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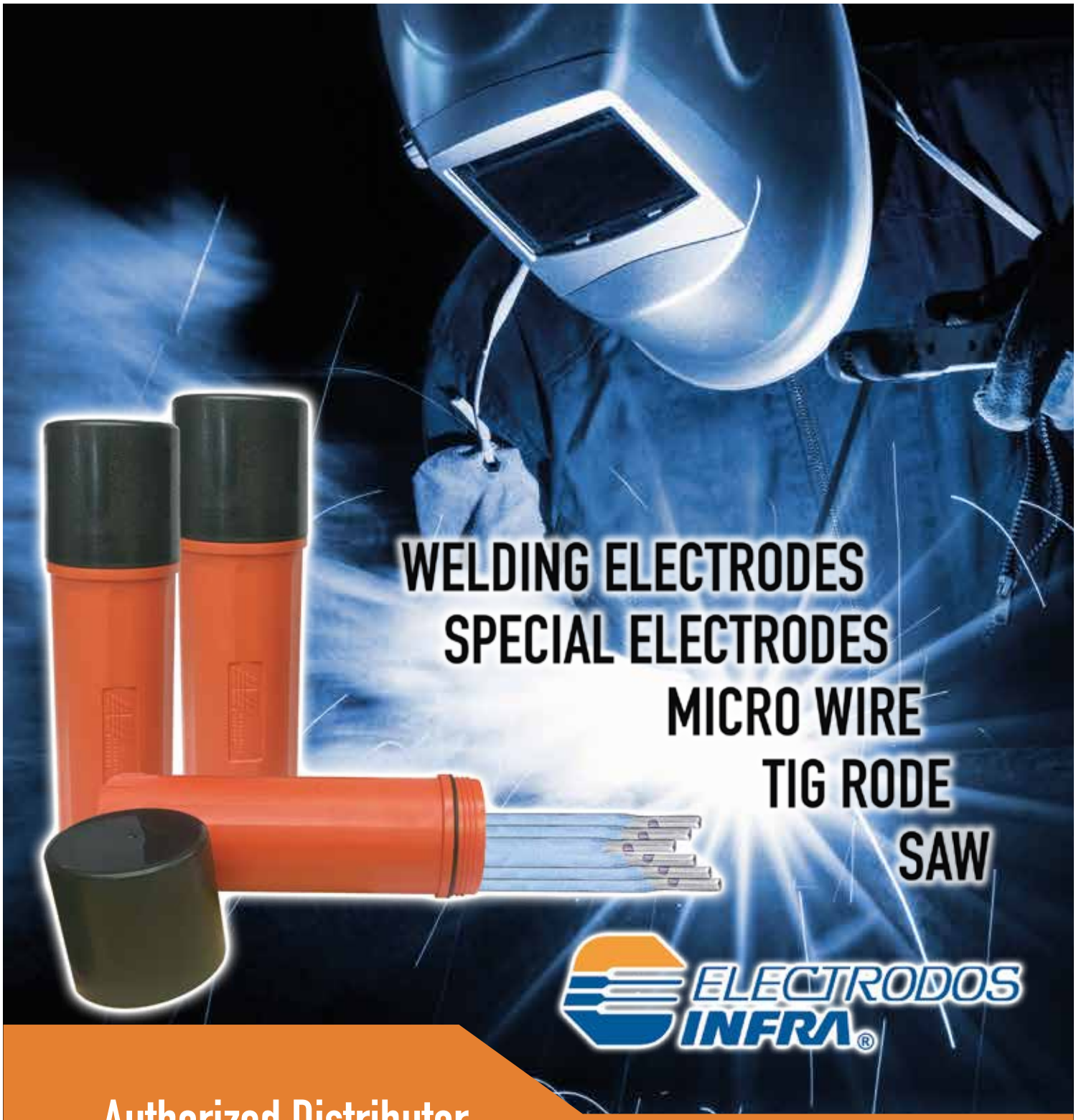

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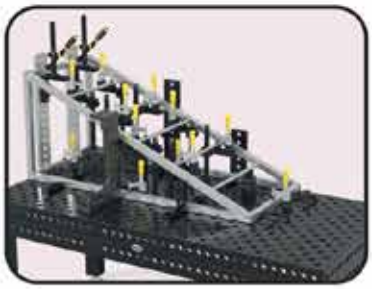

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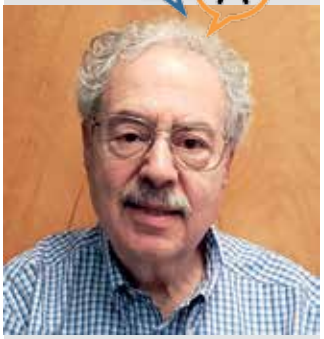

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WOMEN IN WELDING

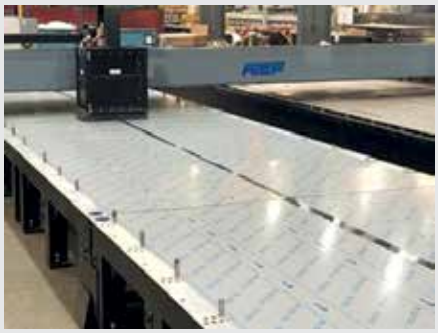
"Doing a man's job and earning the same money if not more as a man, to me, is Independence at its finest."

ADVERTISER'S INDEX

AT&F makes investment in laser welding equipment

AT&F is pleased to announce new technology investments for 2020. The first investment is a laser welding/laser cutting machine, which supports AT&F's core focus to Build, Protect, Energize and Move the world through metal fabrication.

According to Ken Ripich, EVP of Business Development, "There is increased demand for "welded wide" material from our customers. Various steel mills around the world have limitations on the width of material they can produce in specific grades. Many end users in different industries require much wider material for manufacturing their products. We now have the ability to



join large sheets of material and laser cut profiles all on one machine."

AT&F has been providing these services for over a decade utilizing a hybrid laser welding system. While serving the market well for many years, the addition of improved technology will instantly expand AT&F's light gauge welding capabilities and capacity.

After months of research and development, AT&F is proud to announce the recent installation of a new automated laser welding system. This machine will be capable of joining multiple sections of material together, with lengths exceeding 75 feet and widths exceeding 10 feet. Customers are thrilled that AT&F will be able to offer high volume "welded wide" material from their Cleveland facility. In addition to this game changing investment, AT&F has also upgraded their laser cutting equipment.

Source: www.blog.atfco.com

UEI Gardena Introduces New Welding Program

From aerospace and military applications to positions in private and public industry building bridges, highways, and buildings, career opportunities abound for eager and experienced welding professionals. While demand varies by the U.S. region a skilled welder should be able to find work anywhere. Projections from the Bureau of Labor Statistics indicate that jobs for welders, cutters, solderers, and brazers will **continue to grow** for nearly another decade.

To meet this demand, the **UEI College Gardena campus** has launched the all-new **Welding vocational training program,** designed for students who love working with their hands designing,

creating or repairing equipment. Through a combination of specialized coursework, practical experience, and lab activities, students will get up to speed for an entry-level career in the field in as few as 10 months.

"We are pleased to add Welding to our program offerings in Gardena," said Tim Gramling, LP.D., Executive Director. "In this program, we introduce students to shielded arc, STICK, MIG, TIG and pipe welding techniques. Perhaps most importantly, we emphasize safe operating procedures for storing, moving and using welding equipment. We are excited about the opportunity to train future welders for this high demand program in the greater Los Angeles area."

Career training at UEI Gardena could set up the Welding program students for the career of their dreams. The Welding program is student-focused, providing learners with a uniquely practical learning experience. Students will be trained in several processes and fabrication skills, taught different welding techniques, receive foundational training in metals, shop skills, and reading blueprints. Welding program students will also be introduced to soft skills like communications, human relations, job hunting, and safe work practices. The campus is welcoming and well-equipped, featuring smaller class sizes to ensure that students receive the attention they need to succeed.

Source: www.uei.edu

UK Govt grants Babcock green light for £2.1m 'AWESIM' mfg project

Babcock International Group (Babcock) has won Government backing to pioneer advanced manufacturing and sensor technologies with the potential to deliver significant savings. The Automated Welding Equipment System Inspection and Monitoring is the first of its kind to combine machine learning, sensor development and advanced remote manufacturing processes to deliver welding, weld inspection and potentially weld certification all in near real time.

The work is being led by Babcock's civil nuclear business, Cavendish Nuclear, along with some of the UK's most renowned engineering and academic institutions. It's being driven by urgent UK industry targets to achieve a 30% cost reduction in nuclear new build along with savings of 20% in nuclear decommissioning projects by the year 2030.

BEIS' Energy Innovation Programme will allocate £1.3m for Phase 1 of the project which will focus on technology development and last until the end of March 2021. The remainder of the funding will come from the industrial partners. Once developed, the technology will enable detection of flaws as they occur, leading to significant reductions in cost and time in manufacturing processes.

Jon Hall, Managing Director of Technology at Babcock said: "Babcock is a technology-led business driven by engineering insight. Advanced manufacturing is a core part of our offering, given the complex and critical assets we manage. We're delighted to have secured the confidence and funding of UK Government to lead this innovative project which will add value across our customer base."

Tony Burnett, Head of Innovation and Technology for Cavendish Nuclear said: "There has been extensive planning for several years to get to this stage, but we can now develop this ground-breaking technology with our collaboration partners across industry and academia."

"We've initially developed AWESIM for the nuclear sector but any industry

developing large scale critical assets involving high integrity welding processes will benefit from what it will deliver."

A large, factory scale demonstrator to showcase the integrated technologies will be built at the University of Sheffield's Nuclear Advanced Manufacturing Research Centre later this year.

The University of Strathclyde's Advanced Nuclear Research Centre will also develop a non-destructive examination system with Derbyshire engineering company Peak NDT as part of the project. Cavendish Nuclear working in collaboration Doosan Babcock will provide engineering expertise to ensure the technology is industry-ready.

Source: www.babcockinternational.com

Funding European welding innovators to support Weldgalaxy

The WeldGalaxy project, funded under the Horizon 2020 EU research and innovation funding programme, will boost the welding industry by creating an online B2B marketplace that aims to make the European arc welding sector more competitive. The project will also provide financial support to SMEs and Mid-Caps to develop innovative arc welding products and services via the launch of two Open Innovation Calls (OICs). A total of €2.5 million in equity-free funding will be allocated to fund 25 pilot projects.

The WeldGalaxy consortium is launching its first open call. Ten pilots will be selected, to develop innovative technologies in the field of arc welding and become the first platform beta-testers.

Source: www.weldgalaxy.eu

Townsville welding firm wins defence contract

Townsville's Global Welding Supplies (GWS) has won a contract to supply Rheinmetall's new $170 million manufacturing facility in Ipswich.

Minister for State Development Cameron Dick said the contract was a big win for Townsville and will see GWS supply welding machines and consumables for Rheinmetall Defence Australia's Military Vehicle Centre of Excellence (MILVEHCOE).

Source: https://www.australiandefence.com.au/news/townsville-welding-firm-wins-defence-contract

Trumpf successfully completes its digital INTECH

From 26 to 29 May 2020, the high-tech company TRUMPF held its in-house trade showINTECH digitally for the first time ever. Around 1,600 visitors from 56 countries took part in the virtual trade show. "With a digital INTECH, we were able to optimally meet the requirements of our international customers in these corona virus times," says Reinhold Gross, Managing Director Sales and Services of TRUMPF Werkzeugmaschinen GmbH + Co. KG.

TRUMPF set up an online platform for the digital INTECH. In so-called "topicdialogs" TRUMPF experts presented new machines and technologies. In advance, visitors had the opportunity to register for specificprogram items. During the event, the participants were able to address their questions live to TRUMPF experts.

The videos for the new TruLaser Tube 3000 fiber laser tube cutting machine, TruPrint 2000 3D printer and TruArc Weld 1000 received the most feedback.Talkson the cutting-edge topics of electro-mobility and the smart factory were also among the most visited events within the format. "The high level of interest in our machines and technologies shows that we address the right topics and show our customers perspectives at this time," says Gross.

Source: www.trumpf.com

American Friction Welding Continues to Grow With New Facility

American Friction Welding (AFW) has moved into a new 63,000 square foot state-of-the-art manufacturing facility located at 505 Northview Road, Waukesha, WI 53188. The relocation accommodates the recent business growth the company has been experiencing. The 6.5-acre property is on the corner of Northview Road and Airport Road in the city of Waukesha by the Waukesha County Airport. The move took place over two months, relocating 14 friction welding centers ranging from 4 to 250 ton, ten machining centers, and office operations from their previous Brookfield, WI location.

"The new building allowed us to design the most efficient production flow with increased capacity for high volume production and larger part size welding," said Pete Caruso, Director of New Business Development at American Friction Welding. "We're excited to grow with our customers, meeting their friction welding needs today and well into the future."

"The AFW move was a major undertaking with much planning, as you can imagine. We couldn't have asked for a better outcome. I want to thank our customers, the city of Waukesha, for working with us during the transition and the dedication of the entire AFW team!" John Fischer, President of American Friction Welding, said in a statement. "As the industry leader, we continue to advance rotary friction welding technology to serve and provide the best value to our customers."

Source: www.teamafw.com

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Failure analysis of Main Steam Flow Nozzle Weld Joint made of P91 & SS 316

Dis-similar metal weld (DMW) joint or transitions between a Creep strength enhanced ferritic steel (CSEF) and an Austenitic stainless steel (SS) are usually carried out using either an Austenitic Stainless-Steel filler or Nickel base fillers. Austenitic Stainless-Steel fillers are preferred for low temperatures typically less than 400 deg C. For higher temperatures, Nickel based fillers are utilized.

The paper deals with issues in using ERNiCrMo-3 (Inconel 625) filler in combinations of CSEF and Austenitic SS. Multiple Main steam flow nozzles, with steam parameters of 110 kg/cm2 pressure and 540-545 deg C temperature, at a captive power plant had experienced early failures in service. The pipe material was A335 Gr. P91 and Flow nozzle was A182 Gr. 316. The weld procedure employed buttering of P-91 sections using Inconel 625 and PWHT of P-91. The final weld with flow nozzle was carried out using Inconel 625 without PWHT. The failures were in the form of circumferential crack at the interface of P-91 pipe and Inconel 625 butter layer.

The results revealed a significant hardness increase in Inconel 625 weld and observation of creep voids at the interface of P-91 pipe and Inconel 625 butter layer. The phenomenon of precipitation hardening due to formation of secondary precipitates in service at 540-545 deg C led to increase in weld hardness and subsequent creep strain relaxed by formation of creep voids at the interface.

ROHIT SHUKLA
LEAD ENGINEER - ENGG. (G) - METALLURGY
TATA POWER , MUMBAI

Keywords: Dis-similar metal weld (DMW), Inconel 625, CSEF steel, Creep, precipitation hardening

1.0 INTRODUCTION

Multiple failures in main steam flow nozzle were experienced at a captive power plant within 1-1.5 years of service. The process side was steam with parameters of 110 kg/cm2 pressure and 540-545 deg C temperature. The pipe material was A335 Gr. P91 and Flow nozzle was A182 Gr. 316. The weld procedure employed for construction consists of buttering overlay of P91 pipe edge with ERNiCrMo-3 (Inconel 625) followed by PWHT for 2 hours for P91. The final weld with flow nozzle was carried out using Inconel 625 without any PWHT. The failures were in form of circumferential crack just at the interface of P91 and Inconel 625 butter layer covering more than half of pipe circumference as shown in Fig 1. The General arrangement drawing of the Flow nozzle assembly is shown in Fig 2 highlighting the failure location. The outer diameter (ØO) of the pipe

Figure 1: Failed nozzle.

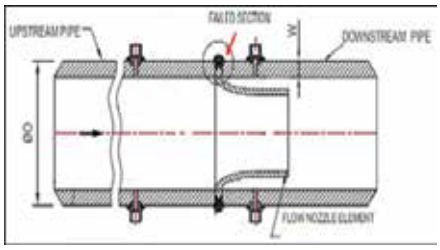

Figure 2: GAD of Flow nozzle

was 355.6mm and thickness (W) was 23.83mm.

2.0 EXPERIMENTAL

To analyze the failures, investigative methods consisting of visual, chemical analysis, tensile test, optical metallography, SEM, EDS & micro hardness were carried out. The findings of the various test results are highlighted below.

2.1 VISUAL EXAMINATION

Fig 3 depicts the closeup of the failure location showing the crack at exactly the interface of P91 pipe and Inconel 625 buttering overlay. A longitudinal through wall section cut from the failed sample depicts the crack at the interface and also shows a section of the nozzle element. (Fig 4).

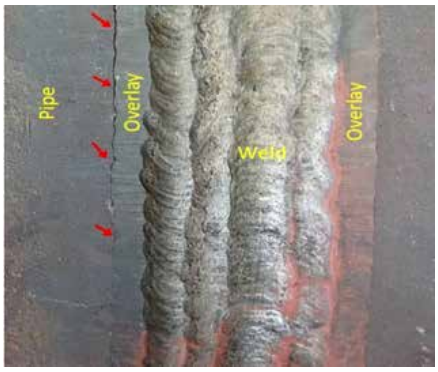

Figure 3: Closeup of crack

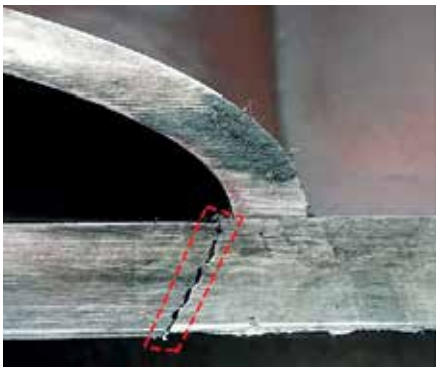

Figure 4: Longitudinal section through nozzle

The fractured surface did not reveal any deformation. Individual weld ripples were clearly seen on the fractured surface indicating the crack followed the interface between Inconel buttering overlay weld and pipe parent metal as shown in Fig 5.

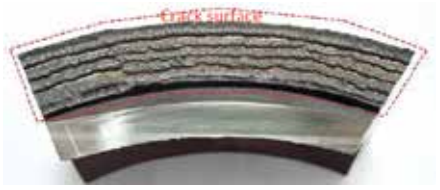

Figure 5: Fracture surface towards weld side.

2.2 CHEMICAL ANALYSIS

Chemical analysis of the pipe parent metal, flow nozzle element and weld indicated that it met the codal requirements of A335 Gr. P91 [1], A 182 Gr. 316 [2] and SFA 5.14 ERNiCrMo-3 [3] respectively. Table 1 shows the results of chemical analysis.

Table 1: Chemical analysis results

	Pipe Parent metal		Nozzle element		Filler		
	Rqd as per A335 Gr. P91	Actual	Rqd as per A182 Gr. 316	Actual		Rqd as per SFA 5.14 - ERNiCrMo-3	Actual
C	0.08-0.12	0.109	0.08 max	0.028	**C**	0.1 max	0.0005
S	0.01 max	0.0056	0.03 max	0.017	**S**	0.015 max	0.001
P	0.02 max	0.017	0.045 max	0.026	**P**	0.02 max	0.0038
Mn	0.3-0.6	0.442	2.0 max	1.88	**Mn**	0.5 max	0.02
Si	0.2-0.5	0.237	1.0 max	0.409	**Si**	0.5 max	0.209
Cr	8-9.5	9.13	16.0-18.0	16.88	**Cr**	20.0-23.0	21.43
Ni	0.4 max	0.169	10.0-14.0	10.32	**Ni**	58.0 min	64.7
Mo	0.85-1.05	0.94	2.0-3.0	2.08	**Mo**	8.0-10.0	8.6
Al	0.02 max	0.0067	-	-	**Al**	0.4 max	0.164
Ti	0.01 max	0.0005	-	-	**Ti**	0.4 max	0.229
Nb	0.06-0.1	0.071	-	-	**Nb + Ta**	3.15 - 4.15	3.69
V	0.18-0.25	0.243	-	-	**Cu**	0.5 max	0.014
N	0.03-0.07	0.054	0.1 max	0.09	**Others**	0.5 max	-
Zr	0.01 max	-	-	-			

2.3 TENSILE TEST

Two longitudinal tensile specimens were drawn from the sample: one from the pipe parent metal and the other with weld in between. The tensile test of pipe parent metal P91 was found to meet the codal requirements of A335 Gr. P91 [1].

The tensile test with weld in between showed the Ultimate Tensile strength with a significantly lower value of 369 MPa, which is even lower than the strength of weakest material involved in the weld i.e. SS316. The failure of the sample with weld in between was just at the junction of P91 pipe and Inconel 625 buttering overlay as shown in Fig 6 below. Table 2 depicts the tensile test results.

Table 2: Tensile test results

	UTS (MPa)	YS (MPa)
A335 Gr. P91 parent metal - rqd	585 min	415 min
Actual	722	549
Inconel 625 Weld in between – rqd (based on weakest material in weld SS316)	515 min	-
Actual	369	-

Figure 6: Failed Tensile test sample with weld in between

2.4 OPTICAL MICROSCOPY

A longitudinal section was cut across the weld joint including the nozzle section for optical microscopy. Sections of P91 pipe, nozzle element, weld and weld interface with parent metal were observed.

P91 pipe showed tempered martensite structure at 100x as shown in Fig 7. Fig 8 shows the Nozzle element of SS316 showed a typical austenitic structure at 100x. Fig 9 & 10 depicts the weld metal at 100x & 400x respectively with dendritic structure.

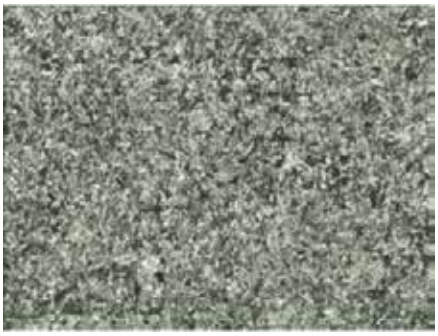

Figure 7: Tempered martensite -P91 (100x).

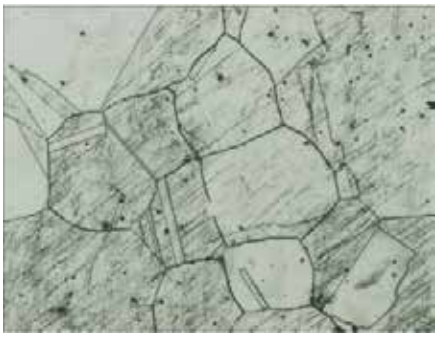

Figure 8: Austenite structure - SS316 nozzle (100x)

Figure 9: Weld metal (100x).

Figure 10: Weld metal(400x).

The weld interface was observed in as polished condition at 100x. It depicted crack along the weld interface in one section and another section showed presence of creep voids at the interface as shown in Fig 11 and 12 respectively.

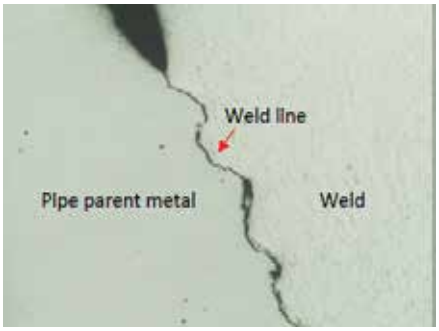

Figure 11: Crack at weld interface (100x).

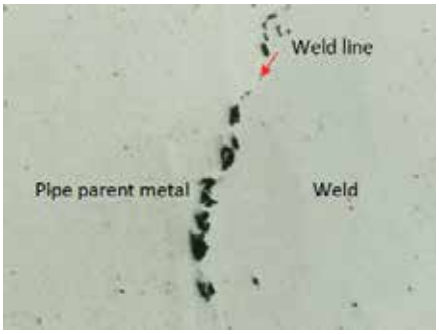

Figure 12: Creep voids at weld interface (!00x)

2.5 SCANNING ELECTRON MICROSCOPY

SEM of interface of butter overlay and parent metal at 5000x depicted an array of carbides on P91 side along the fusion line as shown in Fig 13. These appear to be

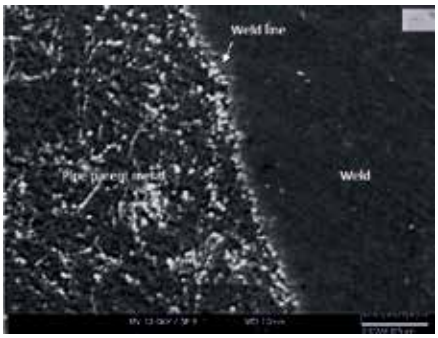

Figure 13: SEM of weld interface showing Type-I carbides (5000x)

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Type I carbides. Type I carbides are a plane of coarse, closely spaced precipitates that dominate (~80%) the fusion line in DMWs made with nickel base filler metals [4].

2.6 EDS EXAMINATION

EDS examination of precipitates observed (Table 3) in the weld showed presence of constituents rich in Niobium and Molybdenum. Fig 14 below highlights the EDS location.

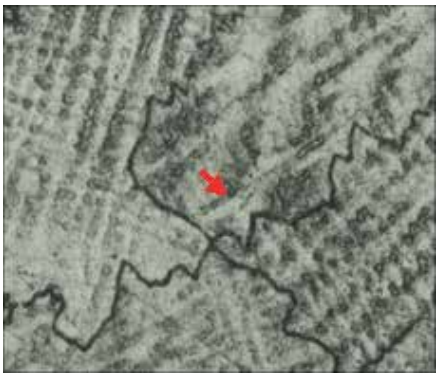

Figure 14: EDS location (400x)

	Cr	Ni	Nb	Mo
Wt.%	20.20	10.85	59.67	7.45

Table 3: EDS of precipitate in weld metal.

2.7 MICROHARDNESS MEASUREMENT

Microhardness measurement of a longitudinal section with weld in between showed a substantial hardness values in Inconel 625 weld region reaching a peak of 490 Hv at 100 gm load. The Inconel 625 butter layer on P91 pipe also had high hardness values with a maximum of 390 Hv though comparatively less compared to Inconel 625 weld in center. This was probably because of dilution of Inconel 625 butter layer from the parent metal P91. Table 4 shows the as the microhardness readings in different sections.

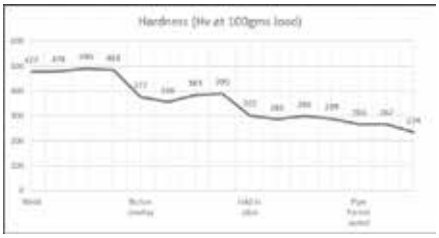

Table 4: Microhardness readings at 100 gm load.

3.0 RESULTS AND DISCUSSION

Some of the key points based on the investigative findings are stated below:

a. The pipe material P91, flow nozzle – SS316 and filler Inconel 625 was found to meet the codal requirements for chemical composition.
b. The failure did not reveal any major deformation and the crack was along the weld beads between P91 parent metal and Inconel 625 butter layer.
c. Tensile strength of a sample with weld in between failed at a very low value of 369 MPa. The failure was also at the interface of Inconel 625 butter overlay and P91 pipe.
d. The hardness values of HAZ on P-91 indicated that the PWHT employed initially was satisfactory. The hardness of P91 pipe was also found satisfactory.
e. Optical microscopy in unetched condition indicated presence of creep voids at the P91 pipe and Inconel 625 butter layer interface.
f. SEM of the etched section indicated presence of an array of carbides on P91 side along the weld fusion line.
g. EDS analysis revealed precipitates in weld rich in Nb and Mo.
h. Microhardness measurement of weld revealed very high values of 490 Hv at 100 gm load. This decreased as the distance from traversed from weld towards Parent metal.

Literature survey reveals that Mo bearing alloys like Alloy 625 which are designed to be single phase exhibit compositions that are beyond the solubility limit and, given enough time and exposure to elevated temperatures can form a wide range of brittle secondary phases [5].

Investigations by Clark, of an ex-service P91- Alloy 625 weld also showed a distinct trend of hardness increase during high temperature exposure which was a result of precipitation of γ' and/or γphase particles. It was also found that the as welded hardness of Inconel 625 was 210-220 VHN100 while the aged weld metal had a hardness of 352 VHN100 [6].

EPRI guideline on welding on CSEF steels even mentions a cautionary note to avoid use of Inconel 625 filler as it may embrittle at the PWHT temperatures required for CSEF steels [7]. Similar caution is stated in Bohler welding guideline for Inconel 625 filler due to weld metal embrittlement in 600-850 deg C temperature range [8].

Precipitation hardening is a known ageing response of Alloy 625, and is useful in many situations, but it is not necessarily beneficial to the properties of DMW in service conditions. While it will strengthen the weld metal, it will have the effect of reducing the amount of creep strain it can accommodate [6].

Based on the above, it appears that:

a. The major factor which seemed to have affected this failure was significant hardness increase in the weld due to ageing and precipitation hardening in Inconel 625 weld that had taken place during service.
b. This type of hardness would not have been obtained in the as welded condition. During service at 540-545 deg C and with time, various precipitates had formed which had increased the strength of weld metal.
c. The creep strain which gradually increase with time had relaxed by way of formation of creep voids just at the interface of weld and parent metal. This interface was significantly weak compared to the very hard weld metal. The lower tensile strength in tensile test of weld and nature of failure manifested this weak zone.

4.0 CONCLUSION

The investigation of the failed flow nozzle highlights the ill-effects of using ERNiCrMo-3 (Inconel 625) in Dissimilar weld joint configurations of CSEF steels to Austenitic Stainless Steels. This is due to the marked increased in hardness of weld because of precipitation hardening upon exposure to elevated temperatures.

While factors contributing to failures due to DMW are identified in three areas [4]:

- Service conditions – Load, cycling conditions
- Type of filler - Nickel base alloys were found to increase life by 4 times compared to Stainless steel filler in lab conditions
- Geometry of the DMW – A bevel of 60 deg on ferritic steel side resulted in 60% increase in life and a wide cap approach resulted in 50% in life.

However, even in Nickel base fillers, the use of appropriate filler would avoid issues related to precipitation hardening and subsequent failures due to accumulation of creep strain.

ERNiCr-3 (Inconel 82) is one such filler which has been the filler of choice in the industry for DMW joints. This filler is fairly stable to Thermal Ageing [4].

EPRI has also developed a filler P87 esp. for DMW joints in grade 91. It has similar Cr content as Grade 91 and is reported to have lower thermal expansion coefficients than nickel base fillers, does not age harden & had shown only isolated fine size Type-I carbides with lower coverage [4].

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Kemppi's Flexlite torches focus on ease and efficiency

The Finnish welding equipment manufacturer, Kemppi Oy, has launched a brand new family of welding torches. The Flexlite family contains torches for all manual MIG/MAG and TIG welding. With this product launch, Kemppi's entire welding torch selection will be renewed. Designed with the focus on comfort, reliability and efficient utilization of consumables, the Flexlite torches will have a strong positive effect on welding productivity and savings in the inventory costs.

Flexlite family contains state-of-the-art welding torch models for professionals. Two product series are available – **Flexlite GX** for MIG/MAG welding and **Flexlite TX** for TIG welding. Both of these product series share the same Flexlite key features: excellent ergonomics, great usability, and high-quality consumable parts.

Flexlites are high-performance torches that use the power source capacity efficiently and help you create smooth and spatter-free welds. They are available in alternative power classes and lengths, including different neck versions. On-torch remote controls are available as optional accessories.

Feels like a natural extension to your hand

Excellent ergonomics is one of the key features of all **Flexlite** torches. Their flexible cable sets and innovative ball-jointed cable protection reduce the wrist loading and allow the welder to concentrate on challenging tasks to achieve the perfect weld.

There is also an anatomically designed pistol grip handle included in every **Flexlite GX** delivery package. It is an optional accessory to further ease the stress on the hand so that it makes the gun feel just like a natural extension to the welder's hand.

Quality is more than meets the eye

The quality of the consumables inside a welding torch reflects clearly in the quality of the welds. To achieve the best welding results, Kemppi recommends using genuine Kemppi consumables in all **Flexlite** models.

Shielding gas flow, for example, has a significant effect on weld quality. Normally shielding gas is invisible, but with Schlieren imaging technology it is possible to observe the gas flow and see how the high-quality Kemppi consumables really give the best shielding gas coverage.

The inner structure of a welding torch also plays an important role in weld quality. In Flexlite GX welding guns, the shielding gas channels are separated and the cooling circulation runs to the very end of the gun neck. This keeps the neck cooler and enables cleaner welds, less spatter and reduced shielding gas consumption.

Less consumables mean lower cost

In **Flexlite** torches, the number of changeable parts has been reduced by improving cross-matching across corresponding models, and by combining the functions of some of the consumables. As a result, the total number of consumables has been reduced per individual gun models. This lowers inventory costs and makes Flexlite perfect for workshop cost management.

Getting support for your **Flexlite** torch could not be easier, because all **Flexlite** welding guns and torches are equipped with a Quick Response (QR) code to help you find the right parts and accessories. Scan the code, and it takes you directly to relevant ordering codes, consumables, product documents, and Kemppi contacts.

From More Info:
Website: www.kemppi.com

Cost Reduction with Improved Process Control in Butt Joint of Cladded Spool Fabrication





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1. ABSTRACT:

In Today's Oil & Petro chemical industries, weld overlay of Nickle alloys on carbon steel is widely being used due to its corrosion resistance and cheap alternative compared to solid Inconel. Due to uncertainty involved in the quality of weld overlay, digital control is very useful to control weld parameters, hence resulted into desired properties. Improved process control has been achieved with new generation arc welding equipment through digital control, giving the benefits of reduced heat input, improved arc stability and spatter-free welding, hence better consistency in quality. Effort is made in this study to show challenges faced during SAW welding in full weld joint with solid Inconel wire along with benefits of Inconel 625 weld overlay on commercial aspects, compared to full joint by Inconel welding for high thickness joints. In this process CRA layer from Inconel cladded pipes was removed up to Carbon steel on both sides and joint was welded with Carbon steel consumable. Later cut back CRA layer was restored with solid Inconel wire using Hot Wire-Pulsed Gas tungsten arc welding machine. By this process better control on heat input, %Fe dilution, & good weld finish was achieved. Also, it was beneficial on commercial aspects with respect to welding full joint with 100% solid Inconel wire.

Keywords: *Productivity, Automation, Quality, Cost*

Project Objective/Aim: *Improving Productivity with Quality and Cost Control by using Automation*

2. Introduction

The Structure of Multi Million Projects is designed to produce million barrels of Oil which ignites lives of Human-beings. The Design, Manufacturing and Installation of these structures is the biggest challenge and requires remarkable team efforts. L&T MFF is one of the leading players in South East Asia for manufacturing of offshore modules. Welding is the core manufacturing process used in fabrication of these offshore structures.

To cut down on the overall project fabrication cost, some of the welding variables can be optimized. The aim is not only to minimize the overall cost but also to enhance the overall final product quality. Welding variables are tactically maneuvered to Increase process efficiency, optimizing cycle time and thereby reducing overall cost without compromising with final product quality. For any given application, some processes are more economical than others. This paper presents some of the initiatives taken by L&T Modular Fabrication Facility for improving productivity, managing time & control of welding costs.

3. Challenges:

a. High weld metal deposition due to high thickness (up-to 104 mm)
b. Client requirements and selection of

welding process

I. Getting required weld chemistry at 3 mm overlay height
II. Welder training and qualification for automated process
III. Restriction of welding process due to joint geometry

c. PQR Qualification

High weld metal deposition

For international project (Client: Saudi Aramco), in CS cladded with Inconel 625 spools fabrication there was high thickness varying from48.34mm to 104.45 mm. Due to this high thickness, high amount of weld deposition was required. With existing WPS and welding process, welding shall be done with solid Inconel wire only. Nickle based solid Inconel wire is costlier than CS and was affecting overall cost of project. Brain storming exercise was necessary to reduce welding consumable cost with faster weld metal deposition. Joint Thickness and Diameter wise detailed exercise was carried out for total scope as per below:

Client requirements and selection of welding process

For corrosion resistance overlay welding, client has specific and stringent requirements to be followed like;

I. If there is access for welding from the ID side, it is acceptable to cut back the CRA layer and carry out girth welding using a carbon steel electrode. CRA layer can subsequently be deposited by automatic weld overlay. Automatic welding is mandatory for the overlay.
II. Weld overlay shall be carried out using automatic GTAW / GMAW / SAW process only.
III. Welding heads shall be equipped with automatic voltage control (AVC). The direction of weld overlay deposit shall be circumferential irrespective of the diameter of the component.
IV. Overlay thickness shall be 3.0 mm minimum and a minimum of two layers shall be applied.
V. For PQR - Chemical analysis shall be carried out at a height of 2.0 mm from the base metal. The chemistry shall be within the range specified in ASME SEC II Part C or AWS classification. In the case of alloy N06625, the iron content shall not exceed 10%.
VI. PQR shall be qualified with same make and model of actual job welding to be done.

Selection of overlay welding process was needed to be in-lined with these requirements.

Why hot wire GTAW-Pulsed ID overlay?

Choosing the right welding process and welding technique is the key to achieve required weld chemistry and sound weld metal in Inconel 625 weld overlay.

For Inconel 625 weld overlay, good appearance and sound and high weld deposition will only be achieved if welding process falls into the category of “Hot” such as SAW, GTAW, Plasma transfer arc, etc,. On the other hand, with any “Hot” process high dilution comes as a normal factor.

An ideal balance to be found for lowest possible dilution with optimum deposition for better weld chemistry, and process efficiency. One of the most successful candidates in achieving those variables is Hot wire GTAW-Pulsed. Although the hot wire GTAW-Pulsed process, commonly known as hot wire TIG-Pulsed, was introduced in 1966, its development and application have been slow to take hold. However, recently there has been considerable renewed interest in the process which initially promised “MIG speed with TIG quality.” While there are some limitations, the hot wire gas tungsten arc welding process has found increasing use over a wide range of groove welding, buildup and cladding operations. The development of automated and specialized hot wire equipment has driven application of the process in industries including nuclear, power generation, pressure vessel and offshore oil which all require high productivity-high quality welds.

GTAW-Pulsed was only option, as It was not possible to get required chemistry at 2.0 mm height with GTAW process without pulsing. With a proper welding technique and control over welding parameters, hot wire GTAW-Pulsed will show following advantages.

- Optimum deposition with lower dilution
- Near zero weld defects in overlay
- Perfect weld finish
- Less consumable wastage due to automated process
- Very good weld chemistry with consistency
- Equipment flexibility for welding of small bore pipe and fittings
- Low cost of labor

Due to these all benefits, Hot wire ID overlay is the suitable process for this type of applications.

Setting welding parameters for ID overlay station

After finalizing welding process for weld overlay, next challenges were setting welding parameters suitable to meet stringent client requirements, and training welding operator for ‘4-axial autowelder machine’. Welding operator was needed to train for programming of power source and ‘4-axial autowelder machine’. Welding Complexity of programming and feeding multiple data in power source as well as programming of ‘4-axial autowelder machine’ was making welder training difficult.

Key requirements for setting welding parameters:

- Weld chemistry of Inconel 625 at 2.0 mm overlay height with iron content less than 10%
- Lowest possible dilution with base material
- Max acceptable overlay height - 4.0 mm, with minimum of 2 layers
- Heat input control with optimum pulsing
- Zero repair as manual repair was not allowed
- Best possible weld finish as weld visual was not possible from inside due to less diameter.

After commencing multiple trials, following parameters were established and PQR was qualified meeting above requirements.

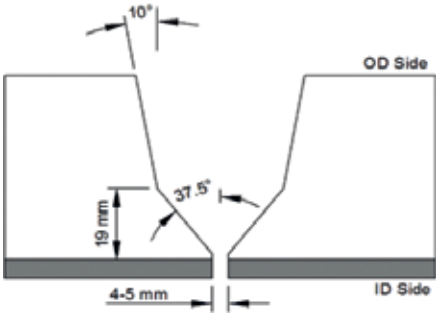
- Peak current – 190 A
- Base current – 140 A
- Hot wire current & Voltage – 40 A and 5 V
- Wire feed rate – 1000 mm/min to 1200 mm/min
- Voltage - 12 V to 16 V for Barrier layer, 13 V to 17 V for subsequent layers
- Travel speed – 190 mm / min for Barrier layer, 210 mm / min for subsequent layers
- Job rotational direction – Clockwise
- Torch direction – Reverse
- Bead Overlap - 40% for first layer, 60% for second layer
- Circumferential Step back Size - 3.5 mm every 360 Deg. rotation
- Start Mode - High frequency mode (HF mode)
- AVC start - 0 sec
- Gas pre-purge - 3 sec
- At start Initial current - 50% of main current
- Current up time - 3 sec
- At start wire feed delay - 2 sec
- At start rotation delay - 3 sec
- At stop wire feed delay - 2 sec
- At stop current down time - 5 sec
- Current at stop - 50% of main current
- Gas post purge - 5 sec

4. JOB EXECUTION

After successful completion of PQR and satisfactory testing results, it was time to execute the same on job. PQR qualification, Welding operator qualification is not enough to assure meet client requirements. Key sequencing, proper methodology and quality checks need to ensure quality during production welding. After Brain storming and past project learning following sequencing and quality check prepared and same was approved from client.

ID OVERLAY WELDING MACHINE SETUP

Step 1: Visual and dimensional inspection was carried out of CRA cladded pipe, CRA cladded Transition piece and CRA cladded Flange. After completion of inspection compound beveling as per fig 1 prepared on Inconel 625 clad pipe and fitting.



Typical Weld Edge Preparation Compound Bevel by Machining.

Step 2: CRA cladded pipe, CRA cladded Transition piece and CRA cladded Flange, which are to be welded shall be machined from ID side, to remove CRA layer up to 15 mm to 25 mm length from the edge.

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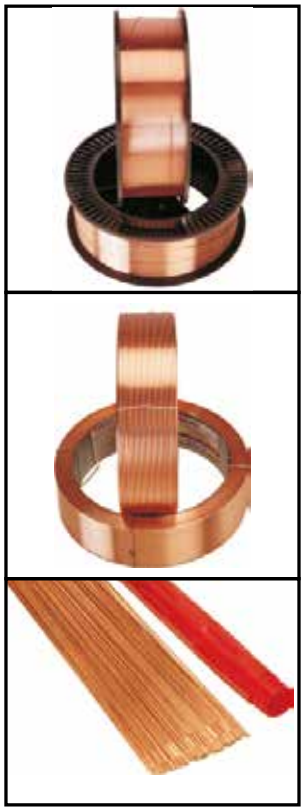

Mfrs. & Exporters :

Co2 Mig Welding Wires

Grade : AWS 5.18 ER 70S6, 90SG

Sizes : 0.60, 0.80, 1.00, 1.20 & 1.60 mm

Submerged Arc Welding Wires

Grades : EL8, EM 12K, EH 14, EH 10K, Ea2, Ea3

Sizes : 1.60, 2.00, 2.50, 3.15, 4.00 & 5.00 mm

Tig Welding Wires

Grades : AWS ER 70S2, ER 70S6, ER 70SG

Sizes : 1.60, 2.00, 2.40, 3.15, 4.00 mm

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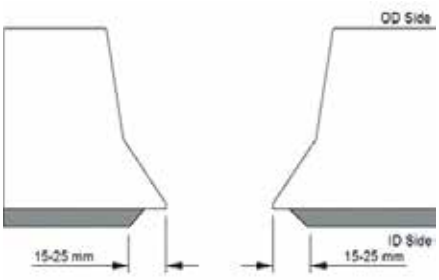
Technical Assistance from ***Technova, SRL, Milano, Italy.***

STRONG WELDING with BETTER FINISHING



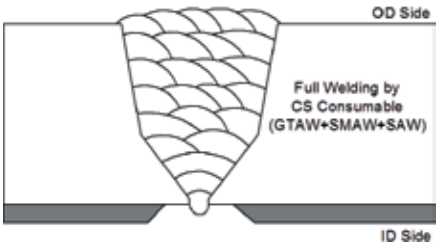
Removal of Clad from ID side 15-25 mm from weld-edge

Step 3: CRA layer shall be removed completely and shall be verified by using Copper sulphate (CuS04) for identifying presence of ferrous material on existing Inconel Clad/Overlay.

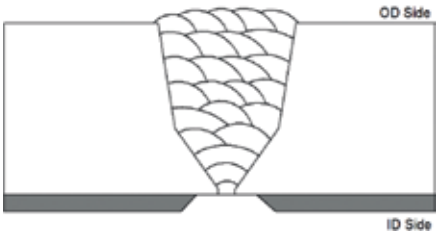
Step 4: It shall be ensured that removal of CRA layer shall be more than 3 mm, by using universal gauge or bridge cam gauge or any suitable method.

Step 5: After completion of above stage, Joint to be fit-up shall be done by bridge tack using carbon steel welding consumables.

Step 6: Girth welding shall be carried out using a carbon steel welding consumable.



Fit-up & Full Groove Welding by CS Welding Consumable.



Flushing-off Root Penetration, Weld Visual, NDE-Radiography & PWHT

Butt Welding with GTAW ER80SNi1 + SAW F8P8-ENi5 as per Applicable Approved WPS

Step 7: After completion of welding, Root penetration shall be ground off and surface shall be smooth grinding.

Step 8: Perform Visual Inspection and then perform Volumetric NDE (Radiography Test).

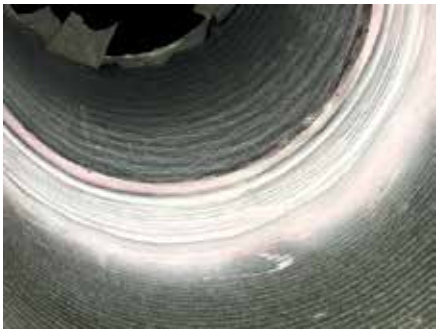
Step 9: Weld repair of carbon steel welding can also be done as per Applicable Approved WPS.

Step 10: Perform PWHT as per approved PWHT procedure

EXECUTION OF ID OVERLAY BY HOT WIRE GTAW PROCESS.

Step 11: Weld Overlay (Clad Restoration) on ID of girth weld with ERNiCrMo-3 as per Approved WPS.

Step 12: Thickness of restored overlay shall be equal to the surface of existing overlay. Final restoration layer shall have smooth transition with existing CRA layer.



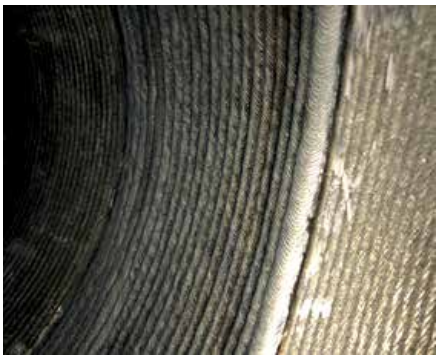
ZERO INDICATION IN DPT – 100% RIGHT FIRST TIME ACCEPTANCE.

Step 13: Automatic GTAW-Pulsed Overlay welding shall be executed by International Client approved welding operator / welder.

Step 14: Perform Visual Inspection & NDE (PT) on Weld Overlay (Clad Restoration).

Step 15: If any repair activity after completion of CRA restoration, shall be done by Approved WPS and followed by NDE (PT).

Step 16: Final Radiographic testing shall be carried out after completion of the weld overlay.



Step 17: Other stages shall be as per approved ITP

ID overlay finished products photographs

5. Cost comparison and cost saving

Due to typical joint and spool geometry, ID overlay by automatic process was not possible from inside. Joints were identified out of available scope, where ID overlay by hot wire GTAW-Pulsed from inside was possible. Average cost for single joint is given below for cost comparison;
Total welding cost for welding with solid Inconel – X

Total welding cost with Hot wire ID overlay – 0.34X

Cost saving for welding consumable – 66%

As we can see in following figure, instead of full joint welding with solid Inconel, very less amount of Inconel welding was required, and rest joint can be welded with Carbon Steel welding consumable.

6. Synopsis

For Turn-key projects in Oil and Gas industry, cost and time is a key factor for project success. To survive in this competitive market and for business sustainability demands, new process developments with latest technology is very much required. Effort is made in this study for development of new process, with overall benefit of cost control and reduction in spool cycle time without compromising quality. With this complete exercise, new overlay technique was added in production line.

- A 100% Sound weld metal and weld chemistry can be achieved with automated overlay welding process.
- ID overlay is economically obvious choice rather than welding full joint with solid Inconel for substantial savings regardless of the size of the project.
- With new Specialized weld overlaying equipment's, it is possible to overcome stringent customer requirements with improved quality.
- Overall spool cycle time can be reduced with help of replacing traditional method with automatic and digital technology.

This is the first step towards success and goes a long way towards closing the gap in productivity and quality with upcoming projects. This study will be encouraging to take more initiatives and will play an important role for each organization, wants to take steps towards overall cost reduction of project.

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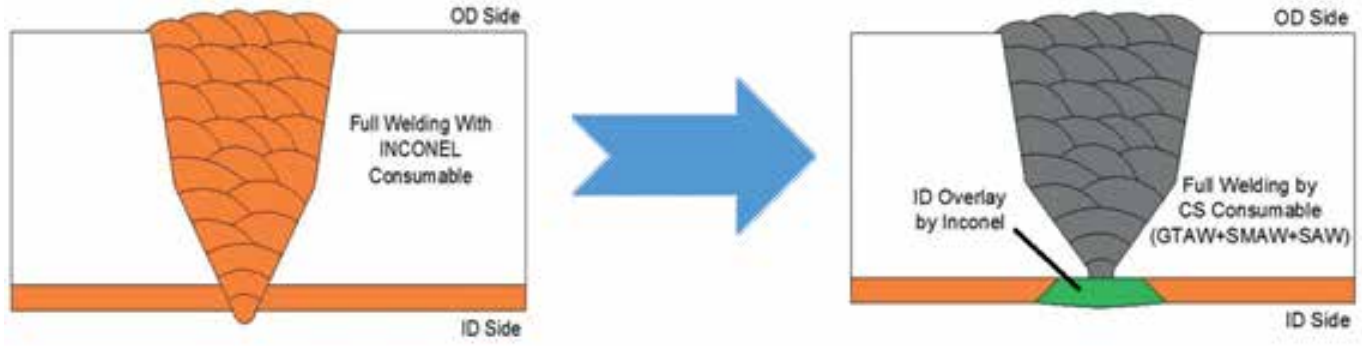

Flange Fitting Station simplifies production & improves safety

www.pemamek.com

PEMA Flange Fitting Station enables fast, safe and accurate fitting and welding of flanges to the wind tower and tower foundation sections. Compared to the traditional way where shells must be flipped to horizontal fitting table for flange fitting and then flipped back to the original position for welding, Pemamek's new innovation allows fit-up process without this complicated crane operation, which results in savings in time and increased safety.

Features

- Solutions for onshore, offshore and offshore foundations
- Wide adjustment area for flange diameters
- Both L- and T-type of flanges
- Hydraulic movements for flange fit-up
- No turning of the shell, cranes can be released to other tasks.

Increase in safety and decrease in damages

PEMA Flange Fitting Station is an ideal solution for both onshore and offshore tower production. Continuously growing size of wind turbines requires larger diameters and heavier weights in flanges and tower sections, which makes handling of these components with overhead crane more challenging and requires special skills and tools from the crane operator.

With PEMA FF Station, flange fitting is possible without turning the shell, and cranes can be released to other tasks. Also, the amount of repairing is minimized as there is no need for lifting clamps.

"It is amazing how many different flange designs there is currently on the market. Pemamek has worked together with both onshore and offshore customers to make PEMA FF Station

flexible for all different variations.

Our FF Station can handle tubular and conical shells, it has a wide range for different diameters and lengths of the shells and changeable tools to help adjusting the fit-up tool for different L- and T-type flanges", explains Teemu Tolonen, Pemamek's Application Manager of Wind Energy.

"Pemamek is also further developing the station with measuring tools, helping operators to perform perfect fittings."

Efficient PEMA Flange Fitting station

Save time

The work cycle shortens radically. For example, in offshore structures work cycle shortens from 8hrs to 2hrs.

100% Increased safety

Chance of injuries is minimized, no cranes needed for turning the work piece.

Improved quality

The leveling tolerance of the flange will be reached without additional machining.

Top quality with PEMA Flange Fitting Station

With PEMA FF station, the production time for flange fitting and welding is reduced while the quality of fit-up only increases. The station can be integrated with PEMA Column & Boom, which enables welding to be done in the same place. The integration significantly increases the easiness and efficiency of manufacturing, and its been proven successful also in offshore wind tower foundation production.

"This new innovative process was firstly tested in Offshore transition-piece flange fitting where our client was able to reduce the fitting time down to 2 hours, keeping the flatness in required tolerance without milling operation", Tolonen mentions.

One of the companies that has invested in PEMA Flange Fitting Station is a Brazilian company TEN, Torres Eólicas do Nordeste. TEN specializes in the manufacturing of metal towers for wind power production.

"Pemamek's solution for handling flange fitting helped us to achieve significant reduction in the process times and with this, our return on investment will be fast", **Mr. Carlos Konopatzki, General Director of TEN** explains and continues:

"With FF Station, we are able to simplify our production and optimize the use of floor space. The need for overhead cranes is minimized and moreover, the safety of the overall process improves – benefit that we cannot put a price on."

"This new innovative process was firstly tested in Offshore transition-piece flange fitting where our client was able to reduce the fitting time down to 2 hours, keeping the flatness in required tolerance without milling operation." – **Teemu Tolonen, Pemamek.**

"Jindal Stainless is co-ordinating with various stakeholders to improve the current fabrication machinery."

Vijay Sharma, Director, Jindal Stainless

Q1. Jindal Stainless is among the leading players in stainless steel segment. How has the journey been so far?

Part of the US $25 billion OP Jindal Group, Jindal Stainless is the pioneer of stainless steel manufacturing in India. With an annual turnover of US $3.2 billion, Jindal Stainless has a melt production capacity of 1.9 mn tonnes. The Company has two stainless steel manufacturing complexes in India, in the states of Haryana and Odisha, with overseas units in Indonesia and Spain. It has a country-wide network of 10 sales offices, 6 service centres, and 14 offices across the world. Jindal Stainless' share in the organized Indian stainless steel market is ~60%.

Jindal Stainless was established to make India self-reliant for meeting its stainless steel demand. It was Shri O P Jindal's vision and his pioneering spirit that led to the establishment of the Hisar plant, India's first stainless steel manufacturing unit, in 1970. As the Company celebrates its golden jubilee year, it looks back at a legacy of 'making in India' while adapting, innovating, and delivering stainless excellence. The Company also endeavors to educate and empower the domestic stainless steel industry with hands-on trainings, aiding in market development, and technical assistance.

Q2. What is your say on the current stainless steel market in India? Is it at par with the international market?

Currently, the Indian stainless steel market is a hotspot. According to the Indian Stainless Steel Development Association's (ISSDA) latest report, the national stainless steel melt production in CY19 was 3.92 mn tonnes. Amidst growing protectionist trade sentiment across the globe, India continues to be the world's second largest stainless steel producer and consumer after China (29.4 mn tonnes; as per ISSF). Stainless steel demand has been growing to the tune of 8-9% CAGR in India over the last couple of years, in contrast to a global CAGR of about 5%. This growth rate in India is directly proportional (around 1.5 times) to the GDP growth. The per capita consumption of stainless steel in India is ~2.5 kg, compared to the world average of ~6 kg. This confirms an immense untapped potential of stainless steel consumption in India.

A wide range of mandatory standards and certifications for stainless steel products has been formulated by BIS (Bureau of Indian Standards). All product standards have been benchmarked with international standards like ASTM and JIS. This ensures supply of high quality Indian stainless steel in the domestic as well as international markets. Jindal Stainless has also been supplying to quality-conscious markets like Germany, US, France, <to be added>. Jindal Stainless is one the few companies in the world to supply stainless steel for the world renowned International Thermonuclear Experiment Reactor (ITER) project. Along with this, the Company has been a supplier to nuclear power projects undertaken by Bhabha Atomic Research Centre and Indira Gandhi Centre for Atomic Research.

However, the COVID-19 pandemic has posed a severe knee-jerk. It has severally disrupted the supply chain and we expect nearly 15-20% downfall in the overall production scenario of the country.

Q3. According to you, how would be the market scenario after COVID–19 situation?

From the demand perspective, revival is expected only after the flattening of the pandemic curve. However, in a globalised world, external impact of COVID-19 will also play a critical role in determining the health of the manufacturing sector in India. We have observed that in other stainless steel producing countries like China, Japan, and South Korea, the pandemic spread is known to have been arrested as only few fresh cases are being reported. It is expected that a recovery for the manufacturing facilities in these countries would start soon. It is also estimated that these countries will enhance their production and export to markets like India at an opportune time.

On the other hand, manufacturing in countries like Indonesia and Taiwan is continuing and even they would be eyeing the Indian market as the restrictions are eased. We are expecting a glut of imports at a time when the domestic industry would be struggling to cope with the COVID-19 aftermath. We feel that given the large and lucrative Indian market, these countries will resort to aggressive dumping. For an industry with high import intensity (over 20% of the stainless steel flat product market), this could aggravate unemployment in the sector.

The industry's fear was confirmed after China announced an increase in the steel export rebate from 10% to 13% in March 2020. It is anticipated that our export market may be captured by the Chinese, unless the government provides requisite export incentives.

Q4. What has been the impact of lockdown on the company?

Both our facilities were shut since the nationwide lockdown was announced by the government and there has been no production during this period. However, plants were partially operational from 4th May to complete the pending orders after government's advisory was released. Initially, we will be processing goods which are currently in the semi-finished stage. These will be further processed as per the delivery schedule. However, with the third phase of lockdown in motion, we expect a further delay in getting back to normalcy. Subsequently, as different markets gain momentum, operations will be reinstated accordingly.

Q5. What about the demand and supply scenario?

Before delving into demand-supply analysis, it is necessary to understand that stainless steel is a highly specialized product as compared to other alternatives. It is, therefore, more value-driven than volume-driven. However, global stainless steel demand and supply is strained under the current pandemic situation.

Demand

The major sources of stainless steel demand in India are as follows:

- Kitchen goods and white goods, the primary drivers of stainless steel consumption in India, amounting to nearly 40% of its demand
- Architecture, Building, and Construction (ABC) segment
- Automobiles, Railway and Transport (ART) segment
- Process industry and white goods

Apart from this, Indian Railways drives a fair share of the national stainless steel demand; railway wagons and coaches, along with rail infrastructure like foot-

over-bridges, station modernization, and dedicated freight corridors. Recently, Railways has targeted to produce all new coaches and wagons in stainless steel. Over the next 5-6 years, this production is expected to increase multifold. Additionally, metro projects in India continue to use stainless steel extensively in various applications. Jindal Stainless holds a 70% and 60% share in the railway wagon and coach market, respectively.

Supply

India's total stainless steel production stood at 3.7 MT in 2018 and 3.9 MT in 2019, as per ISSF. With investments worth thousands of crores for capacity expansion and modernization, the Indian domestic industry is equipped to meet the overall growing demand for stainless steel. It is capable of producing all major series of stainless steel including the 200, 300 and 400 series, as well as duplex and specialized stainless steel products which are used in a wide range of applications. However, only ~60% of the installed capacity is currently operational in the country.

Q6. The company had recently set up a dedicated facility for railways in Chennai. Please elaborate. How will it serve the industry and what is your revenue expectation?

The Company, through its subsidiary, JSL Lifestyle Ltd, commissioned its first dedicated facility for Indian Railways in February last year. This facility has been supplying high quality stainless steel components with 'just-in-time' delivery to the Integral Coach Factory (ICF), Chennai for production of railway coaches. It is equipped with state-of-the-art robotic spot welding guns which complete the welding task faster, resulting in timely delivery of stainless steel components with minimum distortions.

The Company is expecting initial revenue of nearly Rs 100 crore annually from this facility. Revenue is expected to touch nearly Rs 300 crore annually once the enhanced capacity reaches 7200 tonnes. The facility's operations are managed by highly skilled workers with expertise in railway fabrication.

Q7. Jindal Stainless has inked partnership with public sector unit Braithwaite & Co Limited (BCL) to develop stainless steel foot-over and road-over bridges. Please elaborate on your further plans?

Jindal Stainless signed a Memorandum of Understanding (MoU) with Braithwaite & Co Limited (BCL), a Government of India undertaking under the Ministry of Railways, to develop stainless steel foot-over-bridges (FOBs), road-over-bridges (ROBs) etc. The move marked Company's advent in structural infrastructure applications.

This MoU intends to fulfill Railways' vision of world-class railway infrastructure in the country by synergizing the expertise of Jindal Stainless as India's largest stainless steel producer, and Indian Railways' trusted fabrication expert, BCL. The Railways is currently in the process of modernization on a massive scale. Jindal Stainless will be supplying stainless steel to BCL for developing FOBs on railway platforms, ROBs on municipal roads, smart city skywalks, road bridges, and rail bridges.

Q8. Jindal Stainless Limited (JSL) has completed level-2 process automation for its Argon Oxygen Decarburization (AOD) converter at its Jajpur plant in Odisha. How has the automation process helped the company achieve improvement in productivity?

The automation process has helped the Company achieve ~10% improvement in productivity with the help of real-time carbon and temperature analysis during production at its Jajpur facility, while improving the overall refining operations. Level-2 process automation allows both, advanced calculations and online simulation of processes. This helps in significantly trimming errors, improving process accuracy, and the quality of stainless steel produced. The upgrade is also expected to help collate a valuable knowledge database for use in future optimisations and new developments.

Q9. Could you brief us on the type of infrastructure projects that JSL is currently working upon? What are your future plans?

Jindal Stainless is actively supporting the Indian Railways in developing modern infrastructure. This includes train coaches and wagons, foot-over-bridges (FOBs), road-over-bridges (ROBs), toilets, benches, etc. This has not only helped the Railways achieve an infrastructure with an improved life-cycle, but has also upped the game for its aesthetics. As the industry pioneer and a regular supplier to the Indian Railways, Jindal Stainless is one of the key stainless steel producers for such projects and will be expected to supply nearly 80% of the requirement to BCL.

The pan-India metro projects have also played an important role in achieving this growth in the per capita consumption of stainless steel. From coaches to seats and from escalators to vending machines, stainless steel has helped the Indian metro projects develop as one of the best in the world.

Apart from this, stainless steel tanks are picking up in the market and replacing the hazardous plastic tanks

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that lead to several health hazards. Moreover, the metal doesn't shy away from lending its spectacular beauty to modular kitchens.

By being the architect of several such applications imperative to the new age customer, stainless steel is set to achieve an even higher per capita consumption rate in the coming years. The recently announced National Infrastructure Pipeline (NIP) scheme by the government is expected to bring about promising opportunities for stainless steel applications.

Q10. Welding / fabrication sector plays a major role into the success completion of any projects. Your say.

With the onset of rapid urbanization, construction is now diversified. Smart cities, modern applications, and customized requirements have revolutionized the sector. As a modern metal, stainless steel delivers promising results with its peculiar properties like high resistance to corrosion, increased strength, impressive strength-to-weight ratio, low life cycle cost, low maintenance requirement, etc. However, crafting new-age solutions in stainless steel, calls for well-trained fabricators who can understand customers' requirements and deliver in minimal time.

Stainless steel welding required precision as compared to other metals. Since, stainless steel is not painted, welding defects, if any, are difficult to remove during the finishing stage. At Jindal Stainless, we have been supporting several initiatives across the country to educate, train and upskill fabricators. We have been imparting training skills to both existing and new fabricators to develop an ecosystem of solution-based products in the market. With a push for infrastructure, more skilled force will be required. Also, more fabricators adopting stainless steel has led to an increase in the demand of upgraded welding equipments. Jindal Stainless is coordinating with various stakeholders to improve the current fabrication machinery.

Q11. What are you efforts towards the skill development of fabricators?

Jindal Stainless emphasizes on providing hands-on training to stainless steel fabricators across the nation though its monthly fabrication training programmes and workshops. These programmes educate root-level fabricators about the features and applications of stainless steel and empower them to earn a livelihood through this. As of today, more than 100 awareness programmes have been conducted by the Company, imparting training to more than 10,000 fabricators across India. Apart from that, the Company has developed 3 stainless steel display vans to showcase the applications of stainless steel in various sectors and to provide a benchmark reference to the fabricators. Jindal Stainless' skill development programmes have been endorsed by the Ministry of Steel, Government of India and National Skill Development Corporation (NSDC). The Company continues to support the Indian government's programmes like Skill India in order to enable youth to gain employment.

Q12. What are the major challenges that the Stainless Steel industry in India faces? What can be the ways to overcome? Any expectations from government?

As the second largest consumer of stainless steel, India is threatened by a glut of imports from FTA (Free Trade Agreement) nations such as Japan, Korea, and ASEAN countries. Given the zero duty on imports of all stainless steel flat products in India from ASEAN countries, these imports have been rising dramatically, causing a huge trade deficit for India. Moreover, imposition of trade remedial measures like Anti-Dumping Duty (ADD) and Countervailing Duty (CVD) on import of these products from China has led to trade diversion, thereby being virtually ineffective. Further, imports from Indonesia have recently grown drastically, primarily due to trade diversion of Chinese-origin goods and growing Chinese investments in Indonesia. Indonesian imports have increased by ~3.5 times; from around 76,000 tonnes in FY18-19 to more than 2,50,000 tonnes in FY19-20.

Overall, the FTAs have had a negative impact on the entire value chain of the Indian stainless steel industry. Thus it makes it a perfect case for the government to review all existing FTAs and take appropriate actions immediately and to provide stimulus to manufacturing in India.

Moreover, an existing 2.5% import duty on key raw materials like stainless steel scrap, steel scrap, and Ferro-Nickel, renders the domestic industry non-competitive. In order to make Indian goods more competitive, the government must abolish this import duty on raw materials as they constitute nearly 50% of the cost of production and are domestically not available.

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Hytek introduces Weld Cleaning Machines from Bymat, Germany

Since 1995, Bymat GmbH has been known as the leading German manufacturer of cleaning & embossing machines for electrochemical cleaning, polishing and embossing of stainless steels on an environmentally friendly basis.

Utilising the latest technology, Hytek offers its customer cost-effective, fast and effective ways of weld cleaning. The high-quality weld cleaning equipment quickly removes oxides created during the welding process, restoring the original material colour in an environment friendly manner. It also re-passivates the welds.

Using this electrochemical surface treatment, the use of toxic pickling pastes can be either reduced or completely replaced. In addition, it is now possible to clean and polish using the company's high-performance brush.

Dark and Light marking of all conductive metal surfaces is another optional function of Hytek's cleaning and embossing machines which many of its customers utilise; further increasing productivity and quality of the finished product. Due to the different model ranges (Baseline, Classic Line and Premium Line) there is a model to suit every user demands.

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Website: www.hytekmarketing.biz
E-mail: hytek@hytekmarketing.biz

Hytek offers Fume & Dust Extractions Systems from Klimawent, Poland

Klimawent continually invests in high-tech infrastructure, advanced technologies as well as development of qualification of Hytek engineers. Especially, important is development of the company. Innovative implementations are based upon the results of Research and Development Lab, that contribute to larger success. Mission is to provide high quality clean air in the rooms, premises within areas where people stay.

Hytek is conscious that the quality of air near areas, where people exist, has a significant influence on health. Therefore, it delivers filtration devices that increase the purity of air within the rooms. Crucial is the cleanness of the air we breathe in the everyday routine. Therefore, the company's mission is to create devices possessing an array of features distinguishing them in comparison with the competitive companies.

Hytek products provide performances like efficiency, silent work, environment friendly, energetically efficient, attractive in design.

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TAKING WELDING INVERTER TECHNOLOGY TO THE NEXT LEVEL

AMPCOLOY® Mylar as a Resting / Clamping Block on welding fixtures

Overview:

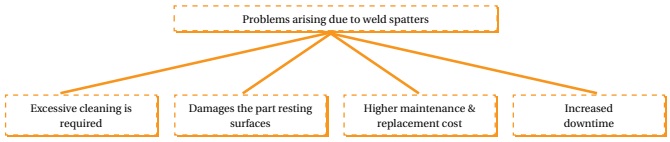
Purpose of this case study is to analyse the weld spatter resistance properties of **AMPCOLOY® Mylar** along with our objective of "cleaning to no-cleaning" process during MIG/MAG welding.

Also to address following points:

- Increasing Overall Equipment Efficiency
- Cost saving by using resting / clamping blocks made of **AMPCOLOY® Mylar** on welding fixture
- Increase in productivity per day by using resting / clamping blocks made of **AMPCOLOY® Mylar**

Weld Spatters:

The biggest enemy in any welding environment. It creates problem like messy welding area, damages the body resting units & adds the fixture downtime. The maintenance teams have to go for additional coating on the units or spatter protection sprays.



Trials:

Trials were conducted for tier 1 supplier of 2 Wheeler manufacturer OEM in comparison with AMPCOLOY® Mylar Block against existing Mild Steel blackodised resting / clamping block.

First, we identified the pain area of the operator where heavy spatter deposition occurs on the welding fixture and huge time & rigorous cleaning activities are required. We submitted **AMPCOLOY®** Mylar at an identified location in the fixture.

Existing resting / clamping block on Fixture.

Machined AMPCOLOY® Mylar

Technical parameters of the welding station on which trials were conducted:

- Welding Station: Robotic MIG welding
- Cycle Time per Job: 3 Minutes
- 120 Jobs per shift
- Welding Wire:
  - o Wire Dia. – 1.2 mm
  - o Wire Material – Er70C-6M
- Welding Parameters:
  - o 260 Ampere
  - o 25 Volt

Findings:

Ordinary MS resting / clamping block After 120 jobs & 160 m welding.

AMPCOLOY® Mylar After 720 jobs & 958 m welding

AMPCOLOY® Mylar After 4320 jobs & 5745 m

Resting block made in MS, heat treated & blackodised

- No resistance to weld spatters
- Mylar gets damaged if placed near to the welding area
- Additional heat treatment & coating is required
- Anti-spatter gel or spray needs to be applied at regular intervals
- Heavy chiseling is required to clean
- High downtime for cleaning / maintenance purpose
- Very low life of the mylar
- Creates problem for resting, clamping & assembly of the component

Mylar made in AMPCOLOY® Mylar

- Very high resistance to weld spatters
- Can be placed very near to the welding area
- No need of additional heat treatment or coating
- No need of anti-spatter gel or spray
- Very easy to clean

- Zero downtime for cleaning & maintenance purpose
- High life of the mylar
- Perfect resting, clamping & assembly of the component due to undamaged mylar

Incase of Existing MS resting / clamping block:

- Cleaning is done after every 3-4 jobs, cleaning time approx 2 Mins.
- One over all cleaning after end of the shift, 10-15 mins rigorous cleaning by chiseling, hammering etc.

Advantages of AMPCOLOY® Mylar as a Resting Block:

- Very high resistance to weld spatters
- Can be placed very near to the welding area
- No need of additional heat treatment or coating
- No need of anti-spatter gel or spray
- Very easy to clean
- Zero downtime for cleaning & maintenance purpose
- High life of the mylar
- Perfect resting, clamping & assembly of the component due to undamaged mylar

Conclusions:

AMPCOLOY® Nozcap –Nozzle that don't catch spatter

A breakthrogh in weld spatter buildup prevention,the AMPCOLOY® Nozcap ,that keeepss weld nozzles free from spatter buildup,while greating extending consumable life. No coating ,no sparying,no gel,with no additional tratment & cleaning equipments –Nothing at all.

Benefits of AMPCOLOY® Nozcap

- Less cleaning time means more welding time.
- Upto 95 % reduction in cleaning activities.
- Upto 99% reduction in cleaning time
- Upto 40% increase in productivity.
- Improves shielding gas flow and weld quality
- Increase effciency of your equipment.

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Website: www.ampcometal.com
E-mail: infoindia@ampcoemtal.com

Observations:

Serial (For 8 hours shift)	No. of Jobs done	No. of cleaning operations		Total Time for cleaning	
		AMPCOLOY® Mylar	Existing MS (Blackodised) Resting Block	AMPCOLOY® Mylar (In Seconds)	Existing MS (Blackodised) Resting Block (In Seconds)
Day 1 / 1st Shift	120	0	30	0	3600 + 600
Day 1 / 2nd Shift	120	0	30	0	3600 + 600
Day 2 / 1st Shift	120	0	30	0	3600 + 600
Day 2 / 2nd Shift	120	0	30	0	3600 + 600
Day 3 / 1st Shift	120	0	30	0	3600 + 600
Day 3 / 2nd Shift	120	0	30	0	3600 + 600
Total	720	0	180	0	25200 (420 Minutes)
Per shift Time saved with AMPCOLOY® Mylar				70 Minutes Approx.	
No. of additional jobs can be done per shift (Cycle time 3 minutes) with AMPCOLOY® Mylar				23 Jobs Approx.	

EWM Taurus Steel saves electricity and costs

With welding machines from the Taurus Steel series, EWM AG customers are already meeting the requirements of the EU Ecodesign Directive. These MIG/MAG welding machines by EWM, Germany's leading manufacturer of arc welding technology and one of the world's leaders in technology, have been designed for working with steel. Thanks to state-of-the-art inverter technology, the machines are resource-efficient and, true to EWM quality, extremely durable and powerful, saving companies real money. This makes welding machines from the Taurus Steel series a veritable alternative to step switch-controlled machines.

Comparison calculations show that through the low power consumption alone, companies using an EWM Taurus Steel machine save more than 3000 kWh per year in comparison to a step switch-controlled welding machine. That translates to almost two tonnes less CO2 and, with an electricity price of 20 cents per kWh, around 600 euros worth of cost savings a year – and that's just one, single machine. For steel and metal-working industries and shipyards, as well as for steel construction companies, there is huge potential for savings with initial procurement costs being paid off in no time.

Thanks to their large power reserves and renowned EWM quality, machines in the Taurus Steel series are suitable for continuous use in three-shift operation. It's not for nothing that the premium welding machine manufacturer offers a three-year guarantee on machines and a five-year guarantee on transformers and chokes, all without a limitation on operating hours.

Fig. 1: The welding machines in the Taurus Steel series from EWM are equipped with state-of-the-art inverter technology and are extremely durable and powerful thanks to the EWM quality.

The machine controls are easy to operate and the welding task can be quickly set up with 100% reproducibility. EWM now offers the Taurus Steel in three power variants. In addition to the Taurus Steel 400 A and 500 A models, EWM now also offers the brand-new Taurus Steel 355 with 350 A output. All three products have an incredible duty cycle. The 350 and 500 variants boast a duty cycle of 60% at maximum current, while the 400 variant offers a 100% duty cycle for easy welding with full penetration. This is all down to state-of-the-art EWM inverter technology that saves electricity while significantly reducing the weight.

The Taurus Steel Synergic is an inverter welding machine with a synergic control concept and optimised characteristics for steel. Thanks to the synergic function, parameters adapt automatically to the specified settings. The inverter-pulse welding machine, the Taurus Steel puls, also offers an additional, convenient pulse function. This ensures less weld spatter, reducing the need for finishing work. Last but not least, the Taurus Basic S is an inverter welding machine with non-synergic twin-knob operation, perfect for the more traditional welders out there.

With their modular system and associated wire feeders, the Taurus Steel machines are incredibly flexible and – depending on the assembly of intermediate hose packages and welding torches – also have a large working radius. The EWM welding machines are robust and perfect for use in demanding work environments. This makes all three variants perfect alternatives to the step switch-

Fig. 2: With welding machines from the Taurus Steel series, EWM AG customers are already meeting the requirements of the EU Ecodesign Directive. These MIG/MAG welding machines by EWM have been designed for working with steel.

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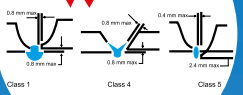

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Fig. 3: Comparison calculations show that through the low power consumption alone, companies using an EWM Taurus Steel machine save more than 3000 kWh per year in comparison to a step switch-controlled welding machine.

controlled welding machines still widely used throughout Germany. Their power sources are significantly lighter than machines with transformers and they are easy to transport thanks to their modular casing. The water block is also quick and easy to dismantle, making the Taurus Steel easy to transport in a car boot, for example.

With EWM already meeting the requirements of the new EU Ecodesign Directive, by purchasing one of each machine, EWM customers are also ready for the future. From 1 January 2021, the Directive will ensure that consumers can more easily repair large electrical equipment. From 2023, welding machines in open circuit and during the welding process must not use more than 50 kWh each. The aim is to save 167 terawatt hours (TWh) of energy per year by 2030 – as much as is currently consumed by the entire country of Denmark in one year.

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HYTEK introduces World Class Welding Curtains from CEPRO, Netherlands. Cepro welding curtains are made of PVC. Welding curtains are designed for use in workplaces where bystanders must be protected against the hazardous radiation emitted during welding work. They provide protection against dangerous Blue Light and Ultra Violet (UV) rays. In case of prolonged exposure these rays can cause actinic conjunctivitis and even cataracts.

The curtains also protect the welder against the reflection of the welding light.Cepro produces welding curtains in four colors.

Cepro products offer protection. They prevent actinic conjunctivitis, cataract, burnt skin, create a safe environment for bystanders and considerably reduce medical costs.

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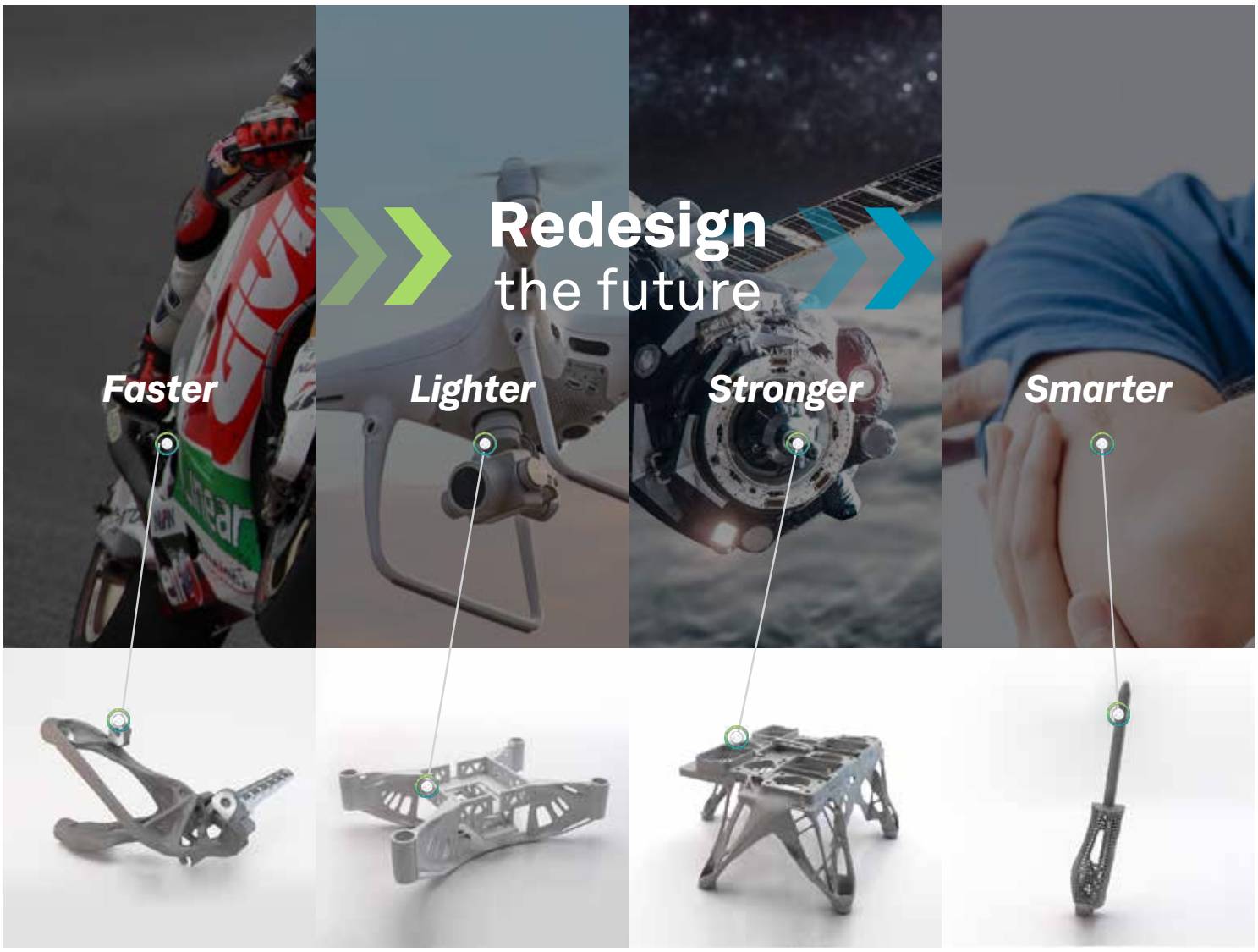

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Need of Welding Process Validation and Welder Skill Tests

Satish Keskar,
DME, DBM, MMS, IIW-IWT, AWS-CWI, ISO 3834, Lead Auditor

As we know that welding processes are widely used in variety of industrial sectors such as Boiler & Pressure Vessels, Steel Structure & Metal Buildings, Machine Building, Automotive Sector, Bridge Fabrication etc. The major Welding Processes involved are :

- SMAW - Shielded Metal Arc Welding
- GMAW - Gas Metal Arc Welding
- FCAW - Flux Core Arc Welding
- GTAW - Gas Tungsten Arc Welding
- SAW - Submerged Arc Welding
- RW - Resistance Welding

Welding processes are having with variables like current, voltage, travel speed, position, welding electrode, material to be welded etc. The quality of welding has great effect of these variables, therefore it is essential to have proper control on these variables in the beginning to avoid rework / rejection.

Secondly, special processes (e.g. welding / painting) needs to be validated because the resulting output cannot be verified by subsequent monitoring and measurement and as a consequence, the deficiencies become apparent only after the product is in use or the service has been delivered. Ref. : ISO 9001 : 2015 clause 8.5.1(f)

Steps of Welding Process Validation:

- To prepare Preliminary Welding Procedure Specification (pWPS) in which all variables are listed and provide guidelines on how to weld
- To prepare Test Piece and get it welded from a welder in accordance Preliminary Welding Procedure Specification (pWPS)
- To carry out Non-destructive (NDT) and/or Destructive (DT) Tests by referring related code / standard / specification
- Review results of Non-destructive (NDT) and/or Destructive (DT) Tests referring related code / standard / specification
- When results of Non-destructive (NDT) and/or Destructive (DT) Tests are found satisfactory, the welding process is deemed as validated
- Prepare and maintain the documentation involved in Validation i.e. WPS & PQR

Tests involved in Welding Process Validation :

Non-destructive (NDT) Tests generally applicable ----->

- Visual Test (VT) ---- Visual appearance and size of welds to be determined
- Ultrasonic Test (UT) ---- Soundness of the welding to be determined
- or Radiography Test (RT) ---- Soundness of the welding to be determined
- Liquid Penetration Test (LPT) --- To verify surface discontinuities if any
- Magnetic Particle Test --- To verify surface discontinuities if any

Destructive (DT) Tests generally applicable ------>

- Tensile Test ---- To verify the yield and ultimate tensile strength of welding is matching with the parent metals being welded

- Guided Bend Test ---- To verify that welding is having required ductility from Which the soundness of welding is being ascertained

- Hardness Test ---- To verify resistant to indentation in HAZ and the weld Zone

- Impact Test ---- To verify the amount of energy absorbed by the weld zone during the fracture

Steps of Welding Skill Test / Welder Performance Qualification (WPQ) :

- To refer validated Welding Procedure Specification (WPS) in which all variables are listed and which provide guidelines on how to weld
- To prepare Test Piece and get it welded from the welder in accordance validated Welding Procedure Specification (WPS)
- To carry out Non-destructive (NDT) and/or Destructive (DT) Tests by referring related code / standard / specification
- Review results of Non-destructive (NDT) and/or Destructive (DT) Tests referring related code / standard / specification
- When results of Non-destructive (NDT) and/or Destructive (DT) Tests are found satisfactory, the welder is deemed as having required skill and certified.
- Prepare and maintain the documentation involved in Welder Skill Test i.e. WPQ

Tests involved in Welder Skill Test :

Non-destructive (NDT) Tests generally applicable ----->

- Visual Test (VT) ---- Visual appearance and size of welds to be determined
- Ultrasonic Test (UT) ---- Soundness of the welding to be determined OR
- Radiography Test (RT) ---- Soundness of the welding to be determined

OR

Destructive (DT) Tests generally applicable ------>

- Guided Bend Test ---- To verify that welding is having required ductility from Which the soundness of welding is being ascertained
- Macro Test ---- To verify the quality of welding particularly root and side wall fusion

- Fillet Break Test ---- To ensure the fusion to the root and the start and the stop done in the middle of the weld.

Typical Reference Codes/Standards for Welding Process Validation & Welder Skill Test

- Boiler & Pressure Vessel Industry - Indian Boiler Regulations / ASME Section IX
- Steel Structure and Metal Building - AWS D 1.1
- Sheet metal fabrication - AWS D 1.3
- Automotive Industry- AWS D 8.1, AWS D 8.6 to AWS D 8.9 as applicable.
- Bridge Welding Code - AWS D 1.5

Variety of ISO standards are also available and referred widely as a part of ISO 3834, EN 15085 and EN 1090 etc. certification programs.

Summery :

- The training to welders i.e. theoretical & practical inputs should be treated as an investment and not expenses.
- The documentation of welding processes validation are documentary evidences and can be produced to Clients/ Third party inspection agencies / Certification body.
- Welder skill tests is similar to driving license provided to welders for welding certain jobs. Therefore, frequent NDT tests are being carried out on finished welds in the product.

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D&H Secheron :
A1 stop shop for all welders

Introduction

D&H Sécheron, incepted in 1966, is today among the leading welding manufacturers in India. The company is an ISO 9001-2015 certified company that offers a comprehensive range of welding solutions in the form of consumables, equipment, training, and fabrication. There are over 800 products that are exclusively 'Made in India', with facilities in Indore. All the products are tested at inhouse NABL accredited lab, and thereafter distributed globally.

The company products range from E7018 (Supratherme) to electrodes of import quality, and some are so unique that they do not have a national or international code. D&H Secheron's products have created a mark in fulfilling its customers demand.

About D&H Sécheron

D&H Secheron, was a Swiss collaboration to develop high-quality welding consumables 'In India For India'. In 1994, the Swiss company was taken over by an Indian Entrepreneur – Mr. A.H Maheshwari. With this, D&H Secheron has achieved new heights of success. Today, the company leads the welding consumables market in terms of innovation to satisfy every requirement of the customer. The products range from Rail joining (Lotherme 457 IVR) to nuclear reactor vessel welding (BATOX-D(NP)). Utmost importance to the delivery of quality products, is what the company has always focused upon, and has received the ISO 9001,14001 and18001 certifications.

Introducing products that can meet the ever-evolving dynamics of the market is no easy task, but D&H Secheron accomplishes this with relative ease under the technical brilliance of Dr. TJ Prasada Rao and his team of more than 22 experts. Dr. TJ Prasada Rao, Executive Director Technical, leads product development and technical services for D&H Secheron. His team develops innovative products at a rapid pace and can meet new customer requirements in a matter of weeks, like he has accomplished in the past for customers like NTPC, BHEL and other major conglomerates.

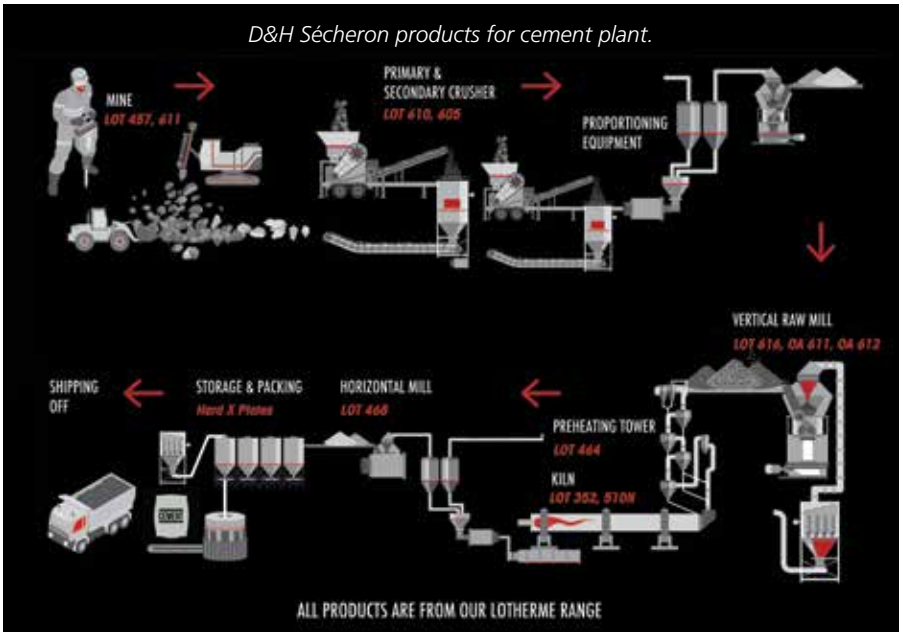
Through Dr. Rao, D&H Secheron can offer extensive technical assistance to its huge client base with technical seminars, on site visits, regular technical insights on how to weld using special products and more.

Cement

The D&H Secheron's Lotherme range of products are utilized to repair many cement plant components. The company has more than 50 different products in its Lotherme range, each one carefully crafted to meet the client's requirement. Products like Lotherme 464, 457 IVR, 605, 610, and 616 leads the special range and cover everything from crusher rotor hard facing to rail joining.

Take a look at the illustration of a cement plant and company products for each application.

Lotherme's 605 and 610, the double defense, are both for hard facing activities with 605 specializing in crusher-rotor and 610 in impactor arm. 605 stands tall amongst their peers due to 57 Rockwell Scale hardness obtained which can fight heavy abrasion with ease and double layer deposition without the need for a base layer. 610 is unique due to its ability to take heavy impact and rapidly hardens to twice its hardness which helps prolonging component life to 12 months. They are called the double defense due to their compatibility and synergy. As the top 605 layer wears out, the 610 layer is ready to



D&H Sécheron products for cement plant.

face wear and tear allowing the machinery to work for longer with fewer breakdowns.

Products like Lothereme 616, 464 and 457 IVR provide cover on multiple fronts. 616 for coal mill VRM buttoning jobs is a 1 stop option for making fresh buttons on sinter cast vertical roller mill tyres while 464 is ideal to join SS or other steels with high strength, good elongation and toughness and the ability to withstand oxidation till 1100 Deg Celsius. This makes Lothereme 464 ideal to withstand service conditions encountered by anchors at work. Lotherme 457 IVR offers excellent resistance to rolling and sliding, while the deposit itself has great hardening properties when used.

Oil & Gas

Mumbai High, India's first offshore oil rig was setup by the Oil and Natural Gas Corporation of India (ONGC) in 1974. Today, ONGC has grown exponentially to produce 70% of India's crude oil and 84% of India's natural gas, thanks to the consistent quality of consumables provided by D&H Secheron. Along with ONGC, national player like The Indian Oil Corporation (IOCL) and international player like the Dangote Group (Rs 28,000 Crore Industrial Conglomerate in Africa) uses D&H Secheron's wide array of Oil & Gas related special electrodes. Products like D&H 2594(NS), Autotherme Grade E, Maxflux SAF 8(LS), F80S-Ni2 and the famous Supratherme (Mod) continues to showcase its innovation in this segment.

D&H Secheron's world famous E7018, Supratherme, has been altered and refocused as Supratherme(Mod) for sour gas applications for the likes of ONGC, IOCL and GSPL amongst others. This product stands out due to its toughness, crack resistance on the weld metal and its low hydrogen need.

D&H 2594(NS)is known for its strength, impact energy and resistance to stress for super duplex stainless steels. This product is regularly used by companies like ONGC and Anugraha Valve. Autotherme Grade E and Maxflux SAF 8(LS), a wire and flux combination for sour gas application produces excellent toughness and crack resistance. It is well appreciated by Dangote Group. F 80S-Ni2 is a unique product due to its ability to withstand low temperate, while maintaining its strength and toughness in a temperature of -60 degree Celsius. This product is typically used in liquified propane and butane transportation by ONGC.

Fabrication

The National Thermal Power Company generates 25% of India's electricity on the back of D&H Secheron's product innovation that consistently allows them to keep plants running at 80% capacity compared to the national average of 65%. Larsen & Toubro Hydrocarbons can consistently deliver top notch projects with the help of D&H Secheron's wide array of fabrication products. Bharat Heavy Electricals (BHEL) continues to deliver innovative and high-quality products joined with D&H Secheron's wide range of Nickel specials. The specials for Nickel based fabrication like D&H 1400(Mod), 1212(NS), 1223(NS), Autotherme 1223 and 1225, FW 1223 and 1225; adds to a successful completion of any projects of BHEL, L&T and NTPC.

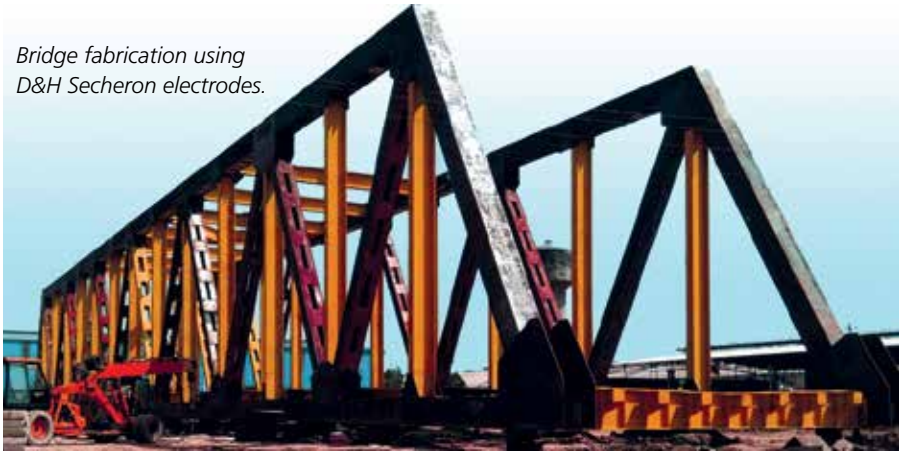
D&H 1400(Mod) is known for its heat resistance and toughness at 1000 degrees Celsius and is great for weld metals with low carbon which is the driving force for its extensive use by BHEL. D&H 1212 (NS) is for cryogenic service to weld clad side joints, again favored by BHEL.

For surfacing of alloy steel where temperature range from cryogenic to 540 degrees Celsius, D&H Secheron offers 1223 (NS) for SMAW applications, Autotherme 1223 for GMAW applications, and FW 1223 for GTAW applications. Where optimum strength and oxidation is required with temperature from 820 degrees to 1150 degrees; Autotherme 1225 and FW 1225 are on offer. All five products are used by ISGEC Heavy Engineering and L&T Hydrocarbons for their casting and fabrication.

Steel and Ancillaries

The massive infrastructure like the Rajiv Gandhi Sea Link, the Sardar Vallabh Patel stadium or the Bogibeel bridge; stand tall, built on steel and concrete and welded together by D&H Secheron's electrodes, the Autotherme class. Autotherme is famed for its reliability in working with steel and its ancillary industries like ship building, industrial products, power equipment and so on.

Autotherme 90S-D2 is capable of high strength and is used for pipeline



Bridge fabrication using D&H Secheron electrodes.

Pipe repair using D&H Sécheron electrodes.

manufacturing and earth moving equipment where high tensile strength is needed. Today, the ships made in the Cochin shipyard sail the seven seas because of this. For similar and dissimilar steels, Autotherme 309L, 310 and 312 electrodes offer unparalleled quality in terms of oxidation resistance, crack resistance and fissure resistance. These products are used across the board by Companies like Godrej Boyce and Larsen & Toubro. The Autotherme class of electrodes extends further from Autotherme 318 to 430 and further for similar steels, with each product focused on resistance to corrosion, but used in different areas due to mechanical properties.

Power

The lights in your home, the device on which you read this, is all powered by electricity generated by NTPC through BHEL and L&T turbines. But what makes those turbines run so effectively – Cromotherme. D&H Secheron was the first to develop an alloy steel electrode, Cromotherme in 1988, for fabrication and maintenance of power plants. Today,the company has overlapped from version 1 to several subvariants like 91, 92, RTE and so on. Take a look at the illustration of a power plant and company products for each application.

D&H Secheron started this journey with Crometherme-1(RTE) used in reactors and power plants all over the country famous for its ability to resist temper embrittlement and improve subzero impact properties best for welding hydrocarbons between 400 to 600 degrees Celsius. The company evolved to the more efficient Cromotherme-2 (RTE) that redefined resistance and impact properties, taking them to new heights. Subvariants like Cromotherme-23 were developed which were ideal for boiler material like P23 steel. The next subvariant was Cromotherme-20(Mo) for casting with excellent elevated temperature properties. The most recent developments have been Cromotherme 91 and 92, ideal for creep resistant P91 and P92. This is a non-synthetic electrode that provides improved creep strength, toughness, oxidation, and corrosion resistance at elevated temperatures.

All in all, its been a long journey for Cromotherme, but today it stands out as a world class product made in India by an Indian company.

Conclusion

D&H Secheron continues to define welding innovation by developing new products at an unprecedented rate. From made to order products to import quality products to every product on the AWS classification, D&H Secheron has them all. To go along with the unparalleled product range and quality, there is an immense technical understanding and support of a qualified team of professionals who have spent decades in the field and have innumerable technical qualifications.

For More Info:
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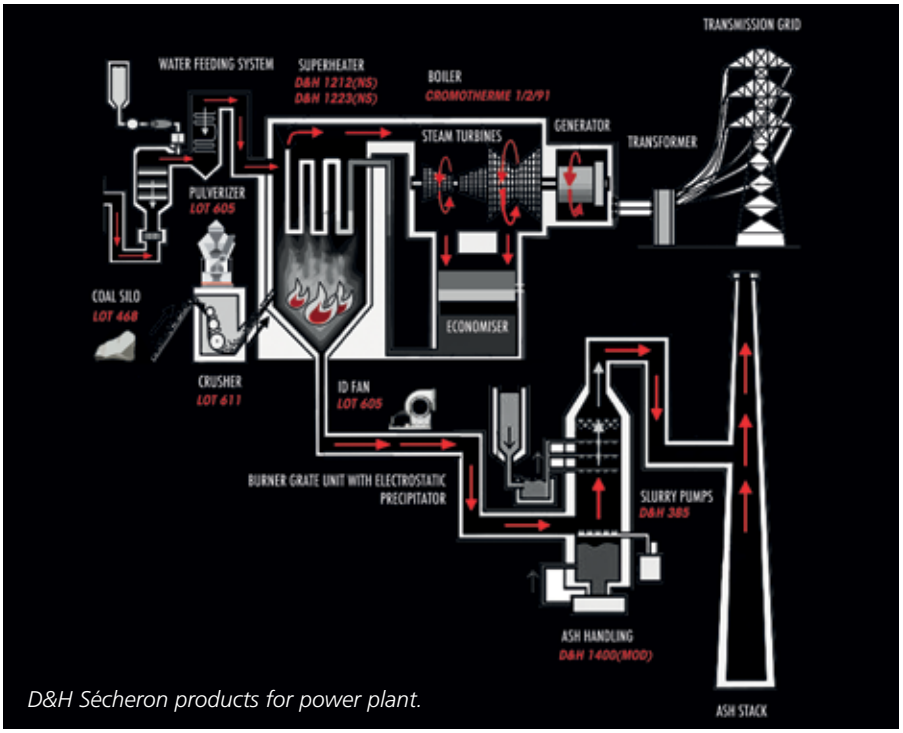
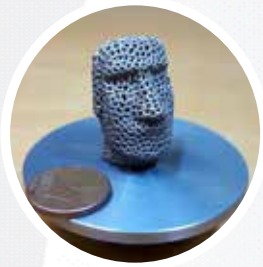
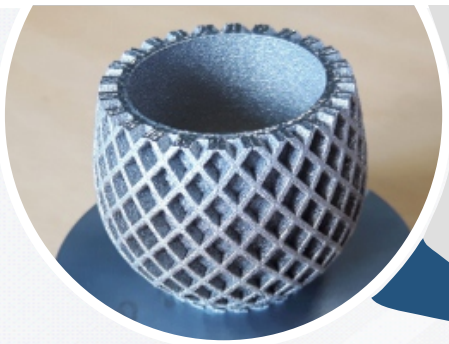
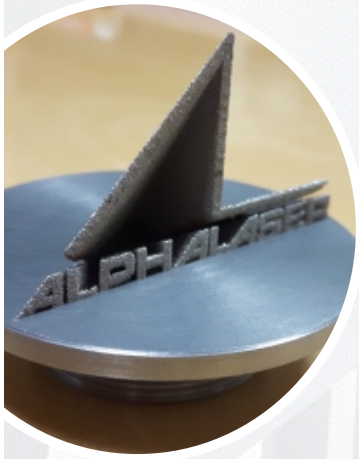
www.dnhsecheron.com



D&H Sécheron products for power plant.







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NATIONAL

EVENT	DATE	LOCATION
Inawelding 2020	26 – 28 August, 2020	Jakarta, Indonesia
Cwe | Imex Expo 2020 – International Exhibition Cutting, Welding Equipment, Machine Tools & Allied Products	27- 29 August, 2020	Pragati Maidan, New Delhi
Worldbuild India	27 – 29 August, 2020	Bombay Exhibition Centre, Mumbai
Laser World Of Photonics India 2020	23 - 25 September, 2020	Bangalore
9th Edition Of India Essen Welding & Cutting	23 - 25 November, 2020	Bombay Exhibition Centre, Mumbai
Engi expo	19 - 21 December, 2020	GMDC Ground, Ahmedabad
Imtex	21 - 27 January, 2021	Biec, Bengaluru

INTERNATIONAL

EVENT	DATE	LOCATION
Indonesia International Welding Equipment and Cutting Material & Services Exhibition	26 - 28 August, 2020	Jiexpo Kemayoran Gate Jakarta, Indonesia
CWE-Cutting & Welding Equipment Expo	27 - 29 August, 2020	Pragati Maidan, New Delhi, India
AmericanHort Plug & Cutting Conference	04 - 06 September, 2019	Embassy Suites by Hilton Charlotte Concord Golf Resort & Spa, Concord, USA
International Conference on Scientific and Technical Advances on Friction stir Welding & Processing	11 - 13 September, 2019	Catholic University of Louvain, Ottignies-Louvain-la-Neuve, Belgium
Metalworking & CNC Machine Tool Show	15 - 19 September 2020	National Convention & Exhibition Center, Shanghai, China

Engineering Metallurgy Metalworking	16 - 18 September, 2020	Exhibition Centre "Udmurtia", Izhevsk, Russia
Trade fair for Joining, Cutting, Surfacing, Testing and Protecting	25 - 26 September, 2020	Design Center Linz Betriebsgesellschaft M.B.H., Linz, Austria
International Trade Fair for Welding (Welding Fair Brno)	05 - 09 October, 2020	Brno, Czech Republic
SAFE WELDINGexpo Safe Welding and Fire Protection Zone	13 - 15 October, 2020	Expo Silesia, Sosnowiec, Poland
ExpoWELDING: International Welding Fair	13 - 15 October, 2020	Sosnowiec, Poland
Weldex	13 - 16 October, 2020	Sokolniki Exhibition and Convention Centre, Moscow, Russia
Aluminium Welding Competence Development Conference	17 October, 2019	Sokolniki Exhibition and Convention Centre, Moscow, Russia
International Sheet Metal Working Technology Exhibition	27 - 30 October, 2020	Deutsche Messe AG, Hanover, Germany
International Exhibition Svarka/welding	11 - 13 November, 2020	Expoforum, Saint Petersburg, Russia
International Industrial Forum	24 - 27 November, 2020	International Exhibitional Center, Kiev, Ukraine
International Exhibition on Metalworking & Welding Technology Vietnam	09 - 12 December, 2020	Saigon Exhibition & Convention Center (SECC), Ho Chi Minh, Vietnam

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Sandeep Kumar,
Welding Specialist, Reliability Support Section, Reliability Engineering Department, Bahrain Petroleum Company B.S.C., Awali, Kingdom of Bahrain

"In fabrication sectors, role of welding engineer is very crucial starting from design to final delivery."

Q1. What made you choose welding as a career?

Choosing a right path for a professional life is a matter of interest in teen age, although its keep changing as we attain towards maturity, depending on surrounding effects created by media/ personnel's/ neighborhood. I want to join IndianArmy till my engineering diploma study. Infact, I hold NCC C certificate with B grade.

Although, with my changed interest in welding and metallurgy, I moved to fabrication industries. I got inspired with the veterans welding engineer's profiles on LinkedIn back in 2009. This helped me to decide my short terms goals such as gaining professional certifications such as AWS-CWI, IWT, IWE, IWIP-C, ASNT Level III and long terms targets e.g. gaining bachelor's in engineering (AMIIW) and getting a master's degree from worldwide recognized university (I did my MSc. in Welding Engineering from Cranfield University, UK) and

continuation learning. Currently, I have enrolled for PhD. Study at Cranfield University which is a challenging and interesting part of my current life.

Q2. How much of total experience do you have?

I got my first job during the college campus with ISGEC Yamuna Nagar. And it was a good start to gain the practical insight of welding processes, inspection & supervision. And later I worked for Siemens India, which was a turning point in my life in terms of best learning and working environment.

As on today, I am having 14 Years plus experience in different sectors such as Heavy engineering (e.g. pressure vessels, columns, heat exchangers, steel plant jobs), rolling stock fabrication, oil & gas fabrication sector, Third party inspection and Oil & gas downstream sector. I have hands on experience as welding trainer. I have worked with welding & materials related codes & standards of ASME, API, ASTM, AISI, NACE, AWS, ISO, EN, DIN, BS and ASNT.

Q2. Since you hold a vast experience in the welding segment, what is your say on the current welding market scenario? Is it on par with the international markets?

If we talk specifically about India and Indian welding segments, I believe we are on par to international level. We work with American (ASME, API, NACE, AWS, AISI, ASTM, ASNT), International (ISO), German (DIN) or other internationally recognized codes and standards in India. We have vast manufacturing technology transfer and local manufacturing of world known MNC's. We have in India, all major welding training and certifications institutes with presence of their local bodies such as ASME, ASM, ASNT, IIW etc. to name a few. We are fabricating as on today, small & simple fabrication structural, heavy engineering to complicated nuclear components construction, hydro power, naval carriers, sub-marines, rockets, fighter planes etc. We have indigenous welding consumables for almost all the metallurgies including advance and complex metallurgies for different welding processes.

Indian institute of welding with the cooperation with international institute of welding and American welding society is doing great job by providing international level training and certification in this area already.

Q3. What according to you is required to boost the welding industry in India?

I feel, we are on right path with our current government initiative (Make in India, startups) to boost the local manufacturing, easiness in setting up new business for oversea corporations. With the government plans to build new infrastructures in India, hopefully this will boost more the local manufacturing in welding segment.

There is a demand in each sector for the Indian economy growth e.g. structural fabrication to heavy engineering, vehicle manufacturing, railway (Metro and high speed trains), defense aviation, hydro, solar & nuclear power generation. In all these industries welding plays crucial part. Commercial aviation manufacturing is one core area, where India should work more as we are expecting a huge rise in domestic flyers and need of commercial aircrafts. This is having huge potential for indigenous manufacturing.

Q4. What are your expectations from the government for the upliftment of the welding segment?

Government of India should bring quality education with mandatory internship for students engaged in welding engineering study at all levels. It's ideal to have industrial exposure along with theoretical curriculum for bright engineers. There are ample initiatives by the government already, and the aspiring students must exploit all available opportunities to the fullest.

Q5. What type of projects have you worked upon?

A professional life working in different sectors gives me unique prospects to work on various projects. In fabrication sectors, role of welding engineer is very crucial starting from design to final delivery. I have worked on heavy fabrications, company certifications such as EN15085 CL1, ISO 3834-2, EN1090-1, 2 & 3 (Related to welding activities & quality control in welding), welders training program developments, Cross country pipeline for crude oil supply, major T & I in refinery.in my carrier I have faced many challenging tasks involving welding of exotic metallurgies such as austenitic, duplex, ferritic and martensitic stainless steels, aluminum, copper and nickel alloys, low alloy steels and high carbon steels.

Q6. Could you brief us on your recent project? What is it all about and your role into the same?

The recent project involves the welding of special chemistry alloy used in hydrogen reformer. We have recently qualified welding procedures to weld aged castaustenitic material for elevated temperature. The materialhas a unique chemistry with the presence of niobium and titanium along with high chromium

and nickel. Due to service exposed aged metallurgy, with the presence of intergranulary carbides of form M (C, N) where M is niobium and titanium types making the material to lose its ductility. This make the welding notoriously difficult with the high propensity for cracking in the heat affected zone.

The welding procedure was successfully qualified meeting the required properties & implemented for the use.

Q7. Tell me about the most challenging engineering project that you have been involved with during the past year.

My current job is challenging as well as gives me opportunities for new learning and applying my expertise. The major challenge arises with the welding repairs of service exposed materials.some of cases which we had encountered and handled successfully were related (Exposed to elevated temperature service) to high carbon austenitic stainless steel, Inconel and HP modified alloys. In such scenarios, theoretical data is not available and hence we have to understand and test the materials for the current conditions to suit the welding, mainly required weldability tests and metallography tests.

Q8. Talk about your field responsibilities in your current organization?

I am working as Welding Specialist under the support section for the Reliability Engineering Department in Bahrain Petroleum Company. My responsibilities include but not limited by providing the welding engineering & welding metallurgical related services to the Bapco, prepare, periodical reviews and updating the welding documents (e.g. WPS, PQR, procedures, work instructions), providing the support as and when required in the plant as well as on the contractor's sites to mitigate welding issues, provide necessary supervision for critical jobs & welding repairs. Perform the welding related failure analysis and devise the preventive methodology. On training side, I provide welding training to new joined trainees.

Q9. What checks and balances do you use to make sure that you don't make mistakes?

I try to make sure to review the activities to avoid the common human errors. I follow Osool's Bapco 'Involve the right people in decisions that affect people, procedures, or equipment' and 'If in doubt, find out'. This is an important point that teach us a lot when making a decision. Most important part is lesson learnt. In our department, people are always encouraged to share the lesson learnt from past failures to make future success.

Q10. What is your say on safety at work?

I work with one of the best employer in the world. Here, first thing you get to know about the 'Safety first'. Bahrain Petroleum Company put great emphasis on the safety of its employees, contractors and the society. The company has achieved a target of 20 Million safe man hours in its history. Safety is given the utmost importance from superintendent, managers and the management level.

I always follow and request others to ensure personal and team safety first. As in Bapco Osool's, ''Do it safely or not at all'' & ''There is always time to do it right''. These two rules are perfect example by the Bapco as a responsible employer.

Q11. What new engineering specialty skills have you developed during the past year?

Learning is enduring, and we learn new things daily. I am involved in the welding sector from long duration. With new experiences & understanding in the industries, I acquired new skills in metallurgy especially the stainless steel and nickel alloys along with carbon & low alloy steels. Apart from welding, I hold ASNT Level III in penetrant and magnetic particle testing with good knowledge of other NDT methods.

The guidance of my superior who is a Corrosion and Material expert inspire me to learn more into the corrosion engineering related to welding areas.

Q12. Have you contributed to any cost savings for your company? Elaborate if any.

Role of welding engineer is crucial in an association. I have done substantial saving by enhancing the productivity, lessening in cycle times, reduction in welding repairs, cost saving in welding consumables& accessories and & life increment of welding auxiliaries during my tenure with ex-employers. Recent work with my current employer, by developing the welding procedures of aged material to new material, contributed a cost saving of USD 0.3 million.

Q13. Where do you see yourself ten years from now?

I want to keep learning and relish the knowledge sharing among interested individuals. Currently, I see myself associated with the same employer. I wish to move to academic teachinglater, so I can contribute more to the society.

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WABAG signs contract Worth Rs. 278 cr with BUIDCO

WABAG signed a contract worth INR 278 crore with Bihar Urban Infrastructure Development Corporation Ltd (BUIDCO) for improvement of Water Supply System in Bhagalpur Municipal Corporation, Bihar, India.

As a reliable partner for building sustainable water infrastructure in the state of Bihar, WABAG is currently developing wastewater infrastructure (Sewage Treatment Plants, Sewage Pumping Stations, Sewerage Network and Household Service Connections) at various zones of Patna like Pahari, Karmalichak, Digha & Kankarbagh. On successful execution of the projects, WABAG will be responsible for managing the sewerage infrastructure in 4 out of the 6 zones of Patna and thus will ensure a cleaner and healthier ecosystem for the people of the city.

Commenting on this occasion, Mr Pankaj Sachdeva, CEO – India Cluster, said, "We are proud to be associated with the Govt. of Bihar for developing sustainable water and wastewater infrastructure. The project reflects WABAG's commitment to fulfilling Govt. of Bihar's vision of providing clean and safe drinking water and sanitation to every household of the state. Further, this project reinforces WABAG's reputation of winning and successfully executing multilateral funded jobs globally."

The scope includes Design, Build and Operation of 141 MLD Raw Water Intake works on River Ganga at Bhagalpur, a 90 MLD Water Treatment Plant with proprietary Plate Settler technology and 29 KM of Clear Water Rising Main. Post successful execution, WABAG will be operating and maintaining the plant for 10 years. The project is funded by Asian Development Bank.

Source: www.wabag.com

Weyburn City proceeds with $4.7 mn new fleet building

Weyburn city council approved the tender and plans for a $4.7 million new fleet building that will start construction in 2020, to replace the 100-year-old roundhouse building that currently houses the City's public works equipment.

Council approved the tender from Dura Construction of $3.61 million to construct the building, & with taxes, professional fees and a contingency fund, the total budget for the building is $4,747,425. Construction will begin in July to the west of the fire hall-public works building, with completion slated for March of 2021.

Source: www.weyburnreview.com

ViK Pernik water utility opens tenders for projects worth 39.3 mln euro

Source: www.seenews.com

Bulgarian water utility company ViK Pernik has launched two tenders for several EU-funded contracts for reconstruction of water infrastructure, worth an estimated total of 76.9 million levs ($44.2 million/39.3 million euro). The largest deal, worth 44.8 million levs, envisages the reconstruction of water supply and sewage infrastructure in the city of Pernik.

Two other deals, worth 9.1 million levs and 2.9 million levs, respectively, concern the reconstruction of water supply and sewage infrastructure in different parts of the town of Radomir, in the Pernik municipality. All projects benefit from EU funding under operational programme Environment 2014-2020.

The deadline for submitting offers for the first three contracts is August 3, while bids for the fourth deal can be submitted until August 5.

Tenders called to construct new carpark in Peninsula

Source: www.miragenews.com

Tenders are now being called for to deliver the second stage of a new car park providing up to 50 spaces for visitors to Shipstern Bluff, Tunnel Bay and Cape Raoul on the Tasman Peninsula.

The car park will add to a number of recent enhancements aimed at improving the visitor experience on the peninsula, including the redevelopment of the existing carpark, a new toilet block, track head infrastructure and track improvements to both the Shipstern Bluff and Cape Raoul walking tracks.

The Stormlea Road carpark redevelopment was funded through the Tasmanian Government's Three Capes Track funding and will be constructed later this year.

The new car park will complement other projects currently underway or in planning on the Tasman Peninsula including stair upgrades at nearby Remarkable Cave.

Tenders launched to construct water treatment plants in Maxico

Mexico could begin construction of almost 30 wastewater treatment plants in 2020, thanks to a federal program to improve water infrastructure and expand clean water distribution.

Tenders to construct the plants or carry out the projects' studies have been launched this year by state governments, government procurement site Compranet shows.

Nine tenders are still open for bids until June 25 but most are restricted to a few selected participants by invitation.

While estimated investment for the plants has not been revealed, the projects are likely to receive funds from the water, drainage and treatment program (PROAGUA) that water authority Conagua launched in January.

Source: www.bnamericas.com

Tenders continued for wind & solar projects, despite Covid

Source: economictimes.indiatimes.com

About 618 MW of utility scale solar tenders and 225 MW of wind-solar hybrid tenders were issued in June despite the Covid-19 outbreak, according to consultancy firm JMK Research and Analytics.

Tender activity is expected to continue in July as well. After a long hiatus, a 2000 MW wind tender is expected to be issued this month by the Solar Energy Corporation of India (SECI), the renewable energy ministry's nodal agency responsible for conducting auctions.

"With the current constraints on capital and the liquidity crunch developers are under, bidding will not be smooth. But interest will certainly be there," said Supreeth Srinivasa Rao, Associate Director, Industrial Practice, Frost & Sullivan.

Bid submission for SECI's 1200MW wind solar hybrid tender is also expected to take place this month, JMK's monthly report said.

Coal India to invest Rs 15,700 crore in conveyor belts for movement between mines and wagons

Source: www.economictimes.indiatimes.com

Coal India Ltd will invest Rs 15,700 crore in conveyor belts that will replace road movement between mines and wagons, the company said.

In the first phase, it will upgrade infrastructure at 35 mines, each with capacity of four million tonnes per annum (MTPA) or more at six subsidiaries of the company. This involved capital expenditure (capex) of about Rs 12,300 crore and total capacity of 406 MTPA.

Phase-2 includes 14 projects in which four subsidiaries will spend Rs 3,400 crore for total capacity of 100.5 MTPA.

Phase-1 is already underway with two projects of combined capacity of 26 MTPY made operational this year and seven projects of 91 MTPY under construction. Tenders were recently floated for eight projects of 76 MTPY capacity. Tenders for remaining 18 will be issued before September 30.

Delhi-Meerut RRTS project: Tender for 33km stretch awarded

The NCR Transport Corporation (NCRTC), which is developing the Delhi-Meerut Regional Rapid Transit System (RRTS) project, said on that modalities for taking up the civil construction work for another stretch of about 33km from Duhai in Ghaziabad to Shatabdipuram in Meerut have been finalised. The work for 17km priority stretch between Sahibabad and Duhai is already on, while the tender for another stretch of 33km has also been awarded. With the award of work, the work of RRTS will now spread to about 50km. The 17km stretch between Sahibabad and Duhai is scheduled to get complete by March 2023.

Source: www.hindustantimes.com

NHIDCL invites bids for Rs 125.01 cr road improvement projects

The National Highways & Infrastructure Development Corporation (NHIDCL) has invited bids for Rs 125.01 crore road improvement projects in Meghalaya, with completion period of 36 months..

The scope of work includes improvement of two lane with paved shoulder of NH-40 section from 81.740 km to 93.490 km (design 0.000 km to 10.670 km). The other improvement project is a four-lane section of NH-44 from design 0.000 km to 0.930 km, (total length - 11.600 km) in Meghalaya. The project is EPC basis under JICA Loan Assistance (Package-I).

REMCL plans to float tender for 1 GW Solar Projects

Source: www.mercomindia.com

The Railways Energy Management Company Ltd (REMCL), is planning to come up with a tender for the installation of 1 GW of solar projects along the railway tracks, the government said in a press statement.

The REMCL is a joint venture of the Indian Railways and RITES Ltd. REMCL has already floated tenders for 2 GW of solar projects on unutilized railways lands.

Only a few days ago, it announced a tender for setting up 1 GW solar projects along the railway tracks in various states. The site locations suggested by Railways are in the states of Assam, Haryana, Gujarat, Rajasthan, Maharashtra, Karnataka, Jharkhand, Telangana, Madhya Pradesh, Chhattisgarh, West Bengal, Bihar, and Delhi.

As of now, rooftop solar systems of nearly 100 MW of capacity have been installed at various stations and buildings of Indian Railways, according to the government.

ArcelorMittal to invest ₹20,000 crore on capacity expansion, infrastructure in Gujarat.

CFE launches tender for 25 MW geothermal plant at Mexico

The state power utility of Mexico, Federal Electricity Commission (CFE), has launched a tender for the design, construction, equipment and installation of a 25 MW geothermal power plant as part of the Los Humeros III Phase B development.

Starting in 2021, the expansion of the Chignautla geothermal plant, Puebla, in the area bordering Perote, Veracruz, is a part of the Expansion Plan 2019 of the initial Los Humeros geothermal plant that contemplates a total investment of USD 95.4 million.

The new project published on the governmental platform of Proyectos México contemplates the construction of the second phase of the plant, which is located in the Los Humeros geothermal field, in the municipality of Chignautla.

The call issued through the CFE's Management of Tenders and Contracts for Financed Investment Projects indicates as relevant dates January 28, 2021 as the limit for the receipt of proposals, while on February 25 of the same year they will be given to know the results of the failure.

Source: www.thinkgeoenergy.com

Union Cabinet approves Agriculture Infrastructure Fund

Source: www.jagranjosh.com

The Union Cabinet chaired by Prime Minister Narendra Modi on July 8, 2020 approved the new pan-India central sector scheme- Agriculture Infrastructure Fund. The scheme will provide a medium - long term debt financing facility for investment in eligible projects for post-harvest management Infrastructure and community farming assets.

Under the scheme, Rs 1 lakh crore will be provided by banks and financial institutions as loans to Self Help Group (SHG), Primary Agricultural Credit Societies (PACS), Farmers, Marketing Cooperative Societies, Farmer Producers Organizations (FPOs), Joint Liability Groups (JLG), Multipurpose Cooperative Societies, Agri-entrepreneurs, Startups, Aggregation Infrastructure Providers and Central/ State agency or Local Body sponsored Public-Private Partnership Project

The loans will be disbursed in a total of four years, starting with the sanction of Rs 10,000 crore in the current fiscal year, followed by Rs 30,000 crore each in the remaining three fiscal years.

McDermott wins contract from Azikel Refinery Project

McDermott International Ltd, has been awarded an engineering and procurement contract from Azikel Petroleum Ltd. for the modular 12,000 BPD Hydro-Skimming Refinery project. The facility will be located in Yenagoa, Bayelsa State within the Federal Republic of Nigeria.

The scope of the award includes the detailed engineering and design of the inside battery limits (ISBL) modular refinery. It also includes supply of equipment and all tagged items within the ISBL.

McDermott has been working with Azikel Petroleum Ltd. since 2018, most recently on an extended Front-End Engineering Design (FEED). This next phase of the award will utilize McDermott's extensive modularization experience and expertise. The design capitalizes on McDermott's world-class refining process engineering abilities.

Source: www.prnewswire.com

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ReNew Power wins India's first e-reverse auction for 400 MW

ReNew Power, India's renewable energy company was declared winner of India's first e-Reverse Auction for 400 MW RE (Renewable Energy) Project with round the clock supply. Renew Power won the bid on a first year tariff of 2.90/kWh with a 3% annual escalation for the first 15 years of the 25-year term of the Power Purchase Agreement (PPA). The bidding was conducted by Solar Energy Corporation of India (SECI) a Central PSU under Ministry of New and Renewable Energy (MNRE).

The power generated by the project will be supplied to New Delhi Municipal Corporation (NDMC), Daman and Diu & Dadra and Nagar Haveli. The tender conditions require the project to be commissioned within 24 months from the signing of PPA.

Speaking about the historic win, Sumant Sinha, Chairman and Managing Director, ReNew Power, said, "The tariff rate, the need for round the clock supply, 80% annual CUF and 100% power from renewable sources made this one of the most unique tenders of the Indian renewable energy sector. By winning this tender, ReNew has set a new benchmark for providing stable power through clean energy sources."

ReNew had also emerged as one of the winners in the world's largest renewable-cum-energy storage tender held by SECI earlier this year.

Source: www.jagranjosh.com

GE wins multiple orders worth Rs. 850.69 cr

GE Power India Limited (GEPIL) has been awarded three contracts for a combined value of Rs. 850.69 crore ($112.57M) to supply its best-in-class air quality control systems (AQCS) solutions to:

Hindalco Industries Ltd (1x150MW) for their Aditya Aluminium Plant Lapanga in Sambalpur, Odisha, which have committed to setting up the India's first ever Semi Dry FGD, a one of its kind system (NID) under the Make-in-India initiative to reduce the SO2 emission within permissible limits. The project is expected to be commissioned by 2021.

NTPC Ltd for their Feroze Gandhi Unchahar Thermal Power Project Stage-I, II & III (2x210MW + 2x210 MW + 1x210MW) in Rae Bareli, Uttar Pradesh. This is GE Steam Power's first Wet FGD order to install common absorber for a combination of multiple boiler units. This landmark order is expected to be completed by February 2023.

UP Rajya Vidyut Utpadan Nigam (UPRVUNL) will be setting up a combustion system modification of the boilers along with advanced firing system equipment to meet the NOx emission norms for their Harduaganj, Parichha and Anpara plants. The order is a first for combustion modification for NOx control by any state utility in India.

Prashant Jain, Managing Director of GE Power India Ltd said, "The commitment being shown by the Government of India to reduce the overall levels of SOx and NOx is very encouraging. GE is an industry leader in clean power generation with a broad and best-in-class portfolio of air quality control systems is proud to partner with customers who are working towards a cleaner tomorrow. The solutions from its AQCS portfolio will help to lower levels of SOx and NOx in emissions and will serve to improve the overall quality of air."

Source: www.ge.com

Samsung Heavy receives order to build three shuttle tankers

Samsung Heavy Industries disclosed in a regulatory filing that it had won a contract to build three Suezmax shuttle tankers with an Asian ship owner on February 28, equivalent to USD 300 million (KRW 361 billion). These ships will be delivered by July 2022.

In 1995, SHI became the first Korean shipbuilder to construct a shuttle tanker. It currently boasts the larget market share in the world of 45%, having clinched orders for 64 out of 143 shuttle tankers placed to date.

"In order to solidify our market dominance, we will help ship owners further reduce operating expenses for ships with new smart technologis and make use of eco-friendly solutions for keeping pace with stricter regulations," said an official of SHI.

Meanwhile, SHI set this year's order target at $ 8.4 billion, which is 18% up from $ 7.1 billion it achieved last year.

Source: www.samsungshi.com

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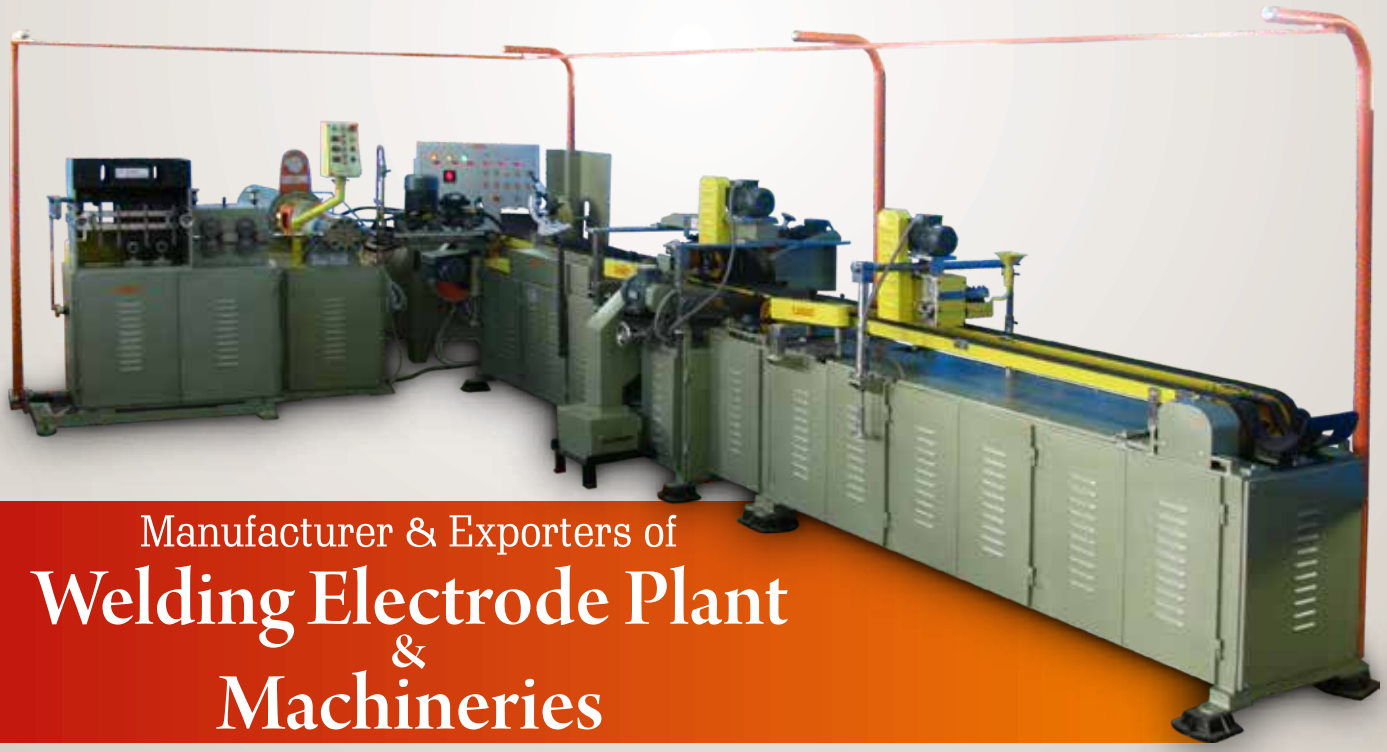

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Tenders for mega bridge in Bihar cancelled, 5/7 bidders had Chinese partners

The construction of a four-lane bridge on Ganga, parallel to Mahatma Gandhi Setu which links north and south Bihar, is set to get delayed as the Union ministry of road transport and highway (MoRTH) has cancelled the tendering process, which was in final stages. The MoRTH had sanctioned Rs 2,927-crore bridge project under the prime minister's special package to Bihar. The mega project included building a 14.5-km-long approach road in Patna and Hajipur of Vaishali district.

Senior officials said five out of seven firms, which qualified for final bidding, had Chinese partners. "This is the first mega project in the state to get cancelled as the contractors had joint ventures with Chinese firms," they said, adding that the selected firms could qualify for fresh bidding if they changed their partners.

Officials said Ashok Buildcon, Dilip Buildcon and Tata Projects are among the five companies, which tied up with Chinese partners for technical and resource assistance. Afcons Infrastructure, Gammon India, L&T and SP Singla are the other construction firms in the race to win the contract.

Bidding documents of all the seven contenders were to be evaluated this month's end. "The MoRTH has invited fresh bids for the project. The bids are open till July 30," informed officials.

Source: www.hindustantimes.com

ABB to power the world's largest diamond recovery vessel for De Beers

ABB will supply an integrated power system package that will ensure the world's largest and most technologically advanced diamond recovery vessel meets exceptional safety, efficiency and availability requirements. The vessel is being built by Damen at Damen Shipyards Mangalia on the Black Sea in Romania.

With a total cost of $468 million, the vessel is the largest single investment ever made in the marine diamond industry. It deploys advanced subsea crawling – a technique for recovering diamonds from the seabed. The newbuild will be delivered to Debmarine Namibia, a joint venture between the Government of the Republic of Namibia and De Beers Group in 2022.

The new 177-meter ship has been designed by renowned Norwegian naval architects Marin Teknikk. It will become the largest ship in the owner's fleet, exceeding the size of Debmarine Namibia's current largest vessel, the Mafuta, by 8,000 tons displacement (vessel weight based on the amount of water displaced by the hull). It is expected to increase the shipowner's annual production by 35 percent, contributing additional 500,000 carats to today's production levels. "The success of the SSN, with high reliability, efficient positioning and low fuel consumption coupled with safe operation, was instrumental in selecting the same systems for the new diamond recovery vessel, with ABB's power systems being an integral part of the solution," said Michael Curtis, who is heading the newbuild project for Debmarine Namibia.

Source: www.new.abb.com

CPP - Techint E&C successfully repairs Heavy Crude Oil Pipeline

On April 6, an erosion event took place on the bed of the Coca River, suddenly deepening it and collapsing the river walls. The ensuing landslide brought down the pipeline supports and led to the rupture of a section of the Heavy Crude Oil Pipeline (OCP) and the Trans-Ecuadorian Pipeline System (SOTE) running along the border between the provinces of Napo and Sucumbíos.

After the break occurred, OCP immediately contacted Techint E&C to draw up a proposal to repair the pipeline and reestablish crude oil transport by building a by-pass. The repairs included work on a part of the pipeline running underground, and another aboveground section along a stretch of 1.7 km.

One of the great challenges this assignment had to tackle was carrying out work in the context of the COVID-19. Although all the requisite preventive measures were applied as from the beginning of the pandemic at company operations in the Auca and Shushufindi fields, in this instance, the team had to cross several provincial cantons deploying different sanitary controls, which delayed mobilization times for crew, equipment and supplies.

In this complex context, the works were completed in 24 days, involving some 270 people from all areas of the company.

Techint E&C returned to the OCP, an emblematic project in its portfolio, seventeen years after completing the building work, involving the construction and laying of 503 km of pipelines, as well as building four pumping stations, two reduction stations, five crude storage tanks and an offshore terminal. This project presented the company with a diverse range of community, climatic and geographic challenges, including crossing a volcano and an ecological reserve. Oscar Scarpari, Area Manager of Techint E&C in the Andean Area, notes that: "We have shown that even in times as complex as the one we are going through, we can respond to our customers' needs in a timely fashion, respecting safety, costs and quality."

Source: www.techint-ingenieria.com

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"Doing a man's job and earning the same money if not more as a man, to me, is Independence at its finest."

Chloe Grace Sales, Welder,
Alpha Manufacturing Ltd in Hixon - Staffordshire

Alpha Manufacturing's only current female welder has received widespread praise and recognition for her drive and determination to be successful in a predominately male orientated field.

It gives me immense pleasure to share my journey into welding as a career.

Initially, I used to be a community career and then started with a full time job for my nana who was very poor. Unfortunately he passed away. After his death, I applied for another job. I started working in warehouse. During my tenure in warehouse, and I was always asked to do welding jobs, as it interested me. I was good at welding, so they offered me an apprenticeship. I gladly took up the opportunity in 2017 at age 21.

Thereafter, my career in welding started flourishing. I won STEM Apprentice of the Year from Stoke-on-Trent College in 2019, where I studied for my qualifications in MIG, TIG and sheet metal fabrication. This achievement was noticed by local press. Various articles in local press are featured, with more still to be published.

I am also an ambassador for Young Enterprise which involves into schools talks and other activities. Besides, I recently finished a 12 month evening aluminium TIG course at Stafford college. I also study at NSEGTA gaining more qualifications including CAD design. I have done many welding jobs from a CAT exhaust system, to high quality stainless steel TIG including hand rails and disabled facilities.

Currently, I am a full-time professional in a company - Alpha Manufacturing Ltd

in Hixon. I joined the company in 2019.

At my current job, I have worked on a range of projects like cabinet doors, skips, arm chair supports, side panels, various brackets, etc. Have also worked on different projects within the food and drink industry, ie from heated trolleys to the tray boxes.

When I'm at work I always like to remind myself "Why I am There". I have the god gifted strength to lift any object just as any man can do. If anybody teaches me on how to work on any project, you can bet I put my 100% in!

I truly enjoy my job, and honestly think that many more females also will surely enjoy grafting at a job that is considered 'male dominated' if they knew more about it. Thus, to fulfill this requirement, I visit many local schools and colleges, to interact with especially girls. I haven't worked with a single female yet and hope to change this scenario in coming time. Everybody told me not to do it. That's why I go out to schools and tell other girls not to listen to their friends or people who want to put them off. They can do it. I did. And I love it. I never had anyone to look up to in a careers way, so I'd love to be able to help at least one person, to inspire someone not to give up and to follow their passion.

I'm now 25 years old and I have already started observing the result and changes. I am so pleased, more girls are applying for stem roles and more girls

are applying for apprenticeships. It's so important to be honest with these young people, so you can help advise the next possible generation of engineers, teachers, mechanics, and scientists etc the list is really endless. It can be a dirty job depending on what your doing, it can be physically demanding, but we girls are just as strong as men! And we can. There are obvious health and safety risks associated with welding due to the fumes, but under my mask and air fed, I'm just another welder, but the girl underneath is rooting for the rest of you!!

The only things stopping you, is you. We make choices every day that affect our future, so make the right ones. We all have to make mistakes to learn. I don't think I have ever faced discrimination in my welding career. But yes, I did have some stupid comments made to me. Luckily I am quite ballsy, so the guys soon shut up!

In this world as it stands, you need thick skin and you need to stand on your own two feet - especially girls! I have so many plans for the future! I definitely want to do some more courses involving welding, and potentially own my own business one day! I would also love to open my own welding college and fund the apprenticeships for some families who are struggling. Everyone deserves a chance in life and money should not stop you. Doing a man's job and earning the same money if not more as a man, to me, is Independence at its finest.

I have been a Welder for almost 3 years now, and I love my job because it's different. I like doing my own thing and being in my own lane. I enjoy the variety of work and the feeling of satisfaction that I get when I've finished a job. It's well paid too. I don't have a problem with being a woman in a man's environment. I feel like I've found the right career and I'm looking forward to seeing what the future holds.

Roger B. Hirsch,
is 'Elihu Thompson Resistance Welding Award' winner, President of Unitrol Electronics Inc. of Northbrook, Illinois, and Former Chair of the Resistance Welding Manufacturing Alliance (RWMA), a standing subcommittee of the AWS

Over the years I have written several articles and Q&A columns about SQUEEZE TIME and HOLD TIME functions in resistance welding controls. But these functions continue to be a mystery to many operators and setup people in the welding department.

BASIC DEFINITIONS:

SQUEEZE TIME is the time between the start of a weld sequence (initiating a welder control) to the start of the first actual weld heat. This time is needed to allow the electrodes to reach the required force that will keep the molten metal of the forming nugget between the parts from flying fly out (Fig. 2).

This time also allows the force between the electrode face and the outside of the part to get up to full force and prevent metal expulsion at this point (Fig. 3). Also too-short SQUEEZE TIME can be a serious danger to the operator and other personnel in the area when flying molten metal from the weld area contacts clothing, skin, or eyes.

Many people I have met over the years have told me that they know the weld is good when they see metal sparks. They are absolutely wrong!

The bottom line is that you need enough time for the air cylinder or servo cylinder that supplies force to the closing electrode to get to full value before the first weld heat cycle starts.

It is important to understand that the force between electrodes is very low when the electrode first touches the workpiece. It takes time for the air to bring the top of the air cylinder to the desired pressure, and it also takes time for the air on the underside of the air cylinder to fully exhaust. It is only after both of these happen that the electrode force is full value.

The three cylinders in Fig. 1 illustrate the electrode force at different times after the electrode touches the part. Times shown are in cycles (60 cycles = 1 second).

The electrode force shown is created by the downward force of the air pressure on the top of the piston minus the upward

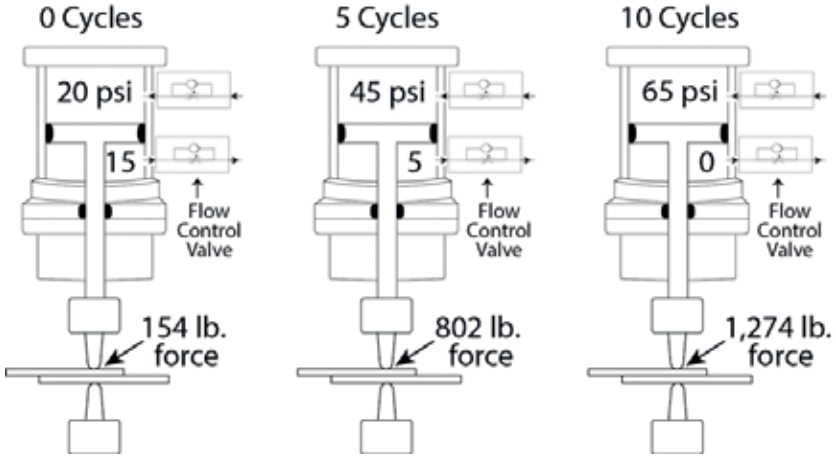

FIGURE 1. Welding cylinder cross-sections. Electrode force is shown just after the electrode touches, 5 cycles after touching, and 10 cycles after touching.

force of the air pressure on the underside of the piston.Because air going into the top port of the welding cylinder moves the piston downward to create an increasing volume, the air pressure inside the section above the piston takes time to reach the full air pressure as set on the welder's pressure regulator.

As seen in Fig. 1, the air on the bottom port of the cylinder exhausts through a flow control valve that meters the air going out of the bottom chamber of the cylinder. This keeps the electrodes from slamming down but also takes time to get all of the air out of this section. The electrode force is calculated as:

ELECTRODE FORCE = AIR PRESSURE X (TOP PISTON AREA – UNDERSIDE PISTON AREA)

A 5" bore (inside diameter) welding cylinder with a ½" diameter shaft is used for this example.

- Area of the top of the piston inside this cylinder is 19.6in2.
- Area of the underside of the piston inside this cylinder is 15.9in2.
- Welding pressure regulator is set at 65psi.

ELECTRODE FORCE is shown in Fig. 1 at times just after the electrode touches, 5 cycles time after touching, and 10 cycles of time after touching. The electrode force shown is calculated using the ELECTRODE FORCE formula above. This easily illustrates the need to wait until full force is reached before starting the first cycle of weld heat.

If the flow control valve on the bottom port of the cylinders in Fig. 1 are closed to decrease the flow of air coming out, it will take more time for the air on the underside of the piston to fully exhaust and will take more time for the electrode to reach the full force. This flow control should be adjusted at the most open position to allow smooth electrode closing.

The flow control valves on the upper and lower ports of the air cylinder should be installed so that air is metered going out of the cylinder. The upper flow control valve should be adjusted to prevent slamming when the electrodes open but, if installed in the correct direction, will not affect closing speed of the electrode.

HOLD TIME is the time after the last weld heat and before the electrodes are released. Its purpose is to allow the welding nugget to cool down before the clamping force of the electrodes is released. I recommend HOLD TIME be set at 3 cycles for metal up to 11 gage, and 5 cycles for heavier metal. Long HOLD TIME just waste production time and do not add to weld strength. Too low HOLD TIME, especially in thick metal, will weld strength and can add to part distortion.

Q I want to speed up my production. If I lower the SQUEEZE TIME, will this affect weld strength?

A If the SQUEEZE TIME is too short, metal will be expelled between the parts (Fig. 2). There will also be metal that will fly out from under the electrode face (Fig. 3). Both of these results will remove metal from the parts in the nugget area to reduce actual metal thickness.

Destruct testing might produce a nice nugget on one part and a hole in the other, but this only proves that the smaller metal thickness near the nugget caused by blown-out metal pulls apart more easily.

The bottom line is that anytime you see metal expulsion, one result will be a lowering of weld strength. Also, if the SQUEEZE TIME is much too short, you can start passing weld current before the electrode starts to touch the metal and before it gets up to full force. Therefore these early weld cycles won't form a nugget but merely expel metal from under the electrode.

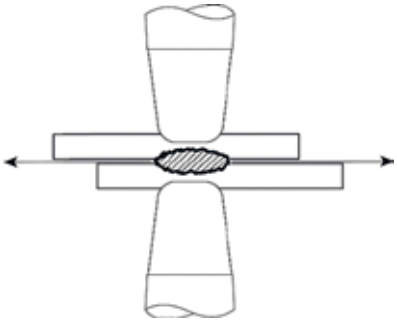

FIGURE 2: Cross section of weld nugget with expulsion between parts

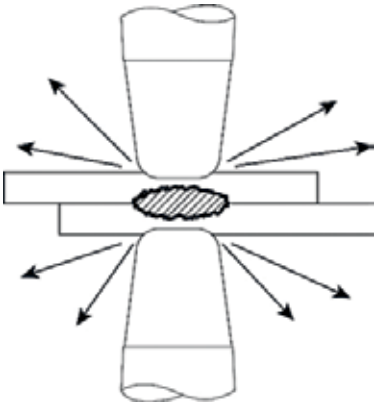

FIGURE 3: Cross section of weld nugget with expulsion at the electrode contact points.

For example if you have a 12-cycle weld time and the electrodes don't reach welding force for the first 3 cycles, these 3 cycles are not being used to create the weld. The resulting welding nugget will be much smaller & weaker than it should be.

Lastly while it is not a weld strength problem, firing before the electrode force is at the required level will leave the outside of the weld area rough and will greatly shorten the electrode life requiring excessive electrode dressing. Many companies spend a lot of time and money grinding spot welds because of this problem. Setting a proper SQUEEZE TIME will eliminate this wasted time.

Q All of our company welding schedules have SQUEEZE TIME at 70 cycles. Nobody

knows exactly where this number came from, but I have been told that any change will affect the weld strength. The space between electrodes is typically 1 inch. Our welding volume has picked up and I need to figure out a way to get more parts per hour through each spot welder. Since the electrodes close and then wait for almost a second before weld heat starts, can I lower SQUEEZE TIME without affecting the weld strength?

A The answer is absolutely yes. You can lower the SQUEEZE TIME on a typical welder to between 20 and 30 cycles. Just use the minimum number of SQUEEZE TIME cycles so that there is no excessive metal expulsion at the start of the weld. If there is expulsion, just increase it until expulsion is eliminated.

One way of getting the absolute minimum time before the start of heat flow is to use a differential pressure transducer. This device will measure the air pressure on the forward port of the air cylinder and subtract the air pressure on the return port of the air cylinder.

Using a single-side pressure switch or single-side transducer will not work since, as noted earlier, air on the underside of the piston will reduce electrode force and fool this device into starting the weld when electrode force is still below the required value. Use of a differential pressure transducer will assure that the welder will not start heat flow until all the air is exhausted from the return port, and the air pressure in the forward port is at the pressure regulator setting.

FIGURE 4: Stand-alone differential pressure transducer device that connects to an existing welding control can eliminate metal expulsion, improve weld strength, and increase electrode life.

Use of a differential pressure transducer allows you to set SQUEEZE TIME to 00 and produce the fastest welding time with consistent results and elimination of metal expulsion. Differential pressure transducers are built into a few resistance welding controls. There is also astand-alone device available that can be added to existing controls.

Q I was trained by the former welding foreman that I need to have at least 50 cycles of HOLD TIME on each weld to keep the weld strength at the value needed for our parts. Is that true?

A Absolutely not. You can lower the HOLD TIME on metal up to 11 gage to 3 cycles without having any effect on the weld strength or appearance. 5 cycles should be enough time over that thickness. Any more HOLD TIME will just waste production time.

Q Our company makes cabinets out of 20 gage CRS. A typical door panel has 26 spot welds to join the center stiffener, piano hinge, latch mounting plate, and keeper angle. Our present weld schedule is:
SQUEEZE TIME = 50 CYCLES
WELD TIME = 10 CYCLES
WELD HEAT = 9,200A
ELECTRODE FORCE = 500 POUNDS
HOLD TIME = 30 CYCLES

Using these numbers, the total time after the initiation switch is closed and the electrodes open is:
50 + 10 + 30 = 90 cycles. Since 60 cycles = 1 second, the total process time of each weld is 1.5 seconds.

Our time study report for this product shows:
Actual weld time = 90 cycles X 26 welds = 2,340 cycles/60 = 39 seconds
Average move time between welds = ¾ second X 25 = 18.75 seconds
Total load & unload time = 10 seconds
Total time per part = 39 + 18.75 + 10 = 67.75 seconds.
On a 55-minute hour, output is (55X 60 seconds) / 67.75 seconds = 3,300 seconds/67.75 = 40.7 parts per hour or 325 parts per 8-hour shift. Because volume requirement has increased, we have to either find a way to weld faster without sacrificing quality or add production hours. Any ideas?

A There is a very easy solution to your problem. Just reduce the SQUEEZE TIME to 20 cycles, and reduce the HOLD TIME to 3 cycles. If you leave the welding schedule unchanged, the new calculation is:
SQUEEZE TIME = 20 CYCLES
WELD TIME = 10 CYCLES
WELD HEAT = 9,200A
ELECTRODE FORCE = 500 POUNDS
HOLD TIME = 03 CYCLES

Actual weld time = 33 cycles X 26 welds = **858 cycles/60** = 14.3 seconds
Move time between welds = ¾ second X 25 = 18.75 seconds
Total load and unload time = 10 seconds
Total time per part = 14.3 + 18.75 + 10 = 43.05 seconds

On a 55-minute hour, output is (55 X 60 seconds) / 43.05 seconds = 3,300 seconds/43.05 = 76.7 parts per hour or 613 parts per 8-hour shift.

So by reducing the excessive SQUEEZE TIME and HOLD TIME, production output will increase by 88.6%, and the weld quality will be exactly the same.Or another way to look at it, in an 8-hour shift you will have 288 more finished parts without changing the quality of the welds.

A serious problem not related to SQUEEZE TIME or WELD TIME.

Q We recently had a welding control destroyed by water inside the control cabinet. This happened when the operator came back after lunch and turned the water valve on to the welder, The water from a rubber hose on the SCR contactor inside the control cabinet ruptured and water sprayed all over the control boards inside. The control was only 5 years old. Is there any way to prevent this in the future? Our water pressure is 35psi. Could this be too high?

A This is a very common problem with direct-cooled SCR contactors (Fig. 5A). First, your water pressure at 35 psi is not the problem. The rupturing of an SCR cooling hose is caused when water is turned off going to the SCR contactor & the line voltage remains on. Many companies either shut a valve to the welder when they are not welding, or use a WATER SAVER circuit to turn this cooing water off when welds are not being made. Others leave power on the welder overnight and shut off the water. These are all big mistakes. The sequence that causes SCR cooling hoses to rupture when water is turned off is:

1. The ends of a cooling hose on the SCR contactor are connected to fittings that are on both sides of the incoming line voltage (208V, 230V, 440V, or 575V).
2. This causes line voltage to pass through the water in the cooling hose.
3. Because all water has some conductivity, the non-moving water inside the hose will start to heat up.
4. After enough time, the water starts to boil.
5. Boiling eventually results in super-heated steam that pockets at the highest point of this hose. Think of it as a bubble of super-heated steam.
6. This super-heated steam will soften the rubber or plastic wall of the cooling hose at this location and eventually melt it.
7. When water is turned on, it will pass through this hole, spray all over the circuit boards, and, if no drain hole is present, fill up the inside of the cabinet with water. Unfortunately the operator will not know this is happening until the welder stops working or the circuit breaker trips. By that time it will be too late and severe damage will have been done to the control.

The obvious solution: NEVER TURN SCR COOLING WATER OFF WHEN LINE VOLTAGE IS STILL TURNED ON.

This problem is so important that the RWMA established a standard warning label (Fig. 6) that should be installed on every welding control that contains a direct-cooled SCR contactor.

I have also had customers replace old SCR cooling hoses with conductive hose material. The result is the same. All hose that is used on direct-cooled SCR contactors must be non-conductive. To check your hose, set a multi-meter to read resistance (ohms). Put the points of the test leads about ½" apart along the water hose. If it is conductive there will be a reading and the hose must be replaced with a non-conductive hose before power is turned on.

Note that this problem only occurs with "direct-cooled" SCR contactors (Fig. 5A). These SCR contactors have water hoses mounted on the SCR contactor.

The problem does not happen for "indirect-cooled" SCR contactors (see Fig. 5B) that use an aluminum or copper sub-base and do not include cooling hoses. Heat is removed from the SCR elements in this type of contactor through a non-metallic barrier sheet. This barrier sheet is made of material that is a good electrical insulator and a fairly good thermal conductor. The white sheet shown in Fig. 5B is the barrier sheet which is mounted between the lower cooling block and tang just under the two SCR elements.

FIGURE 6: Standard RWMA warning label.

Send your comments and questions on resistance welding to: eliza.weldfabtechtimes@gmail.com

A. Indirect-cooled SCR contactor with no cooling hoses.

B. Direct-cooled SCR contactor with line voltage passing through the cooling hoses.

FIGURE 5: Two types of SCR contactors.

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