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# KOBELCO WELDING TODAY

Vol.21
2018 No.1

**KOBELCO Puts the Customer First with All-in-One Product and Service**

# PREMIARC™ NI-C6J for 9%Ni steel: Excellent porosity and hot crack resistance

PREMIARC™ NI-C6J is an AWS A5.11 ENiCrMo-6 type covered electrode with a pure Ni core rod that is suitable for all position welding on LNG storage tanks incorporating 9% Ni steels.

The welding conditions, chemical compositions and mechanical properties of the deposited metal are shown in Tables 1, 2 and 3, respectively. The test results clearly show that all of the AWS chemical and mechanical requirements are fully satisfied.

Table 1: Welding conditions

| Diameter (mm) | 2.6 | 3.2 | 4.0 |
|---|---|---|---|
| Polarity | AC | | |
| Welding current (A) | 110 | 130 | 165 |
| Preheating temp (°C) | None | | |
| Interpass temp (°C) | ≤ 150 | | |
| Plate thickness (mm) | 13 | 13 | 19 |
| Groove angle (°)/root opening (mm) | 60/7 | 60/7 | 60/13 |
| Pass sequence (layers/passes) | 6/15 | 5/10 | 9/28 |

Table 2: Chemical compositions of the deposited metal (mass%)

| Dia. (mm) | C | Si | Mn | P | S | Ni | Cr | Mo | Nb | W | Fe |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2.6 | 0.07 | 0.4 | 2.7 | 0.005 | 0.003 | 65.5 | 13.6 | 6.2 | 1.4 | 1.2 | 8.5 |
| 3.2 | 0.07 | 0.4 | 2.6 | 0.005 | 0.003 | 65.8 | 13.5 | 6.1 | 1.4 | 1.2 | 8.5 |
| 4.0 | 0.08 | 0.5 | 2.6 | 0.005 | 0.003 | 66.7 | 13.6 | 6.1 | 1.4 | 1.2 | 7.5 |
| AWS A5.11 *1 | ≤0.10 | ≤1.0 | 2.0 -4.0 | ≤0.04 | ≤0.02 | ≤55.0 | 12.0 -17.0 | 5.0 -9.0 | 0.5 -2.0 | 1.0 -2.0 | ≤10.0 |

Note: *1: ENiCrMo-6

Table 3: Mechanical properties of the deposited metal

| Diameter (mm) | Tensile strength (at 21°C) | | | Charpy impact test(at -196°C) |
|---|---|---|---|---|
| | 0.2% PS (MPa) | TS (MPa) | El (%) | vE (J) |
| 2.6 | 473 | 748 | 42 | 85, 85, 80 (Avg 83) |
| 3.2 | 457 | 730 | 44 | 81, 89, 93 (Avg 88) |
| 4.0 | 470 | 733 | 40 | 67, 68, 66 (Avg 67) |
| AWS A5.11 *1 | Not specified | ≥620 | ≥35 | Not specified |

Note: *1: ENiCrMo-6

Joints were welded in the 3G position with PREMIARC™ NI-C6J. Table 4 shows the welding conditions in the 3G position, while Table 5 and Figure 1 show the mechanical property test results, bead appearance and a cross-sectional macrostructure of the welded joints.

Table 4: Welding conditions in 3G position

| Base metal | Welding position | Plate thickness (mm) | Dia (mm) | Welding current (A) & polarity | Arc voltage (V) | Welding speed (mm/min) | Heat input (kJ/mm) |
|---|---|---|---|---|---|---|---|
| ASTM A553 Type 1 | 3G | 25 | 3.2 | 120; AC | 21 | 45-96 | 1.6-3.4 |

Figure 1: Bead appearance and cross-sectional macrostructure of the welded joint (3G position)

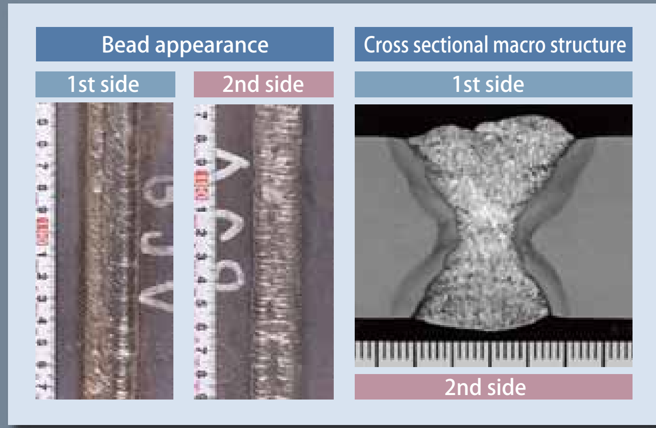
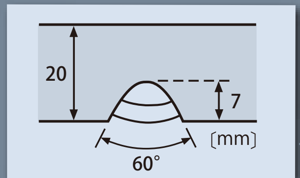



Table 5: Mechanical properties of the welded joint (3G)

| Transverse tensile test | | | Charpy impact test at -196 °C(J) | |
|---|---|---|---|---|
| Specimen size (mm) | Tensile strength at 21°C(MPa) | Fractured position | Location of specimen | |
| | | | 1/2t | 1/4t |
| 23.9 t x 19.2w | 750 | Weld metal | 89,89,85 (Avg 88) | 101,100,93 (Avg 98) |

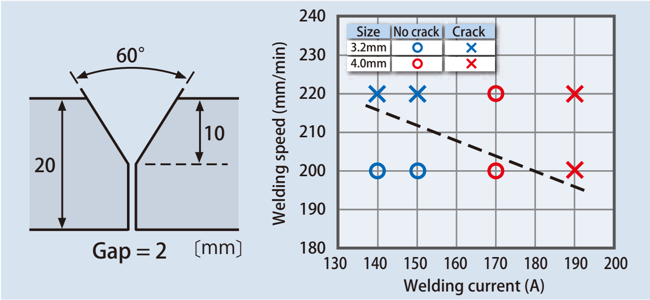
Radiographic tests (RTs) in the 3G and 4G positions as well as the FISCO hot cracking test in the 1G position were conducted and the RT results were judged as acceptable. Both RT result in 4G position and FISCO test result are shown in Table 6 and Figure 2 respectively.

Table 6: RT result in 4G position




| Number of indication (≧φ0.8mm) in 250mm length | |
|---|---|
| Dia. 2.6mm (100A) | Dia. 3.2mm (120A) |
| 5 | 3 |

Figure 2: Edge preparation and test result of FISCO hot cracking test




Because PREMIARC™ NI-C6J covered electrodes greatly reduce porosity generation, obtain superb hot crack resistance and fully satisfy the AWS requirements for 9% Ni steels, they are sure to fit your needs.





# Year 2018: Enhancing Marketing Capabilities and Facing New Challenges!

Dear KWT readers, I wish all of you a Happy New Year! I am Fusaki Koshiishi, the Head of the Welding Business and would like to express my sincere gratitude for your kind patronage of KOBELCO products.

Last October, the KOBE STEEL LTD. (KSL) group admitted to behaving improperly with regard to quality control. I would like to apologize on behalf of KSL for having caused mistrust in the market as well as any stress or burden on you, our customers. As we are determined to make our utmost effort in order to re-gain the lost trust, your warm and continuous support would be most appreciated.

In the Welding Business, I have advocated enhancing the "three Ms." Marketing, Monodzukuri and Manpower in order to embody our business vision of "being the most reliable welding solutions company in the world." The economic prospects for the welding business remain uncertain, due to the sluggish market for shipbuilding and offshore structures worldwide. Under such circumstances, the Marketing Center, established in January, 2017, and the overseas group companies will cooperate together to enforce our marketing capabilities, including marketing and merchandise strategies as well as creating and executing effective business plans this year.

INTIWI, the Indonesian company with whom KSL has long collaborated technically, celebrated its 40th anniversary last November, and TKW in Thailand will celebrate its 50th anniversary this year. TKW is the oldest overseas production base for the whole of KSL, and it proved to be the great first step in the Welding Business' process of globalization. Although it started as a small plant manufacturing covered electrodes, it has grown to become the largest producer and seller of covered electrodes among all of KSL group companies. The year 2018 will represent a major milestone for overseas development, and therefore, a memorial ceremony at TKW is planned for August 2018. It will be yet another important step to once again review the "quality and technology," "trust, safety and security" and "pride and responsibility" that have been cultivated by staff members together with our company's seniors throughout the long history of KSL as we begin to face new challenges.

Covered electrodes are still the mainstream of arc welding technology, particularly in Asia. On the other hand, the increase in advanced welding automation and robotic welding systems is expected to continue, due to the growing lack of skilled welders as well as the increasing need for more efficient welding. Because KSL is the only enterprise that is active in both the technology and business of welding consumables and robotic systems, we can contribute to society while developing arc welding technologies that respond to customer needs from covered electrodes to state-of-the-art automation technology.

Last year, I took part in the ESSEN Fair (Germany) that is held every four year. In April, the Japan International Welding Show 2018 will be held in Tokyo, and we are going to display welding consumables developed exclusively for particular industries as well as new welding automation technologies. We look forward to seeing all of you there. This year as well, in order to increase opportunities to directly communicate with you at exhibitions or other venues, KOBELCO staff members will visit your country or region. Please let us know then your concerns and needs.

Lastly, I wish all of you and your families good health and a successful year in 2018.


**Fusaki Koshiishi**
Director, Senior Managing Executive Officer
Head of the Welding Business
KOBE STEEL, LTD.


# KOBELCO WELDING TODAY No.1 2018

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# Hybrid Tandem MAG Welding Process: An effective porosity-reduction method for welding primer-coated steel plates

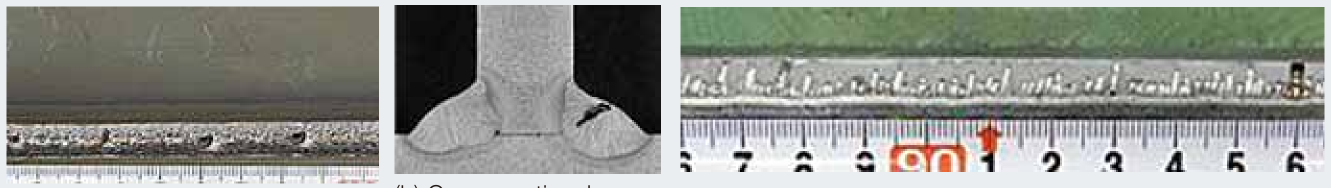
## 1 Preface

In shipyards and bridge construction, shop-primer is generally applied on a steel plate surface to temporarily prevent rust during block fabrication. However, when a primer-coated steel plate is welded, the primer often generates porosity (blow holes and pits) because the arc heat pyrolytically decomposes the primer film, which evaporates and generates gas that gets trapped in the weld metal in the process of solidification as shown in Figure 1.

In order to improve porosity resistance in welding of primer-coated steel plates, research has investigated adjusting the composition of primers used on steel points[1], adjusting the slag formers in welding consumables[2-4], and even developing an efficient tandem welding process in which the same flux cored wires (FCWs) with suitable chemical compositions[5] are applied for both electrodes. However, despite investigating steels, welding consumables and welding processes, the research has yet to find a fully satisfactory solution to the problems described above.

On the other hand, new research studies have allowed the author*1 to better understand the mechanism of porosity generation by direct observation of porosity with X-rays and by experiments seeking to correlate the relationship between porosity and penetration depth. As a result, a new method that emits generated gas out of the weld metal at an early stage has been developed. Called the new Hybrid Tandem MAG welding process, it combines the usage of a solid wire as the leading electrode (LE) to get deeper penetration and an FCW as the trailing electrode (TE) to achieve a smooth bead surface.

Figure 1: Porosity defects caused by welding a primer-coated steel plate



a) Bead appearance (b) Cross-sectional macrostructure (c) Observation of fractured surface

## 2 Effects of welding primer-coated steel plates by a conventional welding process

Tests of horizontal fillet welding utilized frequently in shipyards and bridge construction were performed that obtained 7 mm leg length with FCWs and 100% $CO_2$ shielding gas in both conventional single-electrode and tandem-electrodes processes. The welding conditions are shown in Table 1.

After welding, radiographic testing (RT) was conducted on the test specimens as shown in Figure 2. The observation results of both single- and tandem-electrode welding processes are shown in Figure 3.

When an X-ray is irradiated at the top of a test specimen, as shown in Figure 2, blow holes appear darker than the surrounding weld in the X-ray film. In Figure 3, a number of blow holes can be observed in the fillet welds obtained from both welding processes; tellingly, the blow holes are initiated at the underside of the vertical member that touches the surface of the horizontal member (hereinafter called the underside of the root) and appear in a line along the underside of the root. Also, more porosity appears at the second side than that at the first side because the evaporated gas emits only from the second side during welding as the first side is closed by the weld.

Table 1: Welding conditions for tests of conventional welding processes

| Type of coating & film thickness | Non-organic zinc primer; 30μm | | |
|---|---|---|---|
| Shielding gas | 100%$CO_2$ | | |
| Welding process | Single | Tandem | |
| Electrode | —— | Leading (L) | Trailing (T) |
| Welding wire/Dia (mm) | FCW/1.4 | FCW/1.6 | FCW/1.6 |
| Distance between contact tip end and base metal (mm) | 25 | 25 | 25 |
| Torch angle $\theta_1$ (°) | 45 | 45 | 45 |
| Torch angle $\theta_2$ (°) | 0 | 7 (declined backward) | 7 (declined forward) |
| Welding current (A) /arc voltage (V) | 330/34 | 430/32 | 320/30 |
| Welding speed (mm/min) | 400 | 1000 | |
| Distance between electrodes (mm) | —— | 25 | |

Figure 2: RT method

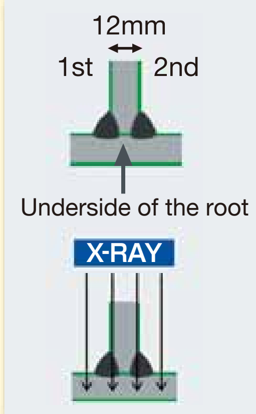
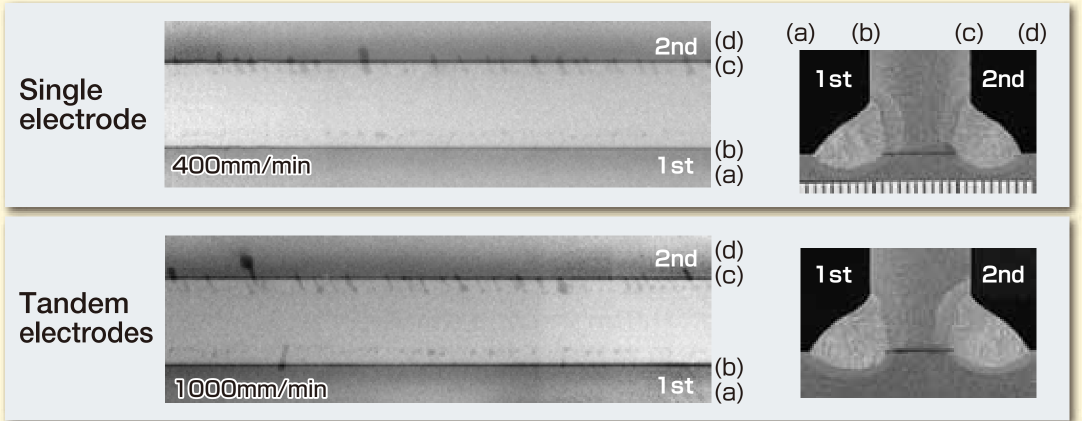



Figure 3: RT result in single- and tandem-electrodes welding processes




## 3 Development of a porosity-reduction method

Research on welding Zn-coated thin steel sheets has shown that obtaining deep penetration right under the arc by adjusting shielding gas components, pulsed wave forms and/or welding wire chemical compositions can reduce porosity as most of the Zn gas is emitted directly under the arc[6-8]. The author has, therefore, developed a porosity-reduction method suitable for horizontal fillet welding by assuming that the mechanism for generating porosity in welding primer-coated steel plate must be the same as that for Zn-coated steel sheet.

It is believed that in the conventional process, vaporized primer enters the molten pool, causing porosity, starting at the root. The author therefore hypothesized that porosity will not be generated if the underside of the root is completely melted; in other words, if the unmelted part of the underside of the root is reduced to zero, 100% of primer shall be vaporized and emitted. Therefore, deep and stable penetration is essential in order to eliminate the entire unmelted part.

In the current research, several horizontal fillet welding methods that obtain deep and stable penetration were studied. By changing welding parameters, it was possible to look at how penetration depth and the amount of unmelted material influence the occurrence of blow holes. These mechanisms of porosity generation were verified by using an X-ray transmission type high speed video camera.

## 4 Factors influencing penetration depth

Because earlier research had shown that the LE electrode controls penetration depth in tandem welding[9-10], it was decided to study the effect of such factors as the LE's torch angle, welding current and arc voltage on penetration depth. The welding conditions are shown in Table 2; definitions for total penetration depth ($L_{Pene}$), the unmelted part of the underside of the root ($L_{Root}$) and leg length ($L_{Leg}$) are shown in Figure 4.

Table 2: Welding conditions

| Steel plate & type of coating: film thickness | SM490A 12mm & Non-organic Zinc primer: 30μm | |
|---|---|---|
| Shielding gas | 100%$CO_2$ | |
| Electrode | LE | TE |
| Welding wire (mm Dia) | Solid wire: 1.6 | FCW: 1.4 |
| Distance between contact tip end and base metal (mm) | 13 | 25 |
| Torch angle $\theta_1$ (°) | 5-45 | 45 |
| Torch angle $\theta_2$ (°) | 7 (declined backward) | 7 (declined forward) |
| Welding current (A) | 350-550 | 300-370 |
| Arc voltage (V) | 20-35 | 30-37 |
| Welding speed (mm/min) | 1000 | |
| Distance between electrodes (mm) | 30 | |

Figure 4: Definition of $L_{Pene}$, $L_{Root}$ and $L_{Leg}$

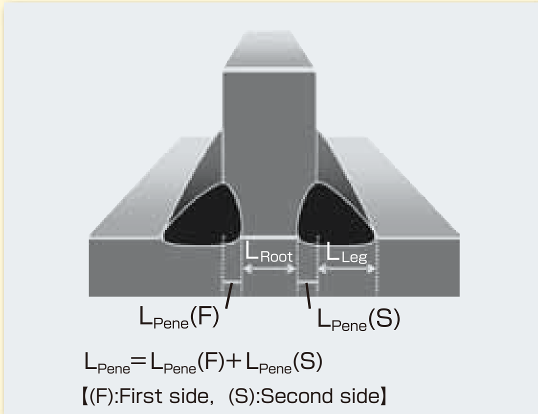


Figure 5 shows the relationship between the LE's torch angles and $L_{Pene}$ (F), the penetration depth at the first side.

It was found that as penetration direction gradually changes, the $L_{Pene}$ (F) becomes larger, and was particularly optimal when $\theta_1$ is changed from 45° to 20°. After this finding, the LE torch angle $\theta_1$ was fixed to 20° to prevent the torch from interfering with the flat member. The relationship between the LE's welding current and penetration depth is shown in Figure 6. It indicates that the higher the LE's welding current is, the deeper the $L_{Pene}$ is.

Figure 7 shows the relationship between the LE's arc voltage and penetration depth. With the LE's wire feeding speed fixed at 8 m/min, the influence of the LE's arc voltage on penetration depth was investigated by changing the arc voltage from buried arc (holding the arc length extremely short) to open arc (holding the arc length extremely long). As a result, it was found that the lower arc voltage was associated with a deeper buried arc and increased $L_{Pene}$.

## 5 Relationship between the occurrence of blow holes and penetration depth

### 5-1. Effect of $L_{Pene}$ on the occurrence of blow holes

As shown in Figure 8, the number of blow holes decreases as $L_{Pene}$ deepens, suggesting that deeper penetration is advantageous in reducing porosity. It is presumed that the primer-vaporized gas is more efficiently emitted right under the arc.

### 5-2. Influence of the unmelted underside of the root ($L_{Root}$) on the occurrence of blow holes

In order to study the effect of $L_{Root}$ on the occurrence of blow holes, horizontal fillet welding was performed in which welding parameters were kept constant while the plate thickness of vertical members was changed from 9mm to 12mm and 16mm. In order to maintain the same welding parameters, the $L_{Pene}$ was held constant and only the $L_{Root}$ was changed. After welding, the blow holes in the specimens were compared by using RT films. Figure 9 indicates that there is a tendency for blow holes to increase in number when the $L_{Root}$ gets bigger. The result was obtained under all tested welding conditions. It is presumed that as $L_{Root}$ becomes larger, the amount of gas remaining at the root part of both members increases, causing blow holes to occur.

### 5-3. Summary of influence of each factor

From the experiments carried out, two suggestions emerge in relation to reducing porosity:

① achieve and maintain large penetration depth ($L_{Pene}$).
② reduce or eliminate the unmelted part of the underside of the root ($L_{Root}$).

As long as plate thickness is kept constant, the two points above mirror each other. However, as were shown in the preliminary tests, the measures to reduce porosity are to apply a) high welding current, b) low arc voltage and c) low torch angle ($\theta_1$) to the LE. By combining a) and b) one may apply a buried arc.

Figure 5: Relationship between the LE's torch angles and $L_{Pene}$ (F) penetration depth

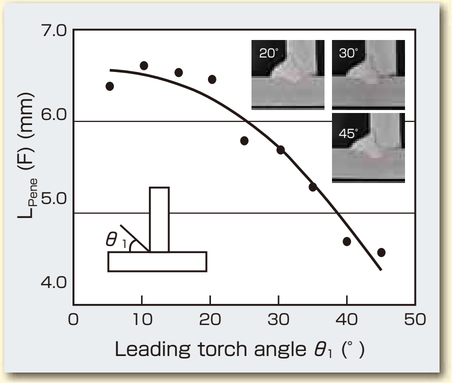



Figure 6: Relationship between the LE's welding current and penetration depth

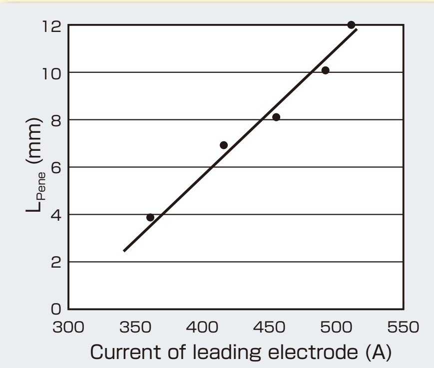



Figure 7: Relationship between LE's arc voltage and $L_{Pene}$

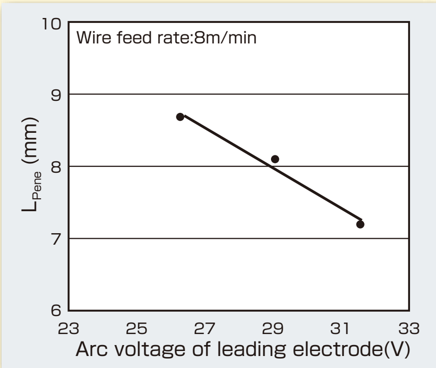



Figure 8: Relationship between $L_{Pene}$ and the occurrence of blow holes

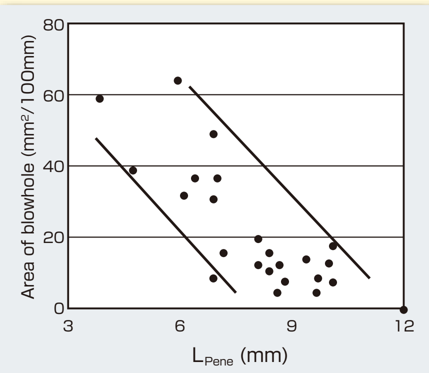
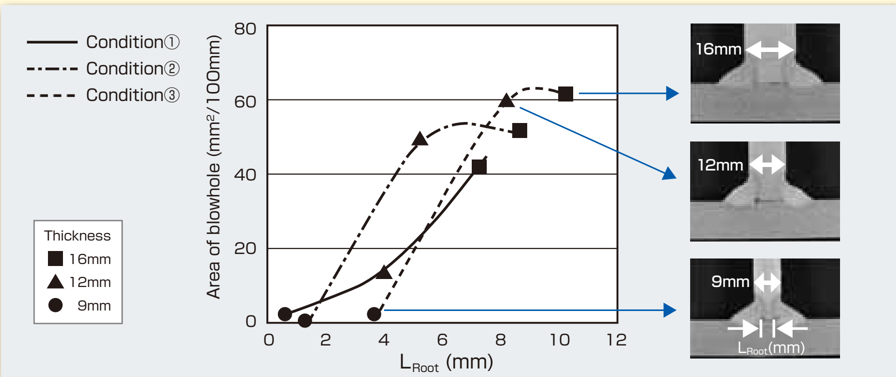



Figure 9: Relationship between $L_{Root}$ and concentration of blow holes




## 6 Observing the generation of porosity

In order to observe the formation of blow holes, their behavior inside a molten pool during welding was observed in the welding of a 12 mm-overlapped fillet weld joint by using an X-ray transmission type high speed video camera as shown in Figure 10.

### 6-1. Behavior of blow holes under an open-arc

When using a conventional welding process that applied long arc length at the LE, equivalent to an open-arc state, it was observed that porosity (blow holes and pits) began forming at the root part while evaporated primer gas at the unmelted part of the underside of the root intruded into the molten pool just behind the arc (see Figure 11). On the other hand, at the solidifying side (rear side) of the molten pool, the phenomenon of either gas emission or gas elimination was not observed.

### 6-2. Behavior of porosity under a buried arc

When the LE's arc length was kept extremely short, as shown in Figure 12, it could be seen that the wire end was buried into the molten pool, causing the arc force to penetrate more deeply into the base metal. It appears that porosity will not occur inside the molten pool under such conditions. The reason is likely to be that as the molten pool right under the arc is pushed backward and reduced its thickness, the force suppressing the primer gas decreases against the pressure of the primer gas itself, resulting in the primer gas being emitted from the molten pool. In other words, the route for emitting primer gas out from the molten pool is secured (Figure 13).

Furthermore, when full penetration was achieved, even though a few blow holes remained at the bottom of the first-side weld, it was noticed that porosity-causing gas was emitted from the second-side molten pool.

## 7 Development of the hybrid tandem MAG welding process

While these experiments have shown that a buried arc improves porosity resistance, a drawback to the buried arc is that it causes poor bead appearance. With these concerns in mind, the Hybrid Tandem MAG welding process (HTM process) has been developed in order to reduce porosity by using a buried arc while maintaining proper bead shape. The system's structure is shown in Figure 14[1)].

The process applies FAMILIARC™ MG-50HM (Solid wire 1.6 mm dia) to the LE for deep penetration and FAMILIARC™ MX-50HM (FCW 1.4 mm dia) to the TE for smooth bead appearance. Furthermore, the LE's torch is declined 20° backward, for gaining the deepest penetration, and the TL's torch, 45° forward for obtaining stable and excellent bead appearance. In addition, the LE utilizes a high ratio of welding current/arc voltage, to

Figure 10: Observation method using X-ray transmission

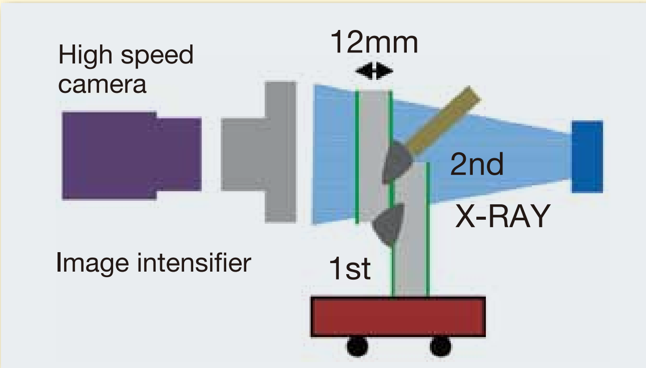



Figure 11: Formation of blow holes in a conventional welding process

(LE: 430A-32V, LT: 320A-30V, Welding speed: 1000 mm/min)

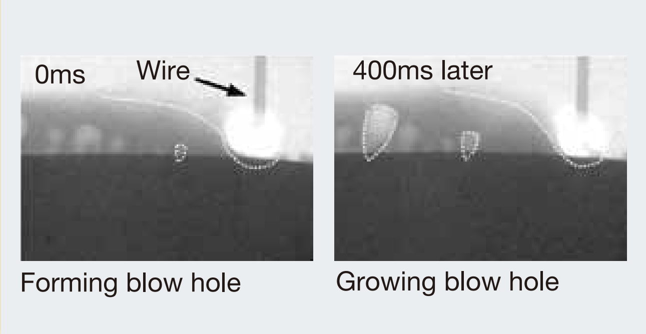



Figure 12: Observation of gas emission phenomenon by the newly developed process

(LE: 500A-32V; TE: 300A-31V; Welding speed: 1000 mm/min)

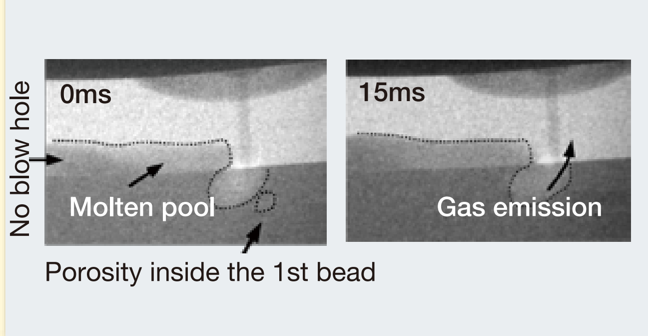
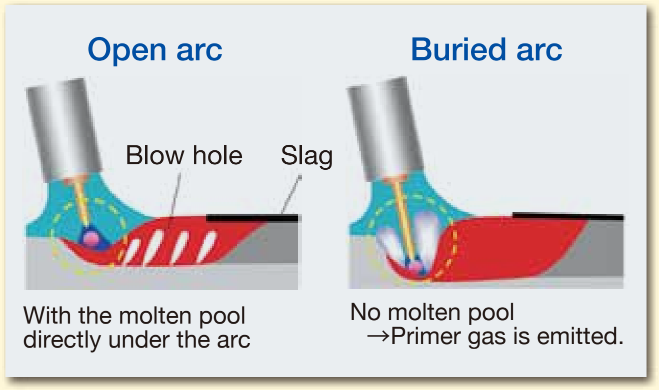



Figure 13: Mechanism of porosity reduction



obtain a buried arc at the large welding current. Figure 15 shows the porosity resistance and shape of penetration, and Figure 16, the bead appearance by the HTM process. No porosity was generated at the first as well as second sides and excellent bead shape was also obtained.

## 8 Postscript

It was hypothesized that, for horizontal fillet welding on primer-coated steel plates, deep penetration as well as minimizing the unmelted underside of the root are important in order to reduce porosity generation. Experimental results were confirmed by direct observation inside molten pools with X-ray transmission type high speed video camera.

The new "Hybrid Tandem MAG welding process" achieves excellent porosity resistance by providing a mechanism for emitting vaporized gas. Dividing two respective functions into two electrodes, it equips the LE with a solid wire for deep penetration and the TE with a FCW for stable and excellent bead shape. The author wants to contribute to high quality and efficiency of welding in the fields of shipbuilding and bridge construction by making the HTM process fit for practical use.

Figure 14: Structural comparison of conventional and new HTM welding processes

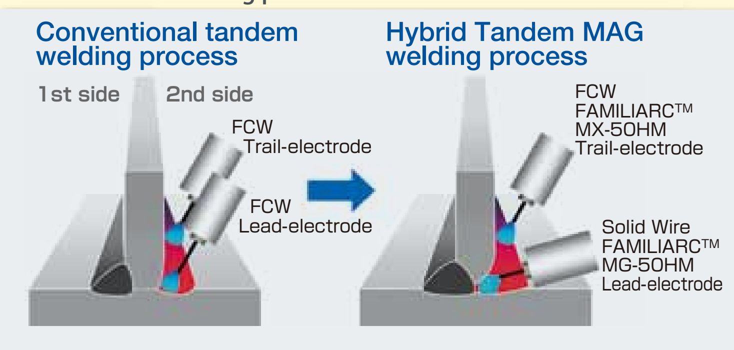



Figure 15: RT result (X-ray film) and shape of penetration by the HTM process

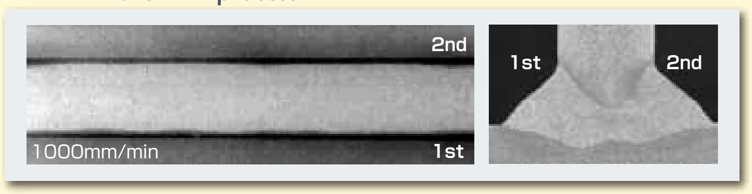



Figure 16: Bead appearance by the HTM process

[Reference]

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KOBELCO WELDING TODAY
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# With the new slogan "Together We Are Strong," INTIWI celebrated its 40th anniversary.

On November 15, 2017, PT INTAN PERTIWI INDUSTRI (INTIWI) celebrated its 40th anniversary at the Royal Tulip Gunning Geulis Hotel in Bogor, Indonesia, once the capital of the Sunda Kingdom and currently the third largest city in Indonesia, located about 60 km away from Jakarta.

INTIWI established technical collaboration based on a license agreement with KOBE STEEL, LTD. (KSL) in 1976 and started operations from the following year. Since then, the company has been managed by Mr Sumarno, a Managing Director with a strong passion for Monodzukuri (production system innovation) and a quality-oriented mind. With the support of all of the employees, INTIWI has earned a reputation for "high-quality KOBELCO welding consumables" in Indonesia in the same way as KSL has in Japan.

A total of 125 people who have been involved in INTIWI's welding business, including shareholders, representativ of KSL and INTIWI's Indonesian distributors and suppliers of raw materials, participated in the ceremony.

Before the ceremony started, guests enjoyed a demonstration of welding with MS-77, a newly-developed covered electrode that is part of INTIWI's new marketing strategy. And at the beginning of the party, a short film of INTIWI's 40-year history was shown. Traditional dances, exchanges of souvenirs, and a presentation of door-prizes ensured the ceremony was completed with great success, leaving the participants with impressive memories,

INTIWI's new slogan, "Together We Are Strong!" was introduced at the ceremony. We would like to extend our best wishes that INTIWI will continue to develop further for the next 50 or even 100 years and continue to bring all of the distributors and raw material suppliers together, as the new slogan says.

Royal Tulip Gunning Geulis Hotel in Bogor

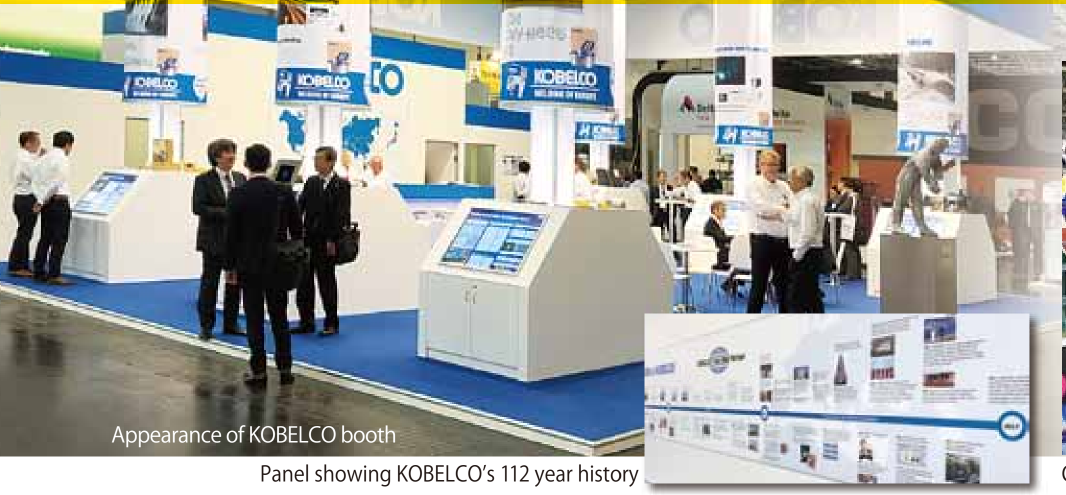
Reported by
**Atsushi (Andrew) Sawada**
Chief Representative, Indonesia representative office, KOBELCO WELDING ASIA PACIFIC PTE. LTD. (KWAP).

Ceremony of INTIWI's 40th anniversary


Welding demonstration with MS-77


Indonesian traditional dance

# Welcoming visitors with “Say Hi to the Original!” at the 2017 Schweissen & Schneiden Düsseldorf.



Appearance of KOBELCO booth

Panel showing KOBELCO's 112 year history

Overview of one of the halls

The “Schweissen & Schneiden” fair, often referred as the “Olympics of Welding Technology” was held at the Messe Düsseldorf in Germany on September 25-29, 2017. Organized by Messe Essen GmbH every four years, it was the 19th event, attracting over 1000 exhibitors from 40 countries - including KOBELCO! Throughout the fair, the halls were full of visitors, even though space was reduced from 17 halls previously to the present 7.

In many ways, exhibits at the 2017 fair reflected the trend toward a worldwide decline in the number of welders. Many displays featured automated welding, easily handled equipment for use by unskilled operators as well as welding methods that are certain to provide semi-skilled welders with stable quality. Visitors were drawn to the many displays of robotic welding systems as well as power sources and peripheral equipment. Even though the decrease in the number of welders is a serious problem worldwide, there were more new robots being exhibited by more companies than I had expected.

With the slogan, “Say Hi to the Originals!,” KOBELCO appealed to customers as the pioneer that had cultivated the European flux cored wire (FCW) market. Our booth also featured KOBELCO's total welding solutions that include products and technologies related to automation, IoT and the SEGARC™ process for shipbuilding, steel fabrication and automobile industries.

As for welding consumables, we exhibited [T] DW-A65Ni1 and [T] DW-A70L for high tensile strength pipe lines, [T] DW-A80L for high tensile strength offshore structures, [T] DW-A62L for low temperature services, [P] DW-N625 for overlay welding on Ni-based reactors, [T] US-521H/PF-500 for submerged arc welding on heat-resistant Cr-Mo steels, [P] DW-410NiMo for hydraulic-turbines, [P] TG-X308L, TIG rod for root pass welding without back purging gas, [P] DW-316LT for cryogenic temperature services and [P] DW-XR series for reducing Cr(VI) production in welding fumes.

Welcoming visitors at the entrance of the KOBELCO booth were “Youtaro,” a statue made by welding, and a panel introducing KOBELCO's 112 years history. It became a popular photo spot that attracted the interest of many.

This was my first opportunity to take part in the fair, and I was impressed by the event's atmosphere. The fair seemed more commercially-oriented than other trade exhibitions. Perhaps there was influence from German culture, as many booths here and there had a café or bar-like atmosphere, where guests and hosts chatted while drinking beer and wine with jazz music playing jazz in the background.

In the near future, ESSEN fairs are planned in Russia in April 2018, China in May 2018 and India in November 2018. Please enjoy each country's particular ambience!

Reported by
**Keiichi Hayano**
Global Operations & Marketing Department, Marketing Center

In this article, **FAMILIARC™**, **TRUSTARC™** and **PREMIARC™** will be abbreviated as [F], [T] and [P], respectively.

All of KOBELCO attendants were posing with “Youtaro” in front of KOBELCO booth.



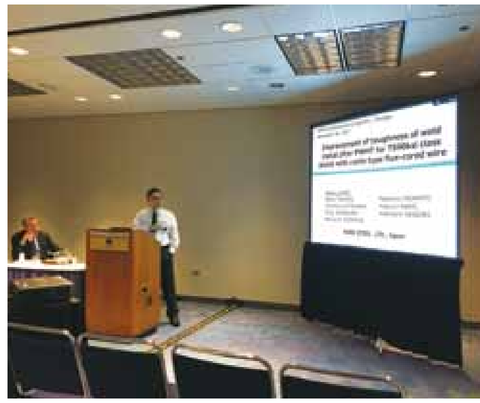


KOBELCO WELDING TODAY Vol.21 No.1 2018

# KOBELCO participates at FABTECH 2017, under the slogan “Your Best Partner KOBELCO”

FABTECH exhibition hall

KOBELCO booth



Technical presentation by a research and development engineer at AWS sponsored seminar

FABTECH is North America's largest annual metal forming, fabricating, welding and finishing event. Alternating each year between Chicago and either Atlanta or Las Vegas, it was held in Chicago this year and will move to Atlanta in 2018. FABTECH is held in Canada and Mexico as well.

FABTECH 2017 hosted more than 1,700 exhibiting companies and more than 50,000 attendees from 120 countries at Chicago's McCormick Place on November 6-9.

FABTECH is a great event as it targets not only welding-related companies but also a diverse range of metal-related fabricators, manufacturers and processors. Another one of FABTECH's features is that participants may sell their products during the fair, offering “special prices only for the exhibition.”

Under the slogan “Your Best Partner KOBELCO,” KOBELCO WELDING OF AMERICA INC. (KWAI), representing the KOBELCO group, set these goals for its display:

1) Promote the KOBELCO brand as a welding solution enterprise with displays of the “ARCMAN™ MP” welding robot in combination with “[F] MX-50R,” the metal-cored wire for robotic welding.

(2) Emphasize the technological capability of our high-end products by displaying “[T] DW-A62LSR,” a new flux cored wire for energy-related industry and presenting on the “Improvement of Toughness of Weld Metal After PWHT for HT610 Class Steels with Rutile Type Flux- Cored Wire” at the AWS-sponsored technical seminar.

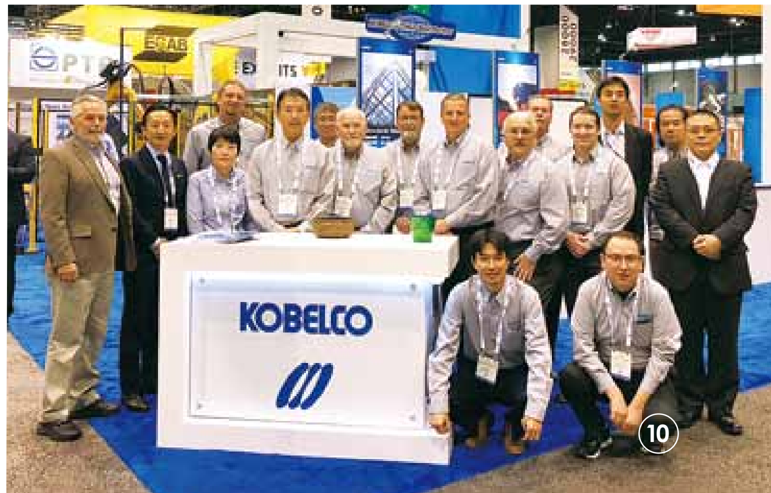
(3) Introduce distinctive stainless steel flux cored wires such as [P] TG-X series TIG filler rods, [P] DW-G series for welding thin plates and [P] DW-XR series that reduces Cr(VI) in welding fumes.

For the first time, the KOBELCO exhibition booth featured a live welding demonstration by the ARCMAN™ MP. With such displays of our technologies at the booth, which was twice the size of last year's FABTECH booth, KOBELCO's visibility at the exhibition was raised significantly. Being seen as a welding solutions company that can provide welding and the robotic systems led to our receiving a wide range of questions and inquiries on our welding and robotic systems from visitors.

At the same time, KWAI's sales staff members, including those based in different territories around the USA, participated at FABTECH by welcoming visitors and working as a team. The technical presentation by the R & D researcher was particularly successful. Therefore, I felt that I experienced an intense four-day event.

Since FABTECH came to an end, I have been determined to work together with members throughout the KOBELCO group in order to further cultivate the North American market.

Reported by
**Marie Ichikawa**
Global Operations & Marketing Department, Marketing Center



Attendants at the KOBELCO booth