctic Shipping Forum held at the Paasitorni Congress Centre in Helsinki, Finland.

According to the organizers, the panel of independent judges, consisting of Arctic specialists, gave the award to “the company or individual that has developed the most innovative new technology, environmental practice, or service to benefit the Arctic region.”

Company CEO Boud Van Rompay said the honor “…strengthens us to keep pursuing our goal of clean rivers, seas, and oceans.”

In addition, the rudders and running gear of various vessels were recently given an Ecoshield protective coating at yards in the United States, Mexico, Canada, Turkey, Poland, Malta, Romania, China, and Singapore. The product is also developed by Subsea Industries.

These ships included tankers, tug boats, a newbuild ferry, a ro-ro ship, and several container vessels. Most belonged to different owners. Returning users had seen the coating solved the problem on their other rudders and wanted the same protection for the rest of their fleet, while new ones saw results obtained by other owners and chose it to prevent corrosion and cavitation from reoccurring. Grit blasting and application of the two required layers can be performed in one day.

Meet the AWS C2 Committee at ITSA’s 3rd Annual Advanced Coatings Symposium

By popular demand, the American Welding Society (AWS) C2 Committee on Thermal Spraying will have its annual meeting in conjunction with the International Thermal Spray Association (ITSA) Advanced Coatings Symposium — and, of course, you’re invited! C2 will meet the day after the ITSA Symposium, on Thursday, October 10. So please plan on staying just one more day in beautiful New England, and join us at the MGM – Springfield in Springfield, Mass. We will have a number of subcommittee meetings and a meeting of the C2 Main Committee.

The meeting schedule can be found on the ITSA Symposium website at thermalspray.org.

For those not familiar with the C2 Committee, we are the AWS Technical Committee responsible for creating and revising thermal spray standards. Feel free to browse our documents on the AWS website at aws.org/standardsCommitteesAndStandardsProgram/c2-committee-on-thermal-spray. We look forward to seeing you!
Product Spotlight

AWS Releases 2019 Summer/Fall Products Catalog


American Welding Society
aws.org/2019catalog / (888) 935-3464

Study Predicts Growth for the Thermal Spray Powders Market to 2024

Thermal Spray Powders Market — Growth, Trends, and Forecasts (2019–2024) posits that this market will register a compound annual growth rate of 7.24% during the forecast period. Some of the major factors driving the growth are the increasing demand for higher-performance, customized alloy powders; increasing prominence for plasma spray coatings; and extensive consumption of thermal sprayed tungsten-cobalt (WC-Co) coatings. Highlights from the report show the automotive manufacturing sector in the Asia-Pacific region has been increasing at a strong rate, and further growth is expected to be witnessed over the forecast period; increasing demand from the aerospace industry is expected to drive the market by 2024; rising popularity of thermal spray ceramic coatings is expected to hinder the growth of this market and more. The report is segmented on the basis of powder type, end-user industry, and geography.

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Cold Spray System Produces Industrial Components in Hours

The large-format WarpSPEE3D cold spray additive manufacturing system produces industrial components in a matter of hours that could take six months to a year using traditional casting methods. It reduces the manufacturing lead time from approximately six months to eight hours. Ideal for the aerospace industry, the 44-lb rocket nozzle stands 265 × 300 mm high. The cost of producing this rocket nozzle on the WarpSPEE3D is approximately $373.43.

SPEE3D
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Report Shows Rising Popularity of Thermal Spray Ceramic Coatings

The Thermal Spray Coatings Market — Growth, Trends, and Forecast (2019–2024) reports the market for thermal spray coatings is expected to grow at a compound annual growth rate of 6.47% during the forecast period. The market’s growth is primarily driven by the extensive usage of thermal spray coatings in the aerospace sector, mainly for components, such as jet engine components, landing gear, and turbine blades, along with increasing usage of components, such as cylinders, engine parts, transmission components, and suspension systems (to enhance their thermal efficiency, coefficient of friction, sliding wear and corrosion-resistance power, and longevity) in the automotive industry. The increasing applications in the oil and gas industry, advancements in spraying technology, and recycling of thermal spray processing materials are expected to provide numerous opportunities for the manufacturers in this market. The aerospace segment accounted for the largest share, contributing 35%, in terms of revenue, in 2018. The United States is expected to remain the major market for thermal spray coatings in the region owing to the increasing demand for improved performance at competitive costs as well as meeting all the regulations and industry standards.

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Cold Spray Diagnostic Tools Offer Quality Control and Research

Oseir Ltd. introduces the new generation HiWatch Cs2 and HiWatch HR2 cold spray diagnostic systems to offer the maximum amount of data from cold spray processes, providing daily quality control as well as process research and development. Both systems provide measurements of individual particle properties and include velocity up to 2000 m/s, position within the viewing area, diameter, and relative plume density. The measurement software delivers both averages and the distributions of the measured values in a sample. HiWatch Cs2 illuminates the particles with a thin sheet laser from one side of the particle plume. The light scattered from the fast flying particles is detected with the special industrial camera and particle parameters are measured using particle tracking velocimetry (PTV). The HiWatch HR2 uses a uniform background light field and thus it can detect the light extinction caused by the fast particles and measure the particle parameters with PTV. With this method, the particle size measurement is accurate down to the size of 5 microns. Both systems use low intensity diode lasers with confined beam path for improved work safety.

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ITSA Member News

I am very happy to announce that ITSA’s meeting organizing committee and AWS staff have made great progress in finalizing the details of this year’s annual meeting and symposium. We now have 22 confirmed speakers for this year’s event, including Keynote Speaker Brian Hazel from Pratt & Whitney.

I invite you to save the dates of October 7–10 for the ITSA Annual Business Meeting and a two-day symposium. The event will be at the MGM Grand Hotel in Springfield, Mass. The gathering will also include a tour and dinner at the New England Air Museum, plant tours, and meetings of the AWS C2 Thermal Spray Standards sub and main committees.

This year’s symposium will focus on aerospace applications. Experts in the field will present and discuss advances in hot applications, wear resistance and clearance control, repair, and other coatings on aerospace-related components. Although these applications may be related to aerospace, they are often transferred to other industries such as power generation, oil and gas, general protection, and repair, so there should be something for everyone in the industry to learn and associate with.

The event will also host tabletop displays for vendors and applicators. There will be opportunities to network and meet new people and companies in a casual environment. We also have excellent sponsorship opportunities and packages available that will allow your company to increase your brand awareness and engage with target customers.

If you have any questions regarding this year’s event, please contact ITSA Program Manager Alfred Nieves at ITSA@thermalspray.org. You may also visit thermalspray.org/itsa-annual-meeting.

ITSA MISSION STATEMENT

The International Thermal Spray Association, a standing committee of the American Welding Society, is a professional industrial organization dedicated to expanding the use of thermal spray technologies for the benefit of industry and society. ITSA invites all interested companies to talk with our officers and company representatives to better understand member benefits.

EXECUTIVE COMMITTEE

(above officers plus the following)

Jim Ryan, TechMet Alloys
Dan Hayden, Hayden Corp.
Bill Mosier, Polymet Corp.
Peter Ruggiero, Curtiss-Wright Surface Technologies

OFFICERS

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ITSA MEMBER NEWS

Tradeshow Assessment for ITSA Members Eliminated

ITSA Members were invited to participate in the ITSA Member Satisfaction Survey, in which they were asked to rate the value of various member benefits. Based on feedback received on the value of ITSA Booth participation at industry tradeshows, at its April 20, 2016, meeting, the ITSA Executive Committee unanimously decided to discontinue ITSA booth activity at tradeshows effective July 2016. As ITSA Members subsidized the cost of ITSA booth activity via annual assessments, this move will result in the elimination of these costly annual ITSA Member assessments going forward.

In lieu of booth representation at tradeshows, ITSA will proactively participate in alternative ways at key industry events. For example, a series of educational presentations promoting thermal spray are being scheduled as free, half-day sessions at tradeshows like FABTECH, POWER-GEN International, and CORROSION.

ITSA SCHOLARSHIP OPPORTUNITIES

The International Thermal Spray Association offers annual graduate scholarships. Since 1992, the ITSA scholarship program has contributed to the growth of the thermal spray community, especially in the development of new technologists and engineers. ITSA is very proud of this education partnership and encourages all eligible participants to apply. Please visit thermalspray.org for criteria information and a printable application form.

ITSA THERMAL SPRAY HISTORICAL COLLECTION

In April 2000, the International Thermal Spray Association announced the establishment of a Thermal Spray Historical Collection that is now on display at the State University of New York at Stony Brook in the Thermal Spray Research Center, USA.

Growing in size and value, there are now more than 30 different spray guns and miscellaneous equipment, a variety of spray gun manuals, hundreds of photographs, and several historic thermal spray publications and reference books.

Future plans include a virtual tour of the collection on the ITSA website for the entire global community to visit. This is a worldwide industry collection, and we welcome donations from the entire thermal spray community.

ITSA SPRAYTIME

Since 1992, the International Thermal Spray Association has been publishing SPRAYTIME for the thermal spray industry. The mission is to be the flagship thermal spray industry publication providing company, event, people, product, research, and membership news of interest to the thermal spray community.
JOIN THE INTERNATIONAL THERMAL SPRAY ASSOCIATION

ITSA is a professional, industrial association dedicated to expanding the use of thermal spray technologies for the benefit of industry and society. ITSA Membership is open to companies involved in all facets of the industry — equipment and materials suppliers, job shops, in-house facilities, educational institutions, industry consultants, and others.

Engage with dozens of like-minded industry professionals at the Annual ITSA Membership Meeting, where there's ample time for business and personal discussions. Learn about industry advancements through the one-day technical program, participate in the half-day business meeting, and enjoy your peers in a relaxed atmosphere complete with fun social events.

Build awareness of your company and its products and services through valuable promotional opportunities — a centerfold listing in the SPRAYTIME Newsletter, exposure on the ITSA website, and recognition at industry trade shows.

Plus, ITSA Membership comes with an American Welding Society (AWS) Supporting Company Membership and up to five AWS Individual Memberships to give to your best employees, colleagues, or customers. Visit aws.org/membership/supportingcompany for a complete listing of additional AWS benefits.

For more information, contact Alfred Nieves at 800.443.9353, ext. 467, or itsa@thermalspray.org. For an ITSA Membership Application, visit the membership section at thermalspray.org.
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KEYNOTE ADDRESS:

Microstructural Challenges in Spraying of Suspensions

Brian Hazel
Technical Fellow
Coatings in Materials and Process Engineering Group Pratt & Whitney (P&W)

Mr. Brian Hazel has 19 years of experience in gas turbine material development including work in TBCs, EBCs, bond coatings, corrosion resistant coatings, and single crystal superalloys. Mr. Hazel has a M.S. in Materials Science and Engineering from The Ohio State University. He has over 40 patents in the area of high temperature coatings with emphasis on TBCs, EBCs, and corrosion resistant systems. Mr. Hazel was or will be a co-chair for the 2017 thermal Spray of Suspensions and Solutions Symposium, 2018 TBC V conference in Irsee, Germany, 2019 thermal Spray of Suspensions Solutions and EBCs Symposium, and will be the chair of the 2022 TBC VI conference in Irsee, Germany.

For More Information or to Register, visit thermalspray.org/itsa-annual-meeting
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ITSA members invite your company to join us in this endeavor.
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■ POWERGEN Asia
  September 3–5 / Kuala Lumpur, Malaysia
  powergenasia.com

■ EUROCORR 2019
  September 8–13 / Seville, Spain
efcweb.org

■ Turbomachinery & Pump Symposium
  September 10–12 / Houston, TX
  tps.tamu.edu

■ Thermal Spray of Suspensions & Solutions Symposium
  September 17, 18 / Boucherville, QC
  asminternational.org

■ Powder Metallurgy and Additive Manufacturing of Titanium (PMTi2019)
  September 24–27 / Salt Lake City, UT
  mpif.org/events

■ Materials Science & Technology (MS&T19)
  September 29–October 3 / Portland, OR
  matscitech.org

OCTOBER 2019
■ ITSA Annual Meeting and Symposium
  October 7–10 / Springfield, MA
  thermalspray.org

■ Heat Treat 2019
  October 15–17 / Detroit, MI
  asminternational.org/web/heat-treat-2019

■ 2019 PM Management Summit
  October 26–29 / Miami, FL
  mpif.org

NOVEMBER 2019
■ ISTFA 2019
  November 10–14 / Portland, OR
  istfa.com

■ FABTECH
  November 11–14 / Chicago, IL
  fabtechexpo.com

■ POWER-GEN International
  November 19–21 / New Orleans, LA
  power-gen.com

DECEMBER 2019
■ 2020 PM Management Summit
  December 6–9 / Orlando, FL
  mpif.org

JUNE 2020
■ ITSC 2020
  June 10–12 / Vienna, Austria
  asminternational.org/web/itsc/home

■ FABTECH Canada
  June 16–18 / Toronto, Canada
  canada.fabtechexpo.com

■ World Congress on Powder Metallurgy and Particulate Materials (WorldPM2020)
  June 27–July 1 / Montreal, Canada
  mpif.org/events

OCTOBER 2020
■ EuroBLECH 2020
  October 27–30 / Hanover, Germany
  euroblech.com

NOVEMBER 2020
■ FABTECH
  November 18–20 / Las Vegas, NV
  fabtechexpo.com

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  December 8–10 / Orlando, FL
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