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KOBELCO WELDING TODAY

Vol.16
2013 No.2

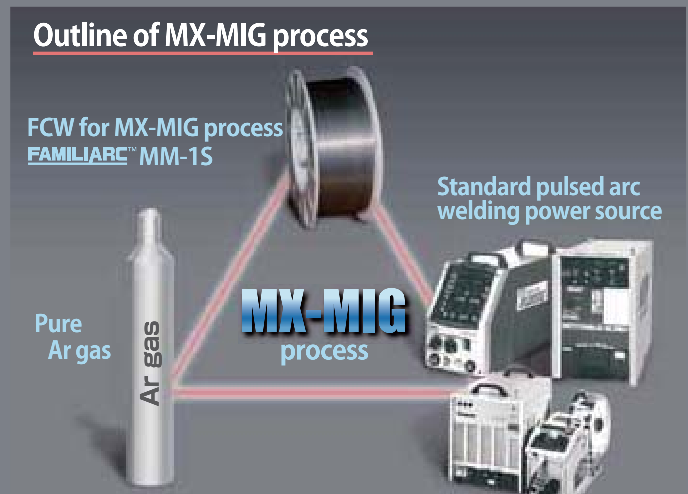
KOBELCO Puts the Customer First with All-in-One Product and Service

KOBELCO

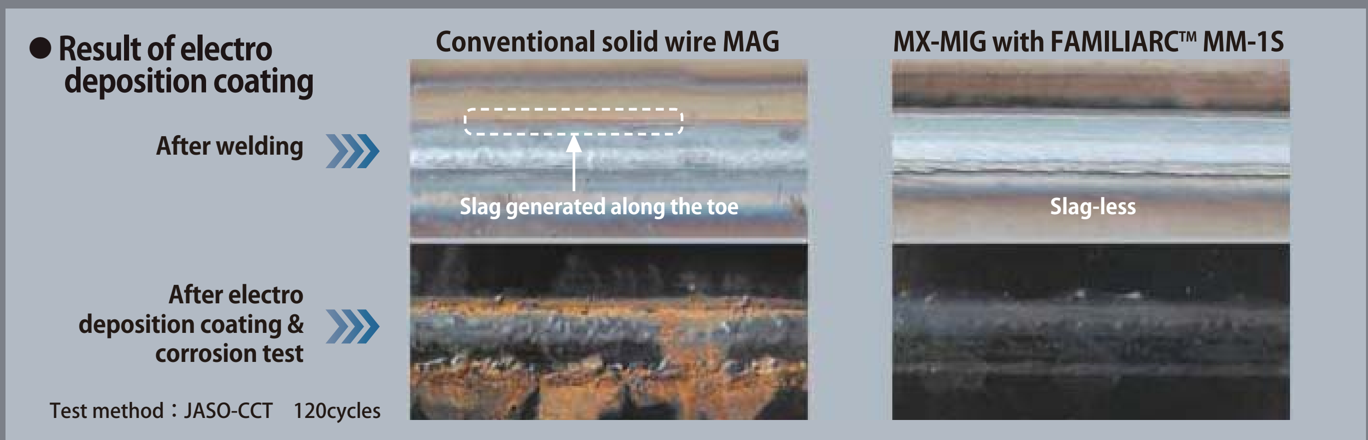
New process for car industry welding: MX-MIG with pure Ar gas and special metal-type flux cored wires

It had always been assumed that MIG welding with pure Ar gas shielding is unstable and impractical. However, the MX-MIG welding process has made it possible by applying pure Ar gas shielding and specially designed metal-type flux cored wires (FCWs). MX-MIG is recommended for lap-fillet weld joints of thin steel plates in the automobile industry.

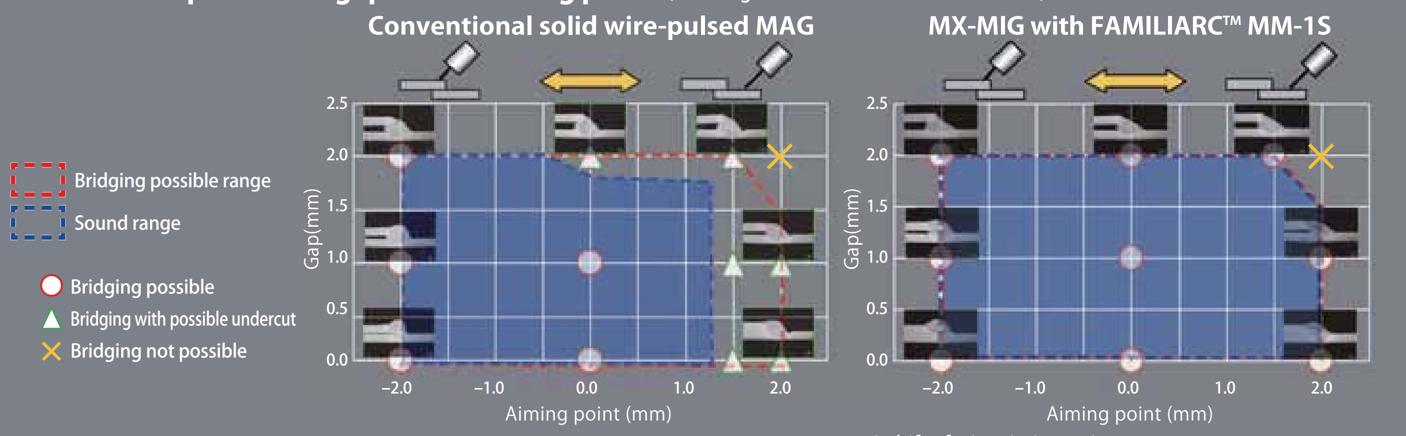
Three metal-type FCWs are available: FAMILIARC™ MM-1S for normal carbon steels, TRUSTARC™ MM-1HS for high tensile strength steels, and PREMIARC™ MM-430Nb for stainless steels. FAMILIARC™ MM-1S offers the following features:



1. Excellent bead appearance:
   The most beautiful bead appearance in MAG and MIG welding processes is obtained by using pure Ar gas with FAMILIARC™ MM-1S, resulting in excellent electro deposition coating after welding as well as superb corrosion resistance after coating.
2. Superior bead shape:
   Due to the flat and wide bead shape, broad gap tolerance is achieved. Because of the uniform bead, short beads in particular are smooth, even right after a welding start and when the crater is short.
3. Low spatter and fume:
   Using FAMILIARC™ MM-1S with a pulsed welding current generates less spatter (and almost no large-sized spatter) than a solid wire used for MAG welding, greatly reducing spatter-removal time. Fume generation is just as low as a solid wire.



● Relationship between gap & wire aiming point (Welding condition：240A-1000mm/min)



A shift of wire aiming point, ±2mm and a tolerable gap up to 2mm are covered.

Challenging the difficulties in Japan and the world through the welding business

My heartfelt greetings to dearest KWT readers! My name is Toshihiro Nakamura, the General Manager of the Marketing Department in the Welding Business.

On March 11, 2011, the biggest earthquake ever hit the Tohoku (northeast) region in Japan, caused three monstrous disasters: the earthquake itself, the tsunami, and the collapse of the Fukushima No.1 nuclear power station. Occurring almost simultaneously, they resulted in 20,000 people dead or missing, 6,000 injuries, and 400,000 demolished or partially-destroyed buildings. The tsunami also swept away much infrastructure, causing immeasurable damages to the people there, such as the stoppage of the energy supply and the diffusion of radioactive substances. Two years on from the earthquake, 310,000 people continue to live in emergency facilities. Facing up to this historic calamity caused by not only nature but also human beings, we are eager to contribute to restoring the region through the welding business.

Meanwhile, the desire for people to remake and live in a more comfortable environment is never ending. We must try to overcome the obstacles by fabricating safe and reliable structures, transportation facilities, and energy-related equipment. In the energy fields, the recent growth in offshore oil drilling has increased demand for products that meet the requirements of steels used in offshore structures, namely low temperature service and higher tensile strength. Our clients have appreciated our ability to supply welding consumables and procedures with good notch toughness, high crack resistibility as well as extremely low hydrogen levels.

In the fields of robotic systems and specially-designed welding power sources, we have developed welding processes that drastically reduce spatter even with CO_2-MAG welding. They include a highly efficient welding method using flux cored wires to weld thick construction machinery plates and a welding procedure that solves how to weld galvanized sheet steels in car-manufacturing.

In the meantime, Kobe Steel's web site has gradually been improved. It is regularly updated with the latest information, such as that mentioned above. We would like to welcome all of KWT readers to our web site as well.

The Essen Welding Fair will be held in Germany this year. Kobe Steel will take part in it, jointly with Kobelco Welding Europe (KWE), Kobe Steel's sister company in the Netherlands. We plan to exhibit a diverse set of up-to-date welding consumables as well as processes. Please join us at the fair and we will be pleased to listen to your opinions, inquiries and suggestions because we believe it is the fastest way to understand and meet your needs.

Last but not least, I wish you success in business as well as good health. And I look forward to seeing you soon.

Toshihiro Nakamura
General Manager
Marketing Department
Welding Business
Kobe Steel, Ltd.

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KOBELCO WELDING TODAY
is published by
Marketing Department
Welding Business, Kobe Steel, Ltd.
URL: http//www.kobelco.co.jp/english
Email: ISMS@kobelco.com

KOBELCO WELDING TODAY Vol.16 No.2 2013

Meeting the requirements of offshore structures that operate in ever deeper and colder waters

1 Trends in global demand for offshore structures

Global energy consumption in 2035 is forecast to expand by 1.8 times that of 2010, while global GDP from 2010 to 2035 is estimated to grow an average 2.8% annually. Consumption of crude oil is expected to increase just over 30% between 2010 and 2035 mainly because of motor vehicle demand in developing countries. Consumption of natural gas, which is seen as the only energy source that will see an exponential increase in demand, is forecast to rise greatly, by 50% or more in 2035, as compared with 2010.

As demand for oil and natural gas increases, the decline rates of existing fields are intensifying; accordingly, new offshore drilling sites must be sought out and developed to secure oil and gas reserves. It is predicted that investment in offshore structures and related facilities between 2010 and 2020 will increase by a factor of three. Figures 1 and 2 show the trends in world oil and gas production and Figure 3, the estimated investment in offshore structures.

Figure 1: World oil production

Figure 2: World gas production

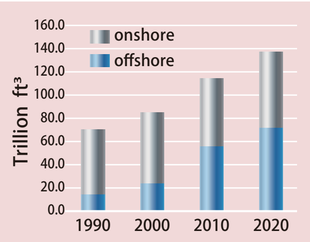
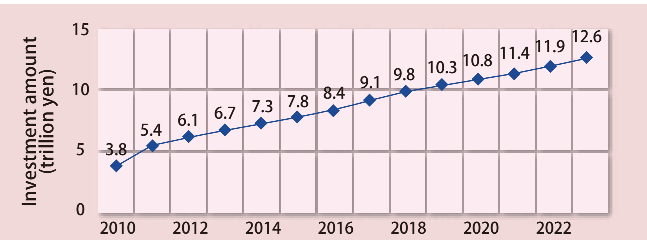


Figure 3: Estimated investment in offshore structures



About 50% of oil fields discovered in the last five years were mainly located in the deep waters off the coasts of Brazil and Africa. Because oil and gas prices have remained high, even deepwater drilling has become profitable and is likely to be developed further. Demand will increase for such offshore floating structures as semi-submergible rigs (SSRs), tension leg platforms (TLPs), floating production, storage and off-loading systems (FPSOs) and spars. Even demand for drillships, the vessel most often used for scientific or exploratory drilling of new deepwater oil or gas wells, is expected to increase. Figure 4 shows common offshore structures. In addition to drilling in deep waters, exploration in extremely cold areas, such as the polar regions, where high costs have kept them untouched will likely to begin in the near future.

New gas fields, mostly small- or medium-sized and offshore, will be depleted in 10 to 20 years. Exploration or production in such fields has been limited because the profits were too low to cover the high investment costs in onshore storage tanks and subsea pipelines. However, a new concept, Floating-LNG (F-LNG) is being researched as a way of dealing with distant gas fields where liquefaction facilities cannot be constructed for geographical or political reasons. F-LNG involves a floating ship able to carry out every operation in the production of Liquefied Natural Gas (LNG), including liquefaction, storage and off-loading to LNG ships. The first such developments in the world have been initiated in Malaysia and Australia.

2 Requirements for weld metals

As offshore drilling moves into increasingly colder and deeper regions, steels and weld metals are required to be tougher to be able to withstand harsh environments. On the upper structure (above sea level), such as a jacket,notch toughness of $vE_{-40°C}$≥42J is required, and weld joints for YP420MPa class high tensile strength (HT) steels, require fracture toughness of $\delta c_{-20°C}$≥0.25mm.

On the other hand, the lower part (below sea level) of a jack-up-rig, which must bear the load of ocean waves and tidal flows, requires the application of YP690MPa class steels in order to lessen a rig's total weight and improve the load bearing capacity as well. In addition, reliable welding consumables and procedures are required in order to secure appropriate notch toughness and cold crack resistance.

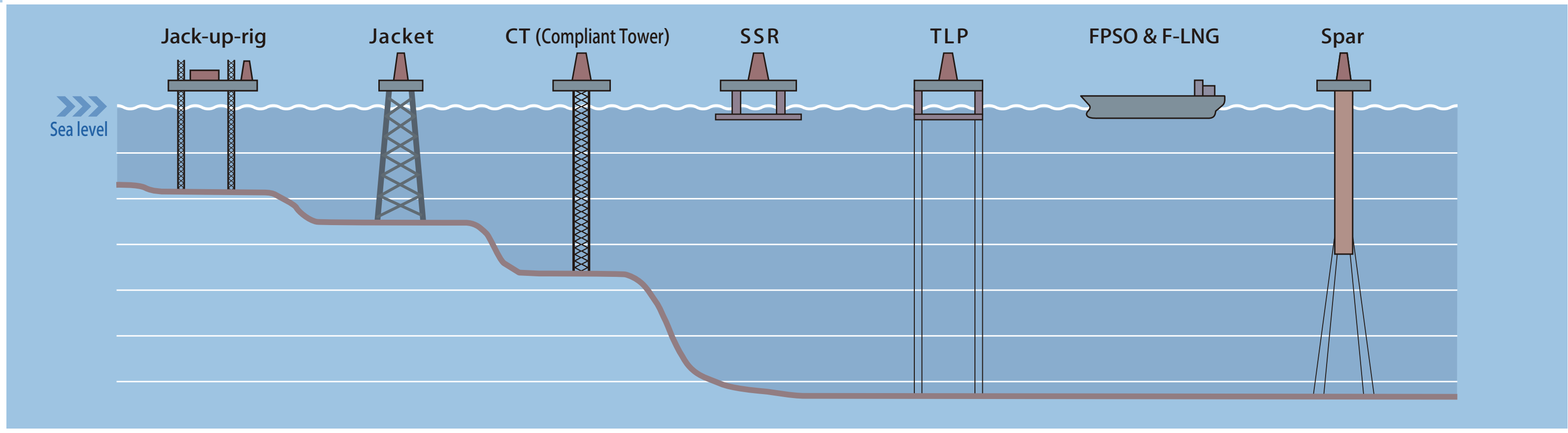
All-position welding consumables are essential for jackets in particular because they have multiple large diameter pipes for TKY joints as seen in Figure 5.

Carrying on-board liquefaction facilities, F-LNGs will be larger in size than FPSOs for oil; hence, F-LNG hull and tank structures are required to be unprecedentedly strong.

Another requirement for F-LNG will be to deal with the wave motions of LNG as it sloshes around inside partially-filled tanks, heavily pressing against hull or tank walls. In this regard, extremely heavy plates (about 50 mm thick) will add strength, and weld joint notch toughness will be required at -40°C or -50°C as well as fracture toughness at -10°C.

Figure 5: TKY joints

Figure 4: Typical offshore structures



3 Welding consumables for offshore structures

Table 1(page 5) shows typical welding consumables for offshore structures operating in low temperatures. Given that more offshore structures are being built in ever more challenging environments, the welding consumables developed for such offshore structures, in particular those developed for HT780MPa as well as HT520/HT550MPa class steels, are the subject of this article.

3-1. Welding consumables for HT780MPa class or YP690MPa class steels

For offshore structure fabrications using HT780MPa or YP690MPa class steels, SMAW, FCAW and SAW welding consumables have already been developed and marketed.

3-1-1. TRUSTARC™ LB-80L

For welding YP690MPa class steels requiring high notch toughness as well as cold crack resistance at low temperatures, ultra-low hydrogen covered electrodes (low in oxygen as well) still play a major roll. LB-80L (AWS A5.5 E11018-G H4), which was designed for DC welding, satisfies all of these requirements as shown below. Figure 6 shows an example of welding processes for rack portions of jack-up-rigs, where YP690MPa class steels are mainly used.

Figure 6: Example of welding processes for a rack portion of a jack-up-rig

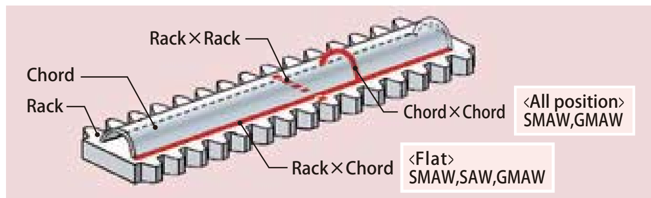


Table 2 shows that diffusible hydrogen in test results of LB-80L is as low as 2.0ml/100g and stable. It is, therefore, regarded as the most reliable welding consumable for cold crack resistance.

Table 2: Diffusible hydrogen content (ml/100g)

N=1	N=2	N=3	N=4	Average
1.9	1.5	1.3	1.7	1.6

Note: Test method: According to AWS A4.3 (Gas chromatography)
Welding current: 150 A (4.0mm dia.; DCEP)

The test conditions and the tensile properties of a butt joint of HT780MPa class steel welded by LB-80L are shown in Tables 3 and 4, and the macrostructure and the notch toughness transition curve, in Figures 7 and 8 respectively.

Table 3: Test conditions of butt joint (LB-80L: 4.0mm dia.)

Test plate	HT780MPa class steel; 50mm thick
Groove preparation	Double V (50° and 70°)
Welding position	Vertical upward (3G)
Welding parameters	120 A-22 V (DCEP)
Heat input	2.0 kJ/mm
Preheating & interpass temperature	150°C

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Table 1: Typical welding consumables for offshore structures in low temperature services

Welding process	Welding consumables	Min. applicable strength*1 (MPa) 0.2%YP (MPa)	TS (MPa)	Applicable temperature*1 (°C) vE ≥47J	CTOD (δ) ≥0.25mm or ≥0.10mm*4	C	Si	Mn	Ni	Mo	Ti	B	Polarity or shielding gas
SMAW	LB-7018-1	400/390*2	520/490*2	-40	0	0.06	0.4	1.5	—	—	0.03	0.004	AC/DCEP *3
	LB-52NS	400/390*2	520/490*2	-60	-30	0.08	0.4	1.4	0.5	—	0.02	0.002	
	NB-1SJ	460/400*2	550/520*2	-60	-40	0.08	0.3	1.3	1.3	—	0.02	0.002	
	LB-55NS	470/460*2	570/550*2	-60	—	0.06	0.3	1.5	0.9	0.1	0.01	0.003	
	LB-62L	530/460*2	620/550*2	-60	-10	0.07	0.3	1.0	2.1	0.1	0.02	0.002	
	LB-67L	530	620	-60	-20	0.06	0.3	1.1	2.6	—	0.01	0.002	DCEP
	LB-67LJ	530	620	-60	-40 *4	0.07	0.4	1.1	2.6	—	0.02	0.002	
	LB-88LT	690	770	-60	—	0.04	0.6	1.8	2.6	0.7	—	—	AC
	LB-80L	690	770	-60	—	0.04	0.5	1.4	3.0	0.8	—	—	DCEP
SAW	PF-H55LT/US-36	400	520	-60	-50	0.08	0.2	1.4	—	—	0.02	0.004	AC
	PF-H55LT/US-36J	465	550	-60	-20	0.09	0.3	1.7	—	—	0.02	0.004	
	PF-H55S/US-2N	530	620	-60	-20	0.08	0.3	1.3	2.3	0.2	—	—	
	PF-H80AK/US-80LT	690	770	-60	—	0.08	0.3	1.7	2.5	0.7	—	—	
	PF-H55AS/US-36J	400	520	-60	-20	0.07	0.2	1.4	—	—	0.02	0.004	DCEP
	PF-H62AS/US-2N	530	620	-60	-20	0.05	0.3	1.3	2.5	0.2	0.01	—	
	PF-H80AS/US-80LT	690	770	-60	—	0.06	0.5	1.6	2.4	0.7	—	—	
GMAW (Solid)	MG-S50LT	400	520	-60	-30	0.09	0.4	1.9	—	—	0.08	0.006	80%Ar-20%CO_2
	MG-S88A	690	770	-60	—	0.06	0.5	1.6	3.6	0.8	—	—	
GMAW (FCW)	DW-55L	400	520	-60	0	0.04	0.4	1.3	1.4	—	0.05	0.003	CO_2
	DW-55SH	400	520	-60	-10	0.05	0.3	1.4	1.6	—	0.04	0.003	
	DW-55LSR	420	550	-60	-10	0.06	0.3	1.2	1.5	—	0.05	0.004	
	DW-62L	500	610	-60	-40 *4	0.06	0.3	1.2	2.5	—	0.06	0.004	
	DW-A81Ni1	420	550	-60	-10	0.05	0.3	1.3	0.9	—	0.04	0.005	80%Ar-20%CO_2
	DW-A55L	460	550	-60	-20	0.06	0.3	1.2	1.4	—	0.06	0.003	
	DW-A55LSR	420	550	-60	-20	0.05	0.3	1.3	0.9	—	0.04	0.003	
	DW-A62L	500	610	-60	-40 *4	0.07	0.3	1.3	2.1	—	0.04	0.003	
	DW-A80L	690	770	-40	—	0.07	0.3	1.9	2.5	0.2	0.07	—	

Note: *1: It is in as-welded condition but not under post weld heat treatment.
*2: The left value is applicable to AC (alternate current) welding and the right, to DCEP (direct current, electrode positive) welding.
*3: Chemical compositions of LB-52NS, NB-1SJ and LB-62L weld metals are obtained by AC welding and the others, by DCEP welding.
*4: CTOD value at -40°C is ≥0.10mm.

Table 4: Tensile properties of butt joint weld metal

Location	Tensile properties 0.2%PS (MPa)	TS (MPa)	El (%)
Final	773	865	19
Center	807	864	17
Back	753	832	17

Figure 7: Macrostructure of butt joint weld metal

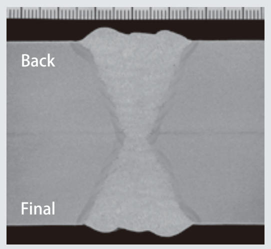
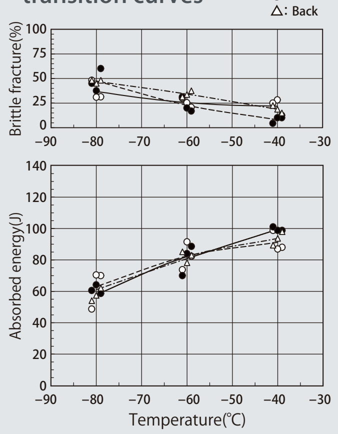


Figure 8: Notch toughness transition curves



3-1-2. TRUSTARC™ DW-A80L

Because SMAW is inefficient and requires a rather high level of skill, the development of all-position rutile type flux cored wires (FCWs) has been desired. However, rutile type FCWs deposited weld metals with higher oxygen content and more oxide inclusions than those of SMAW in general, resulted in poor notch toughness. DW-A80L (AWS A5.29 E111T1-GM-H4) provides a solution by controlling the oxygen content in the flux while maintaining high notch toughness. The diffusible hydrogen content with DW-A80L is around 2.5ml/100g, as shown in Table 5, an extremely low level for a rutile type FCW.

Table 5: Diffusible hydrogen content (ml/100g)

N=1	N=2	N=3	N=4	Average
2.5	2.3	2.3	2.7	2.4

Note: Test method: According to AWS A4.3 (Gas chromatography)
Welding parameters: 265A–28V–300mm/min
Wire stick out: 20mm; Shielding gas: 80%Ar-20%CO_2

Butt joint welding with DW-A80L on HT780MPa class steel was conducted in the vertical upward position (3G) and horizontal position (2G). Tables 6 and 7 show the test conditions and the tensile properties; Figures 9 and 11, the macrostructures; and Figures 10 and 12, the notch toughness transition curves in 3G and 2G positions respectively.

Table 6: Test conditions of butt joint welding (DW-A80L:1.2mm dia.)

Test plate	HT780MPa class steel; 50mm thick	
Welding position	Vertical upward (3G)	Horizontal (2G)
Groove preparation	Double V (40° & 60°)	Double bevel (50° & 60°)
Welding parameters	180-200A, 23-24V	220-260A, 25-28V
Heat input	1.7 kJ/mm	1.0 kJ/mm
Shielding gas	80%Ar-20%CO_2, 25 l/min	
Preheating temperature	100 °C	
Interpass temperature	100-150 °C	
PWHT	As-welded	

Table 7: Tensile properties of butt joint weld metals

Welding position	Location	Tensile properties 0.2%PS (MPa)	TS (MPa)	El (%)
3G	Final	736	811	23
	Center	807	856	23
	Back	738	817	24
2G	Final	776	814	19
	Center	833	863	18
	Back	808	843	20

3-1-3. TRUSTARC™ PF-H80AS/TRUSTARC™ US-80LT

Developed by Kobe Steel, PF-H80AS is a bonded type SAW flux with high basicity that allows very low oxygen content in weld metals. In combination with PF-H80AS flux and US-80LT wire (AWS A5.23 F11A10-EG-G), it offers excellent notch toughness even at low temperatures. The diffusible hydrogen content in the weld metals is reduced to as extremely low as 1.5ml/100g (Table 8) by the effect of the flux on the arc. Also shown are the test conditions, the multi-layer cracking test results and the mechanical properties in Tables 9, 10 and 11 respectively. This combination obtains very high quality weld metals.

Figure 9: Macrostructure of butt joint weld metals in 3G position

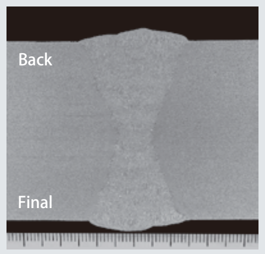


Figure 10: Notch toughness transition curve in 3G position

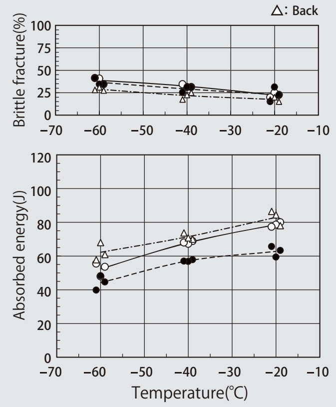


Table 8: Diffusible hydrogen content (ml/100g)

N=1	N=2	N=3	N=4	Average
1.2	1.3	1.6	1.4	1.4

Note: Test method: According to AWS A4.3 (Gas chromatography)
Welding parameters: 500A–30V–300mm/min; DCEP

Table 9: Test conditions of butt joint welding with PF-H80AS/US-80LT

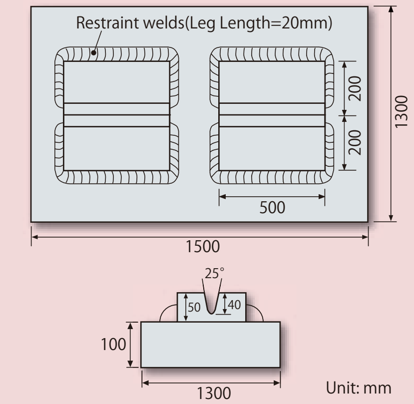
Test plate	HT780MPa class steel; 50mm thick	
Welding position	Flat (1G)	
Restraint condition		
Welding parameters	600A-30V-300mm/min	
Heat input	3.6 kJ/mm	
Preheating temperature / Interpass temperature	75°C	100°C

Table 10: Multi-layer weld cracking test results

Preheating & interpass temperature (°C)	Ultrasonic test result
75	No defect
100	No defect

Table 11: Mechanical properties of weld metal

0.2%PS (MPa)	TS (MPa)	El (%)	Absorbed energy (J) −80°C	−60°C	−40°C
768	895	23	88, 88, 90 Avg 88	101, 93, 93 Avg 96	101, 105, 106 Avg 104

Figure 11: Macrostructure of butt joint weld metals in 2G position

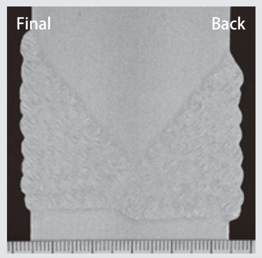
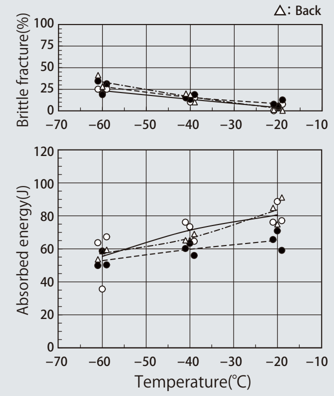


Figure 12: Notch toughness transition curve in 2G position



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3-2. FCWs for HT520MPa and HT550MPa class steels

While a range of FCWs for HT520MPa and HT550MPa class steels exist in world markets, rutile type FCWs that are easy to operate, satisfy notch toughness at -60 C as well as CT D at -10 C, and enable PWHT have not been available. However, DW-55SH (not for PWHT), DW-55LS and DW-A55LS (both for PWHT) are FCWs that meet these requirements.

3-2-1. TRUSTARC™ DW-55SH

Construction of the world s largest F-L G (the Shell Prelude F-L G project) has started in Korea. It is more than 450 m in length, over 70 m in height, and its L G storage capacity exceeds 200,000m^3. Welding such an enormous floating structure requires strict controls as well as high welding efficiency. DW-55SH (AWS A5.29 E81T1-K2C) has been developed at the client s request. A rutile type FCW for all position welding, it offers superior notch toughness as low as -60 C and CT D as low as -10 C.

Tables 12 and 13 show the respective test conditions and the mechanical properties, including CT D at -10 C. Figures 13 and 14 show the macrostructure and the notch toughness transition curve in butt joint weld metals with DW-55SH, respectively.

Table 12: Test conditions of butt joint welding (DW-55SH: 1.2mm dia.)

Test plate	JIS G3106 SM400B; 40mm thick
Groove preparation	Double V (45° & 60°)
Welding position	Vertical upward (3G)
Welding parameters	200A - 26V
Shielding gas	100%CO_2, 25 l/min
Preheating and interpass temp.	130 -150 °C

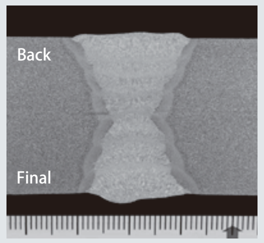

Figure 13: Macrostructure of butt joint weld metal

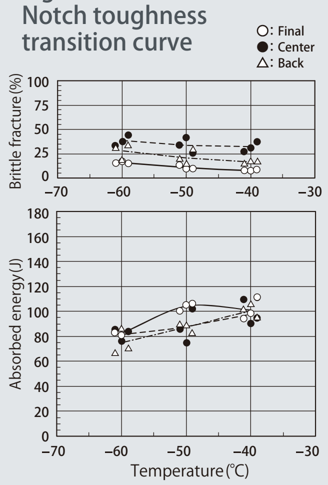

Figure 14: Notch toughness transition curve

3-2-2. TRUSTARC™ DW-55LSR & TRUSTARC™ DW-A55LSR

DW-55LS and DW-A55LS (S series FCWs for Stress elief) (AWS A5.29 E81T1-K2C, - i1M) were developed for PWHT applications in the mid 1990s and have been in use ever since for offshore structure fabrications. They are rutile type FCWs for all positions, offering excellent usability as well as extremely low levels of such impurities as b and . Figure 15 shows that reduced b and can raise notch toughness at -60 C in the as-welded condition as well as minimize the deterioration of notch toughness after PWHT.

S series FCWs are highly reputed by many offshore structure fabricators for their stability, high notch toughness and superb CT D properties. Singular products manufactured exclusively by Kobe Steel, these FCWs have been reaching over 300 tons a year in sales.

Butt joint weld metals deposited by DW-A55LS were tested. Tables 14 and 15 show the test conditions and the CT D property in the as-welded condition and after PWHT. Figure 16, the macrostructures in 3G and 2G positions, and Figures 17 and 18, the notch toughness transition curves in the as-welded and after PWHT conditions in 3G and 2G positions respectively.

Table 13: Tensile and CTOD test results

Location	Tensile properties			Critical CTOD (mm at -10°C)
	0.2%PS (MPa)	TS (MPa)	El (%)	
Final	536	613	29	0.95; 0.91; 0.88
Back	541	621	30	

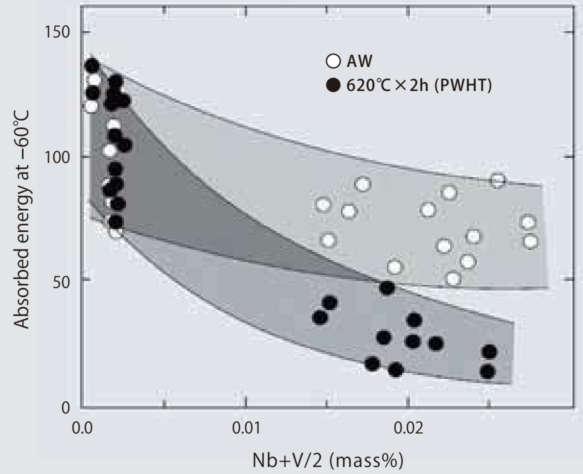

Figure 15: Relationship between Nb, V and notch toughness

Table 14: Test conditions of butt joint welding (DW-A55LSR: 1.2mm dia.)

Test plate	NK KF36; 50mm thick	
Groove preparation	Double bevel (50° & 60 °)	
Welding position	Vertical upward (3G)	Horizontal (2G)
Welding parameters	220A - 24V	260A - 28V
Shielding gas	80%Ar-20%CO_2, 25 l/min	
Heat input	1.9 kJ/mm	0.8 kJ/mm
Preheating temperature	100 °C	
Interpass temperature	100 -150 °C	
PWHT	As-welded & PWHT (623°C x 2h)	

Table 15: CTOD test results

PWHT	Welding position	Test temp. (°C)	Critical CTOD (mm)
As welded	3G	-35	0.75, 0.75
	2G		0.62, 0.63
623°C x 2h	3G	-20	0.89, 0.98
	2G		0.86, 0.85

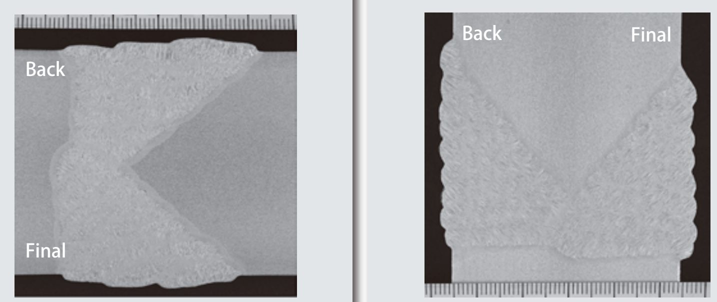

Figure 16: Macrostructures of butt joint weld metals

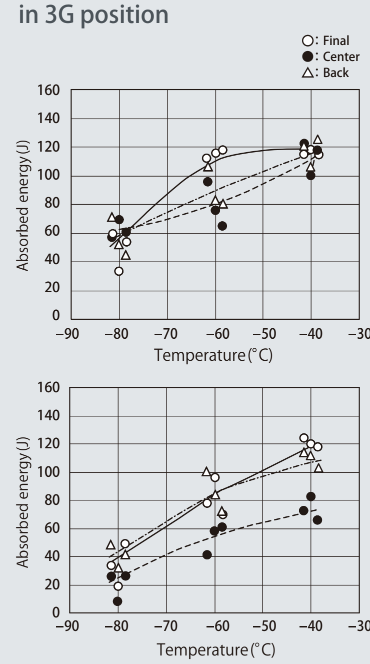

Figure 17: Notch toughness transition curves in as-welded (above) and after PWHT (below) conditions in 3G position

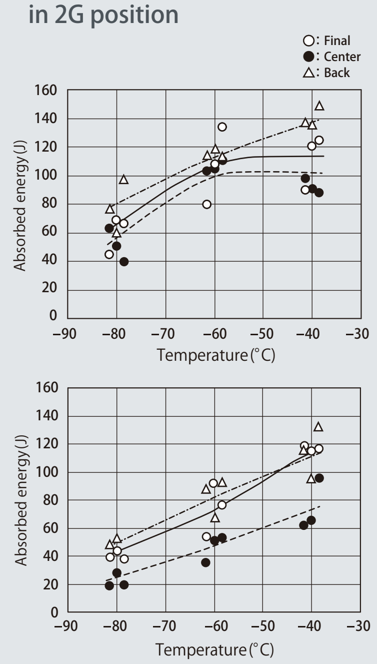

Figure 18: Notch toughness transition curves in as-welded (above) and after PWHT (below) conditions in 2G position

4 Postscript

Even though the shale energy revolution in the USA is impacting the supply and demand of energy worldwide, dependence on crude oil or natural gas will continue as global energy demand continues to increase. Drilling will continue to move offshore to deeper and colder waters. Accordingly, as offshore structures operate under more extreme conditions, standards and requirements, particularly for weld metals, will become more severe. For instance, a drilling project currently planned for the arctic is rumored to require CT D properties at -60 C. However, we are ready to develop the total welding solutions required for any welding need.

Although specifications and requirements for offshore structures will vary according to client needs, ship classification societies as well as the particular dimensions, operational conditions and weather conditions, we must maintain strict welding controls and procedures. For more details about purchasing and using our products, please contact the nearest Kobelco office or sales representatives.

References

【1】Ministry of Land, Infrastructure, Transport and Tourism of Japan, Maritime Bureau Document
【2】Photographs by Japan Drilling Co., Ltd.

First job transfer to the Netherlands, challenging and exciting at work and in private

Dear KWT readers My name is Hirohisa Watanabe, Managing Director of Kobelco Welding of Europe B. . (KWE) in the etherlands. I was transferred to KWE in April 2012 from the Technical Development Department (TDD) in Fujisawa, about 40 km south-west of Tokyo.

Since joining Kobe Steel, Ltd. (KSL) 17 years ago, I had been at TDD until I was transferred for the first time in my life to KWE about a year ago. Another first experience was that my assignment was to assume the managing director s position in the overseas company. And living alone, apart from my family was yet another first experience. How drastically my private life and my working environment have changed But I have found my new assignment as well as my daily life challenging and exciting.

KWE is the production and sales base of flux cored wires (FCWs) in European markets, and it is located in Heerlen, the southeastern section of the etherlands that borders on both Germany and Belgium. KWE covers all European countries, including ussia and Turkey, with a diverse range of FCWs of high quality and efficiency, under the slogan T (uality Products, Technical Supports, uick Delivery).

European economic problems continue, and under these market situations, we concentrate our marketing efforts in the energy-related industries such as offshore structures and pipelines, which show comparatively steady growth.

Let me introduce my home of Maastricht, which is about 30km west of Heerlen. Maastricht is now famous with the Maastricht treaty that determined the inauguration of the EU in 1992. However, its history goes back to the B.C. era. Although the city had often been ruled by

many different countries, it prospered by absorbing their respective cultures. It is really a border-less city, and the most distinctive example of this is seen in the food. estaurants in Maastricht serve multinational dishes of excellent quality, and of course at reasonable prices. (However, I ve noticed there is no Korean restaurant, though I do not know why.)

People in Maastricht are quite cheerful and enjoy their time by eating, drinking and chatting under open terraces until dark during the summer time, when the sun sets around 10 pm. The winter Carnival was held between February 9 and 12 this year, and the people, wearing original costumes, could be seen throughout the city - drinking, singing and parading in the streets. But there was no dancing with bikinis - unlike the carnival in io de aneiro, Brazil. It s too cold to do so here. This year, ob, Production General Manager at KWE, and his wife vonne were honored by being chosen as their town s Carnival Prince and Princess. Posters of them were put up in many places at KWE.

In Maastricht, where the long history and people s cheerful spirits are well mixed, I cannot stop eating delicious dishes, despite my gradually increasing weight. EET SMAKELI K (Bon appetite in the Dutch language)

The Essen Welding Fair, held every 4 years in Germany, is going to be held in September this year, and KWE will take part in it, jointly with KSL as usual. I sincerely look forward to seeing all of you there.

Poster of ROB, Production GM at KWE, and his wife, Yvonne, wearing the Prince and Princess costumes in this year's Carnival.

Mr Hirohisa Watanabe, Managing Director of KWE, toasting "EET SMAKELIJK!" with his favorite wine at dinner.

KOBELCO WELDING TODAY
Vol.16 No.2 2013

Wonderful Texas and broad-minded Texans

Dear KWT readers My name is asuyuki okota, and I was assigned to Kobelco Welding of America Inc. (KWAI) located in Houston, Texas, as a Senior Welding Engineer in February 2012. ow that I have spent almost one and half year here, I feel that I have become accustomed to the American way of living and doing business.

Though I d always wanted to live and work in a foreign country like the USA, I felt uneasy about whether I could manage to get along because of the difference in language as well as culture. evertheless, Houston s warm climate as well as the broad-minded Texans have greatly calmed my uneasiness and helped me to settle down comfortably.

Established in Houston, KWAI has been doing business with welding materials for more than 20 years. The flux cored wires (FCWs) for stainless steels in particular have highly been reputed for their quality. The FCWs for carbon steels, for low temperature service and for nickel-based alloys also meet our clients diverse needs in orth, Central and South America.

In the USA, business looks to be rapidly recovering, judging from the activity of energy-related industries thanks to the shale gas revolution and from the pickup in car sales after a long and heavy slump. In Texas, where several big oil companies are headquartered, the work force is growing from outside the state. Even in our daily life, we can see such changes as increased numbers of cars, more crowded restaurants and higher home rental prices, which may make for a somewhat more difficult living environment. Meanwhile, as for KWAI s business, sales are gradually expanding in parallel with growth in the oil industry, and we keep our fingers crossed, hoping that this good business trend will continue for a long time.

When I first arrived here, I confess that I was shocked by American food. Although I had an image of what American dishes would be like when I was in apan, the actual sizes and quantities were far bigger than what I had imagined. Another surprise was how proud the Texans were of anything big. The quantity of food you get in Texas is so much more than in the other states. It goes without saying that you will likely damage your health if try to eat everything you are served. ou have to be brave enough to leave some food on the plate. In restaurants, you can take responsibility by not eating some of the food or by taking it home. I was impressed with such an American way of taking responsibility.

In the USA, there are natural monuments, such as the Grand Canyon, that have been left untouched. From Houston, many famous travel destinations are easy to get to - like ew rleans, which is famous for jazz, or Cancun in Mexico, the well-known resort and honeymoon Mecca. Furthermore, we can go to basketball, baseball, or American football games that are quite exciting to watch. Playing golf or tennis is also popular and available at a reasonable price. Houston might be the place where people who like to watch or play sports will never get bored.

If you have a chance to visit America, I recommend that you try American foods, travel around or play or watch sports.

I look forward to seeing you soon at FABTECH 2013 in Chicago or somewhere in the USA.

Mr Yasuyuki Yokota, Senior Welding Engineer at KWAI, watching a Houston Astros baseball game.

Mr Yokota (2nd from left) posing with players on the Houston Astros baseball team.