



Singapore Welding Society

SEPTEMBER 2026

WELD POINT



HIGHLIGHTS



President's Message

3



29th Beijing Essen
Welding & Cutting Fair

6



The 79th IIW Annual
Assembly and
International Conference
Successfully Held in
Salzburg, Austriag

9



SINGAPORE WELDING SOCIETY

MORE INSIDE >

3 President's Message

New Membership for
Jun 2026 to Aug 2026

5 New Corporate Member Profile

6 29th Beijing Essen Welding & Cutting Fair

9 The 79th IIW Annual Assembly and International Conference Successfully Held in Salzburg, Austria

14 30th China National Annual Conference on Welding Technology Successfully Held in Shenzhen

17 Motivation Online Monitoring for Laser Welding

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PRESIDENT'S MESSAGE

Dear SWS Members and Industry Partners,

It is my privilege to address you for the first time as President of the Singapore Welding Society. I would like to express my sincere appreciation to Professor Pang Hock Lye John, our Past Presidents, Council members, committee members and volunteers for their leadership

and contributions to SWS. As we begin this new term, I look forward to working with the Council and our members to further strengthen SWS as a professional platform for technical knowledge, industry collaboration and the development of Singapore's welding and joining community.

I am pleased to share an important milestone for the Society. SWS has successfully renewed its status as an IIW Authorised Nominated Body (ANB), with the new certificate valid until 14 July 2031. This achievement reflects the dedication and collective effort of those involved and reinforces our commitment to maintaining internationally recognised qualification and certification activities in Singapore.



International engagement continues to be an important part of SWS activities. In July, SWS was represented by Past President Dr Sun Zheng at the 79th IIW Annual Assembly and International Conference in Salzburg, Austria, where developments in artificial intelligence, intelligent manufacturing, digitalisation and additive manufacturing featured prominently. Earlier, SWS also participated in the 30th China National Annual Conference on Welding Technology and

the 29th Beijing Essen Welding & Cutting Fair in Shenzhen. These engagements strengthen our international connections and keep SWS abreast of developments in automation, robotics, intelligent welding and advanced manufacturing.

Looking ahead, preparations for the IIW International Congress 2028 in Singapore are progressing, including venue planning, international promotion and development of the technical programme. This will be an important opportunity for Singapore to welcome the international welding community and showcase our technical and engineering capabilities. Before then, the 80th IIW Annual Assembly and International Conference will be held in Bangkok from 18 to 23 July 2027, providing another valuable opportunity for our members and institutions to engage with the global welding community.

Within Singapore, we will continue to focus on delivering practical value through education and training, certification, technical talks and emerging technology programmes. The Council is also exploring opportunities in laser welding training while continuing to strengthen member engagement and participation in SWS activities.

I encourage our members, industry partners, educational institutions and young professionals to participate actively in our programmes and share your ideas with us. Together, we can continue to advance technical excellence, professional development and collaboration within Singapore's welding community.

Best Wishes,

Yusoof Aynuddin
President
Singapore Welding Society

NEW MEMBERSHIP FOR JUN 2026 TO AUG 2026

CORPORATE MEMBERS

Company Name	Contact Person	Join Date
RKR PROCESS MAINTENANCE PTE LTD	Mr MARUTHA MUTHU MANIVEL	1-Jul-26
SYNERGYX TECHNOLOGY PTE LTD	Ms CHARLENE CHAN	1-Jul-26

FULL MEMBERS

Name	Company Name	Join Date
Mr GANESAN SATHEESHKUMAR	GEVERNOVA	1-Jun-26
Mr TAN JUN WEI	MATCOR TECHNOLOGY & SERVICES PTE LTD	1-Jul-26

ASSOCIATE MEMBERS

Name	Company Name	Join Date
Nil		

NEW CORPORATE MEMBER PROFILE

RKR PROCESS MAINTENANCE PTE LTD

NATURE OF BUSINESS:

Process and Industrial Plant Engineering
Design and Consultancy Services



RKR Process Maintenance Pte. Ltd. is a Singapore-based engineering and maintenance service provider specializing in plant maintenance, mechanical works, piping fabrication and installation, scaffolding services, equipment servicing, and manpower support for industrial facilities.

We provide safe, reliable, and cost-effective solutions for petrochemical, pharmaceutical, marine, and general industrial sectors.

The company is committed to maintaining high standards of quality, workplace safety, and customer satisfaction while ensuring timely project delivery

SYNERGYX TECHNOLOGY PTE LTD

NATURE OF BUSINESS:

Supplier and consultant



Established in 2009, Synergyx Technology Pte Ltd is a Singapore-based company specializing in welding systems and solutions for industrial applications. The company distributes advanced welding equipment, including robotic and automated welding technologies, to customers across the manufacturing and industrial sectors.

Beyond equipment distribution, Synergyx provides welding solutions and technical support to help customers resolve complex welding challenges and improve their welding processes. The company is also actively engaged in research and development of advanced welding technologies, working to expand the capabilities and versatility of modern welding systems.

Driven by a commitment to innovation and quality, Synergyx aims to build lasting partnerships with customers and industry stakeholders, contributing to the advancement of welding technology and practice within Singapore's manufacturing and industrial landscape.

29TH BEIJING ESSEN WELDING & CUTTING FAIR



The 29th Beijing Essen Welding & Cutting Fair (BEW 2026) was successfully held from 29 June to 2 July 2026 at the Shenzhen World Exhibition & Convention Center, Shenzhen, China.

Jointly organised by the Chinese Mechanical Engineering Society, the Welding Society of the Chinese Mechanical Engineering Society, the China Welding Association, the Welding Equipment Branch of the China Welding Association, the German Welding Society (DVS), and Messe Essen GmbH, BEW has established itself as one of the world's leading exhibitions for welding and cutting technology. Each year, it attracts thousands of professionals from around the globe, including manufacturers, distributors, agents, research



institutes, government agencies, and procurement specialists.

This year's exhibition covered more than 80,000 square metres, featuring over 900 exhibitors from around the world and attracting more than 30,000 professional visitors. The event brought together global industry leaders, innovative technologies, and the latest market trends, while leveraging the manufacturing strengths of the Guangdong–

Hong Kong–Macao Greater Bay Area to provide a premier platform for business networking, technology exchange, and international trade across the welding and cutting industry.

Alongside many new exhibitors, numerous internationally recognised companies showcased their latest products and technologies, including Panasonic, TAYOR, KUKA, Hugong, Han's Laser, SIASUN, Golden Bridge, Carl Cloos, KAWASAKI, Penta Laser, Manific, JASIC, Fuerm, Aotai, HIMACH, Kaierda, Qianjiang, and HG Laser. Their exhibits reflected the industry's rapid progress in automation, digitalisation, laser processing, and intelligent manufacturing.

Visitors represented a broad range of industries, including mechanical manufacturing, pressure vessels, automotive, railway, oil and gas pipelines, shipbuilding, and aerospace. More than 100 domestic and international media organisations, including trade journals, exhibition publications, and online media platforms, provided extensive coverage throughout the event.

Several specialised exhibition zones highlighted the latest developments in advanced manufacturing technologies:



- **Industrial Laser Pavilion** – featuring breakthrough technologies in ultra-high-precision laser welding, ultra-thick plate laser cutting, and integrated laser processing systems for applications in new energy vehicles and aerospace manufacturing.
- **Robotics & Intelligent Automation Corner** – showcasing AI-enabled collaborative welding robots, real-time online quality inspection, digital twin production simulation, and flexible automated welding systems designed to enhance productivity and manufacturing quality.



THE 79TH IIW ANNUAL ASSEMBLY AND INTERNATIONAL CONFERENCE SUCCESSFULLY HELD IN SALZBURG, AUSTRIA



79th Annual Assembly and International Conference on Welding and Joining



The 79th International Institute of Welding (IIW) Annual Assembly and International Conference 2026 was successfully held in Salzburg, Austria, from 12 to 17 July 2026. This year's event marked a historic milestone as it was the first Annual Assembly organised directly by IIW, with the support of the Austrian Member Society and local organising partners, introducing a new operating model for future IIW Annual Assemblies.

Salzburg, the birthplace of Wolfgang Amadeus Mozart, provided an impressive setting for the international gathering. Renowned for its magnificent Baroque architecture, rich cultural heritage and UNESCO World Heritage Old Town, the city welcomed approximately 1,000 delegates from 51 countries, representing academia, research organisations, industry, standards bodies and professional welding societies worldwide. The Singapore Welding Society (SWS) was represented by Dr Sun Zheng, Past President of SWS and Chairman of International Affairs.

IIW General Assembly

The IIW General Assembly (AGM) was held on the morning of 12 July, where delegates reviewed the organisation's progress and discussed strategic priorities for the coming years. Major agenda items included:

- President's Report
- Financial Report
- Election and renewal of Board members
- Reports from the Technical Management Board (TMB)
- Reports from the International Authorisation Board (IAB)
- Membership development
- Review of IIW activities during the past year
- Future strategic initiatives and organisational development

The AGM also approved the establishment of Commission XX – Intelligent Manufacturing, making it the 20th IIW Technical Commission. The new commission reflects the increasing importance of artificial intelligence, digital manufacturing, robotics, automation, and smart production systems in the future of welding and joining technology.

Following the AGM, the Stakeholder Forum was held in the afternoon. Introduced last year as a

regular feature of the Annual Assembly, the forum encouraged open dialogue between IIW leadership and national member societies. Besides updates on membership growth, the IIW Weld Fund and other ongoing initiatives, delegates participated in a round-table discussion entitled “The Role of IIW in the Evolving Scenario.” The discussion explored how IIW can continue to create value for its members, strengthen international collaboration, attract younger professionals, and respond to rapid technological changes within the manufacturing sector.

Opening Ceremony and IIW Awards

The Opening Ceremony on the evening of 12 July celebrated the achievements of outstanding individuals who have made significant contributions to welding science, engineering and the IIW community.

The prestigious 2026 IIW Awards for Career Achievements and Contributions included:

- Fellow of the IIW Award
- Evgeny Paton Award
- Arthur Smith Award
- Yoshiaki Arata Award
- Thomas Medal
- Chris Smallbone Award



Awards recognising Outstanding Technical Achievement included:

- Henry Granjon Awards (Categories A, B and D)
- Halil Kaya Gedik Award





Annual General Assembly

- Welding in the World Best Paper Award
- Ugo Guerrera Prize
- Young Professional International Conference Online 2026 Award

These awards recognised excellence in research, industrial innovation, education, international collaboration, and dedicated service to IIW. The recognition of outstanding young professionals also demonstrated IIW's continued commitment to developing future leaders for the global welding community.

Technical Commission Meetings

Throughout the week, more than 30 Technical Commission, Working Unit and Select Committee meetings were conducted, covering virtually every aspect of welding and joining technology.

Over 500 technical papers and presentations were delivered across the various commissions, addressing topics including:

- Welding processes and equipment
- Welding metallurgy
- Structural integrity and fatigue
- Welding quality assurance and inspection

- Resistance welding
- Brazing, soldering and adhesive bonding
- Pressure vessels and pipelines
- Welding education and qualification
- Health and safety
- Additive manufacturing
- Standardisation
- Digital manufacturing and intelligent welding

The meetings provided an important platform for experts from around the world to exchange technical knowledge, review international standards, initiate collaborative research, and discuss emerging technologies that will shape the future of manufacturing.



IIW Stakeholder Forum

Symposium on AI-Powered Advancements

One of the highlights of this year's Annual Assembly was the Symposium on Scalable and Applicable AI-Powered Advancements, held on 16 July.

The symposium featured 40 technical presentations covering the application of artificial intelligence in welding automation, intelligent sensing, machine learning, robotic welding, digital twins, computer vision, process optimisation, and quality prediction.

The large number of high-quality papers demonstrated that AI has rapidly become one of the most active research areas within IIW. The symposium attracted strong international interest and highlighted the increasing integration of AI technologies into modern welding production and inspection systems. It also complemented the establishment of the new Commission on Intelligent Manufacturing, signalling IIW's strategic focus on digital transformation and Industry 4.0.

International Conference

The IIW International Conference, held on 17 July, was organised under the theme: "Metal Additive Manufacturing – Materials, Processes and Component Performance." The conference brought together researchers and industrial experts to present the latest developments in

metal additive manufacturing, with particular emphasis on:

- Advanced metallic materials
- Additive manufacturing processes
- Process monitoring and control
- Mechanical performance and structural integrity
- Welding technologies supporting additive manufacturing
- Qualification and certification
- Industrial applications

The conference highlighted the growing convergence between welding technologies and additive manufacturing, demonstrating how wire arc additive manufacturing (WAAM), laser-based processes and hybrid manufacturing technologies are creating new opportunities for aerospace, energy, automotive and advanced manufacturing industries.

Networking and Cultural Programme

In addition to the technical programme, delegates enjoyed a variety of networking and social activities that promoted international friendship and professional exchange. These included the



Gala Dinner



Technical commission meetings in progress

Austrian Evening, the IIW Gala Dinner, city tours and other cultural activities showcasing Salzburg's unique history, music and traditions. These events provided valuable opportunities for delegates to strengthen existing collaborations, establish new partnerships and exchange ideas in an informal setting.

Looking Ahead

The 79th IIW Annual Assembly was successfully delivered under IIW's new organisational model, demonstrating that IIW is well positioned to independently organise future Annual Assemblies while maintaining the high technical standards and international participation expected by its members.

The event also reflected the major technological trends shaping the global welding industry, particularly artificial intelligence, intelligent manufacturing, digitalisation and metal additive manufacturing. Together with the establishment of the new Commission on Intelligent Manufacturing, these developments indicate IIW's commitment to leading the transformation of welding technologies in the era of smart manufacturing.

The global welding community now looks forward to the 80th IIW Annual Assembly and International Conference, which will continue to strengthen international cooperation and advance welding science and technology for the benefit of industry worldwide.



International Conference

30TH CHINA NATIONAL ANNUAL CONFERENCE ON WELDING TECHNOLOGY SUCCESSFULLY HELD IN SHENZHEN



焊光三十砺初心 产研融合向新程

第30次中国机械工程学会焊接分会学术年会

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中国机械工程学会

承办单位：

中国机械工程学会焊接分会
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广东省机械工程学会

协办单位：（排名不分先后）

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高性能新型焊接材料全国重点实验室
高能束流制造全国重点实验室
高效焊接新技术国防工程研究中心
印刷电子技术工业和信息化部重点实验室
深圳市先进制造材料研究院
特种焊接技术研究中心
广东省机械工程学会焊接分会
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中国机械工程学会焊接分会深圳分会

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宣传媒体：

《焊接学报》《焊接》
Advanced Materials Joining
China Welding

6月26-29日 深圳



The 30th China National Annual Conference on Welding Technology was successfully held from 26 to 29 June 2026 in Shenzhen, China. Recognised as China's most influential annual academic event in the welding and joining community, the conference brought together leading researchers, industry experts, manufacturers, and young professionals to exchange knowledge and showcase the latest technological developments in welding science and engineering.

The conference was jointly organised by the Chinese Mechanical Engineering Society (CMES), the Welding Institution of the Chinese Mechanical Engineering Society, Harbin Institute of Technology (HIT), and the Guangdong Mechanical Engineering Society. This year's event attracted more than 900 delegates, making it the largest conference in its history, reflecting the rapid growth of China's advanced manufacturing and welding industries.

Dr Sun Zheng, Past President of the Singapore Welding Society (SWS), was honoured to attend the conference as an invited international representative of the Singapore Welding Society. The conference provided an excellent opportunity to strengthen professional relationships between Singapore and China's welding communities while promoting future technical collaboration and exchanges.

The conference commenced with an impressive plenary session featuring 12 distinguished keynote speakers from leading universities, research institutes, and industry. Their presentations highlighted the latest advances in welding technologies, intelligent manufacturing, materials engineering, and digital transformation. Topics included artificial intelligence in welding automation, digital manufacturing, high-performance materials, advanced joining



technologies, green manufacturing, and future trends in smart factories. The keynote presentations also addressed the opportunities and challenges facing the welding industry as it supports emerging sectors such as new energy vehicles, aerospace, high-speed rail, shipbuilding, and renewable energy.

A major highlight of the conference was the presentation of more than 400 technical papers across 14 parallel technical sessions, covering virtually every important aspect of modern welding and joining technologies. The technical programme included topics such as:

- Brazing and diffusion bonding
- Cladding and surfacing engineering
- Weldability of advanced materials
- Welding consumables and filler materials
- High-energy-density welding
- Solid-state joining technologies
- Welding production and quality assurance
- Welded structure design and integrity
- Composite materials joining
- Pressure vessel and pipeline fabrication

- Additive manufacturing and wire arc additive manufacturing (WAAM)
- Intelligent welding, robotics and automation
- Digital manufacturing and Industry 4.0 applications
- Structural health monitoring and non-destructive testing

The high quality of the technical papers demonstrated the rapid progress being made in both fundamental research and industrial applications. Many presentations focused on the integration of artificial intelligence, machine vision, digital twins, sensor technologies, and big data analytics into welding processes, illustrating how digitalisation is transforming modern manufacturing. Considerable attention was also given to lightweight materials, high-strength steels, aluminium alloys, titanium alloys, and advanced materials required by the aerospace, automotive, energy, and offshore industries.

Another encouraging observation was the strong participation of young researchers, postgraduate students, and early-career engineers. Their enthusiasm and active involvement in technical discussions reflected the continued investment by universities, research institutes, and industry in developing the next generation of welding professionals. This is particularly significant at a

time when many countries are facing an ageing workforce and an increasing shortage of qualified welding engineers, inspectors, technicians, and skilled welders. The conference clearly demonstrated China's commitment to nurturing young talent and strengthening the long-term sustainability of the welding profession.

The exhibition area accompanying the conference also showcased the latest welding equipment, automation systems, laser processing technologies, inspection instruments, and intelligent manufacturing solutions from leading equipment suppliers. Participants had the opportunity to interact directly with equipment manufacturers and technology providers while exploring emerging products and industrial applications.

Beyond the technical programme, the conference served as an important platform for networking and international collaboration. Researchers,

engineers, industrial practitioners, and representatives from professional organisations exchanged ideas on future research directions, industrial challenges, international standards, and opportunities for collaborative innovation. Such interactions continue to play a vital role in accelerating technology transfer and strengthening cooperation between academia and industry.

Overall, the 30th China National Annual Conference on Welding Technology was a highly successful event, demonstrating the remarkable progress of China's welding research, manufacturing capability, and technological innovation. The conference not only provided valuable insights into the latest developments in welding science and engineering but also highlighted the growing importance of intelligent manufacturing, automation, digitalisation, and sustainable production in shaping the future of the global welding industry.



MOTIVATION ONLINE MONITORING FOR LASER WELDING

By Markus Lindemann, TRUMPF Pte Ltd

For most laser welding applications in industry, online monitoring of the welding process can be beneficial. Especially for welding applications in series production, online monitoring can prevent defective parts from reaching further process steps or, in the worst case, from being used in the final product. Additionally, the data can be used to optimize the welding process to achieve higher quality.

For example, when several battery cells are joined in a complete module, each weld must have a good connection to the connector in order to have good electrical performance.

Due to the afore-mentioned situation in manufacturing process chains, many sensor systems are available, such as plasma sensors, camera-based sensors, etc. Most of these sensors can only provide indirect data or compare welding results of an actual signal to a reference signal but cannot provide actual measurement data from the welding process itself or the weld depth or weld quality.

Optical Coherence Tomography (OCT) technology can be utilized to measure and evaluate distances reliably. OCT sensors can be used in various ways:

- 1) **IN Process - Online process monitoring of the penetration depth**
- 2) **POST Process - Online process monitoring of seam topology**

Additionally offline measurements such as seam positioning before the actual laser welding topology, including work piece height and position can be performed. But in this article, we focus on inline process monitoring only.

The OCT is an optical tool for measuring distances. Based on the principle of an interferometer, the signal from the reference arm is overlaid with the

signal from the measurement arm. The resulting interference pattern is used to evaluate the length difference between both arms. Galvo scanners can be used to move the OCT measurement beam on the workpiece and measure the surface topology. When using OCT technology in laser processing, an additional sensor scanner is mounted next to the focusing optics. The OCT beam is coaxially coupled into the processing beam (see figure 1). Different measurements can be performed with OCT: offline topology measurement for seam positioning or online monitoring of welding depth and seam surface during the process. The sensor's scanning system allows the beam to move relative to the optic's TCP. In terms of scanner optics, there is no position restriction within the entire scanning field of the PFO.

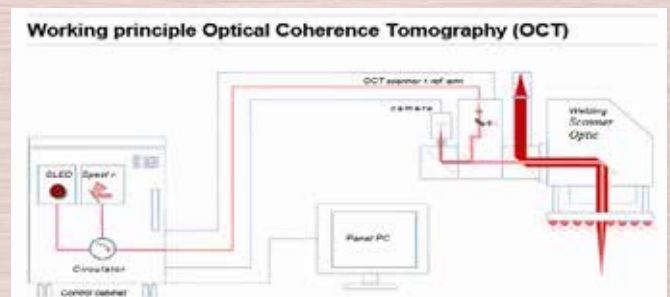


Figure 1) Principle of OCT sensor system.

The high measurement frequency of 250 kHz increases the lateral resolution, enabling different measurement tasks to be performed in one run with acceptable resolution. Optimized thermal management ensures good thermal stability of the system.

The application and accuracy of for different materials like copper, aluminum, mild steel, and stainless steel are tested in basic research. Penetration depths in the range of 0.5 to 4.5 mm can be measured. Steel materials in high welding speeds result in lower signal quality, while for copper and aluminum, high welding speeds increase measurement stability.

OCT Online Process Monitoring

Once the welding parameters for a welding process with a stable keyhole are set, the OCT system can be used for online process monitoring.

IN Process – Determination of best measurement position for keyhole shape measurement

To measure the penetration depth, the OCT determines the capillary depth during welding. Before running an IN process measurement, a suited measurement position must be found. Therefore, a so-called keyhole shape measurement must be performed in the first pass to evaluate the capillary shape and to find its deepest point. In a stable welding process the keyhole shape is approximately constant during the whole seam, and the measurement position has a fixed relative position to the laser TCP. Some processes require coaxial positioning, while others may have the optimum behind or some even in front of the laser spot, depending on the material, welding parameters, and target penetration depth. Figure 2 shows an example for a keyhole shape. In this picture the keyhole ground is shown by the big number of valid points in the middle. The offset value of the OCT should be set in the middle of this region.

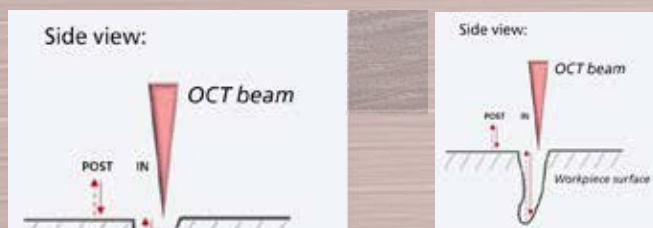


Figure 2) Measuring data and schematic drawing of the keyhole shape.

IN Process – Penetration measurement working principle

Once the optimum measurement position is determined, the penetration depth can be measured. To obtain an absolute depth value, the measured keyhole depth is always correlated to the part surface. For this reason, the system performs a surface measurement with each

measurement run and calculates the penetration by correlating the keyhole and surface signal. As a result, a depth measurement graph is shown in figure 3. The blue points in this curve show the detected penetration. OCT measures the capillary depth, but since there is molten material under the keyhole penetration depth determined in the section is higher than the measurable depth. This offset value varies depending on the material and welding parameters. In general, a good penetration measurement has a deviation of a maximum of 10% from the penetration in the section.

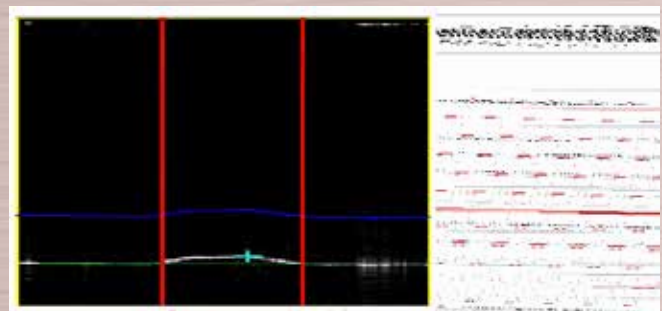


Figure 3) Measured penetration depth

POST Process – Seam surface evaluation by OCT

If the seam surface is to be evaluated, a POST-scan can be recorded. This measurement can be performed either during welding or in a separate surface scan afterwards. Moreover, IN and POST measurements can even be performed in the same pass. Measuring both in one run is a compromise in terms of the measurement resolution since there is no IN measurement while measuring POST and vice versa. In all cases, the weld topology is measured by measuring the height differences following an OCT scan line perpendicular to the welding direction as shown in Figure 4. The red lines in figure 4 indicate the detected seam width while the white line shows the detected height. This height profile of the weld seam can be used to detect weld defects such as blowouts, edge notches, or to evaluate the shape of the weld seam. The resolution of POST-scans is mainly influenced by the welding speed of the welding scanner optic and the OCT sensor's measurement rate. Depending on the weld seam shape, different evaluation algorithms can be selected.

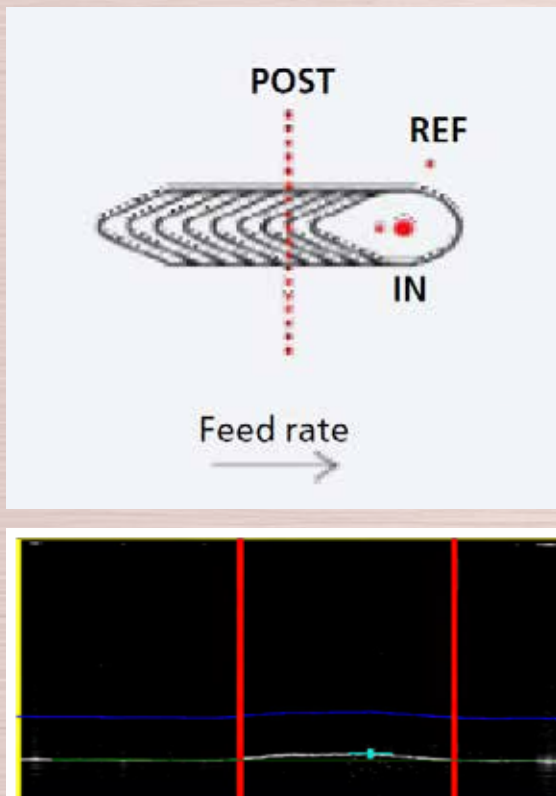


Figure 4) Post scan for weld beam surface evaluation – schematic (up) and real data (down).

Challenges and limitations of OCT Measurements

Since the keyhole shape, its stability, and the melt pool dynamics have a huge influence on the signal quality, any change in the welding parameters may require a readjustment of the OCT position and measurement parameters. Especially small laser spot sizes in case of single-mode lasers are more difficult to measure due to the small keyhole dimensions and require a high accuracy in calibration and measurement parameters. In addition, different materials have different signal quality due to their reflectivity, which can be evaluated with the valid point percentage.

The IN process measurement has two major limitations: In the case of heat conduction welds, there is no keyhole, and therefore the capillary depth cannot be measured. On the other hand, if there is a full-penetration weld with a constantly open capillary, the OCT light is transmitted completely and cannot be used to obtain depth

information. For these reasons, welding depth monitoring (IN) is generally only possible with partial penetration welds. Evaluation of the seam surface (POST) is possible even in terms of full penetration seams.

In all the afore-mentioned scenarios error and warning limits can be defined for IN and POST measurements. Whenever predefined limits for an IN or POST scan values are detected, an on-going production can be interrupted automatically, and defective parts can be removed or replaced. Error or warning signals can be transmitted via fieldbus to peripheral devices. Additionally, the system provides statistical values for each measurement value like mean, standard deviation and minimal and maximal value to summarize the results for each weld.

Example of a “Contact Welding” with TRUMPF VisionLine OCT

In this example an electrical contact made of aluminium is welded as an insert into a recess. For an optimized electrical conductivity an even and high weld depth is required. The qualitative weld sample is depicted in as-welded condition (Figure 5, Left) and the quantitative weld quality are assessed (in Figure 5, Right).



Figure 5) Electrical contact welding sample. Left: as-welded condition. Right: Cross section of welding for comparison with OCT-results.

In this case the penetration measurement can be performed using single-mode or BrightLine Mode laser sources. As the OCT spot diameter is almost the same as the laser spot diameter, the calibration of the OCT beam to the laser beam must be very precise. Once aligned, the OCT can be used in the same way as in the multimode process. In this application, a BrightLine Mode laser with single-

mode core and multimode ring is used to weld a mixed material joint of copper on aluminum.

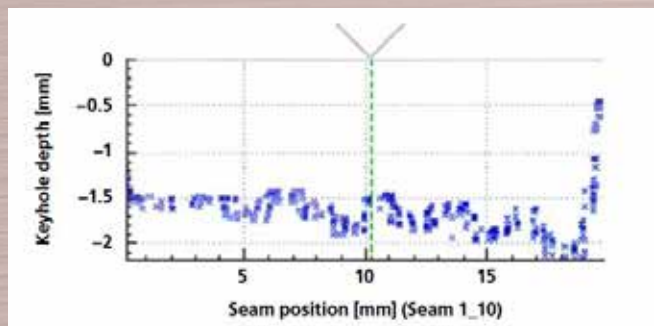


Figure 6) Measured capillary depth of 360-degree circular weld seam.

The weld seam is a single circle with no beam oscillation. The capillary depth in figure 6 shows

a small fluctuation (waves), which is most likely a real fluctuation of the capillary. Nevertheless, a good signal quality can be obtained. The OCT weld depth measurement correlates to a very high degree to the metallographic preparation of the weld (compare Figure 6 to Figure 5, Right). If the OCT keyhole depth measurement is compared to the cross section, one can see a very small deviation on the left depth: approximately 1.5mm by OCT in comparison to the cross section, which indicates a penetration depth of 1.53mm. On the right side of the cross section the keyhole depth measured by OCT indicates a penetration depth of approximately 1.9mm, while the cross section reveals a slightly higher depth of about 2.1mm. In both cases the measured deviation to the cross section is in average than 10%.



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- ✓ Narrow gap welding
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