Zamil Steel, a Global Supplier of Quality Steel Buildings and Structures

Founded in 1977, Zamil Steel Industries (ZSI) is a global leader in the manufacture of pre-engineered steel buildings and the Middle East premier supplier of steel structures.

ZSI products are marketed in more than 70 countries through a network of 50 sales offices, 59 certified builders and 27 agents and distributors, and its main factories are located in Dammam First and Second Industrial Cities, with additional factories located in Egypt and Vietnam.

ZSI is one of the three business sectors of Zamil Industrial Investment Company (ZIIC), and its principal business units are Pre-Engineered Buildings, Structural Steel and Towers, and Galvanizing.

The Pre-Engineered Building Business Unit (PEBBU) is the oldest and largest of the company’s business units, with a monthly production capacity of 6,500 metric tons. Its Dammam-based factory is the largest single PEB factory in the world.

Welding is a key integral part of the fabrication process of any pre-engineered steel buildings. In order to manufacture quality products, ZSI uses quality welding consumables such as FCAW wires from KOBELCO due to the prime quality in strength and usability in out-of-position welding that is an essential part in producing good products.

ZSI has built a very unique and long business relationship with both Kobe Steel and United Welding & Supply (a local agent of Kobe Steel in KSA) ever since they started and established their business.

United Welding & Supply, which is a part of Abdullah Hashim Gases, a large industrial and medical gases producer in the Middle East, is a reliable supplier covering most industrial and welding needs including the supply of Kobelco FCAW wires.

The Structural Steel Business Unit (SSBU), established in 1983, is the second business unit of ZSI. It has been awarded recently the OHSAS 18001 and ISO 14001 certifications in addition to the ISO 9001:2001 to make it the only company in Saudi Arabia to have these endorsements. Today, SSBU can satisfy the structural steel requirements for large power and desalination plants, petrochemical, oil and gas plants, fertilizer and cement plants, steel mills, high-rise buildings and other industrial and commercial complexes.

Zamil Steel has been especially satisfied using one particular Kobe Steel FCAW wire for over 15 years: DW-Z100. The quality is suitable for and approved by ZSI’s clients for manufacturing quality buildings, due to its convenient self-peeling slag removal and glossy bead appearance that contribute to saving time and labor for postweld cleaning.

Reported by Azhar Shafi, Product Manager
United Welding & Supplies Co. Ltd., AWHAS
Enhancing our global view of our business

The Japan International Welding Show is scheduled to run from July 14th (Wed) to 17th (Sat) in Osaka, Japan. The Annual Assembly of the International Institute of Welding (IIW) is also going to be held simultaneously at the same place during the Welding Show. KOBELCO is preparing to exhibit the newest products including welding robots. I hope they will be attractive to and helpful for all the visitors to our booths to enjoy and learn new welding technologies. I also looking forward to seeing our important customers and the long time friends like dear readers of KOBELCO WELDING TODAY at the Show.

We are enhancing the global view of our business to respond to increasing demands for quality products and services from welding fabricators and distributors, worldwide. As an international manufacturer of welding consumables and robots, we will persistently strive for customer satisfaction by putting all our power and energy into developing advanced technologies and products. If our efforts will provide our customers with fruitful results and contribute to the welding industries by supplying state-of-the-art products, procedures and services, that will be our highest pleasure.

The supply-shortage problem of raw materials caused initially by the sudden boom, in one particular area overseas, is still a big issue for all of us. It is very difficult for us to estimate when this problem will cease. In this situation, what we can do now is to maximize our capability to supply our welding consumables and robots, in cooperation with our customers.

Masakazu Tojo
General Manager
International Operations Dept.
Welding Company
Kobe Steel, Ltd.

Canteen in TKW

Shown top left is the canteen of Thai-Kobe Welding. In a hot country like Thailand, the canteen is of course fully air-conditioned and fills the stomachs of 300 total day and night-shift workers and vendors around the clock. The most popular dish among the employees is/“Kra prao moo” (bottom left). This is rice topped with fried minced pork and coriander leaves. Perhaps, it is quite hot for you but you can make it milder by placing “Kai dao” (a fried egg) on it. You will get addicted to it, so to speak, as you continue to eat it every day. Fried rice with all these materials in it is also very nice... I like this fried rice better.

Reported by Kamata, TKW
The number and variety of filler metal brands marketed around the world is enormous. The vast majority of brands are classified and designated in accordance with relevant national standards such as AWS, BS, CSA, DIN, JIS and NF, European standard (EN), and ISO international standard, depending on which welding markets are targeted. Thanks to the specification number and classification system of such standards, selecting the filler metal for a particular base metal is not difficult.

When particular national standards are specified in the international trade, the specifications may become accepted in other national markets. For example, the AWS filler metal specifications are often accepted in the international welding trades because they have prevailed in the welding industry worldwide in conjunction with other American national welding-related standards such as ASME Boiler and Pressure Vessel Codes, AWS Structural Welding Code, and AWS Bridge Welding Code.

Part 1 of this article will show how Kobe Steel has followed the AWS filler metal specifications in the production and supply of welding consumables and participated in the AWS for the standardization of filler metals. Part-2 of this article (appearing in the next issue) will describe the EN standards that prevail more widely in the newly expanded EU countries. Part-2 will also include more information about the AWS standards.

### AWS specifications

**Kobe Steel currently follows**

Many of the standards that are concerned with welding, brazing, and related processes are drawn up by the American Welding Society (AWS), which include filler metal classifications for steel, aluminum, copper, nickel, magnesium, titanium, zirconium metals and alloys. There are currently 31 AWS specifications for welding materials, including 29 specifications for filler metals and two for brazing fluxes and shielding gases. Table 1 is a summary of AWS filler metal specifications that Kobe Steel currently follows when classifying KOBELCO brands for international trades.

<table>
<thead>
<tr>
<th>Description</th>
<th>AWS A5.1</th>
<th>AWS A5.10</th>
<th>AWS A5.2</th>
<th>AWS A5.5</th>
<th>AWS A5.6</th>
<th>AWS A5.7</th>
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Most AWS filler metal specifications have been approved by the American National Standards Institute (ANSI) as American National Standards. They are designated as ANSI/AWS A5.XX (and A5.XXM for the metric edition) and published by the AWS. These specifications have been adopted by the American Society of Mechanical Engineers (ASME) and are published as ASME Sec. II Part C - Specifications for Welding Rods, Electrodes, and Filler Metals. When ASME adopts an AWS filler metal specification, it adds the letters SFA to the AWS alphanumeric designation. Thus, ASME SFA-5.1, for example, is identical to the AWS A5.1 specification.

However, the year of publication of a particular ASME SFA-5.XX specification is not necessarily the same as that of the relevant AWS A5.XX specification because
of the different procedures for revision and inclusion by the two organizations. Kobe Steel follows the year of
publication adopted by current SFA specifications to
determine the AWS classifications for KOBELCO
products taking into account the convenience for users,
as shown in Table 1.

**A5.XX and A5.XXM are not equivalent**

As described in the relevant specifications, the
A5.17/A5.17M specification, for instance, is a combined
specification that utilizes both U.S. Customary Units
(such as psi and "") and the International System of
Units (such as MPa and ""). Because each system
produces measurements that are not equivalent, they
must be used independently, without combining values
in any way. There are 11 of such combined
specifications adopted by ASME Sec. II Part C (incl.

A KOBELCO brand, AF-490/US-12K for SAW, for
example, has been classified as F17A4-EM12K per
A5.17. If this brand were classified in accordance with
A5.17M-97, the classification would have to be F14A4-
EM12K. Therefore, this change may affect the existing
welding procedure specifications developed by
customers using the classification per the traditional
A5.17. This is why Kobe Steel presently follows the
traditional specifications for classifying all the filler
metals for international trade.

**Classification systems of
SMAW electrode specifications**

This section summarizes some of the most widely-used
classifications in order to show what factors are used to
classify shielded metal arc welding covered electrodes
by each specification.

**A5.1:** Carbon steel covered electrodes for SMAW are
classified with the basic designation consisting of (1)
minimum tensile strength, (2) welding position and (3)
type of covering. Table 2 shows the requirements for
some examples of the basic designation. Optional
supplemental designations add a suffix to the basic
designation to clarify higher elongation, higher notch
toughness, lower moisture content, and lower diffusible
hydrogen content as compared to the standard
designation, as shown in Table 3.

**A5.5:** Low-alloy steel covered electrodes (no single
alloying element exceeding 10.5 percent) for SMAW are
classified with the basic designation consisting of the
chemical composition of the weld metal together with
the same factors as stated in A5.1. Table 4 shows the
requirements for some classifications. Similar to A5.1,
supplemental classifications, with additional suffixes,
can designate diffusible hydrogen and moisture content.
The scope of applications for covered electrodes
classified by this specification ranges widely and
includes high strength steels, weather proof steels, heat-
resistant low-alloy steels, and pipeline steels.

**A5.4:** Stainless steel covered electrodes for SMAW are
classified with the basic designation comprised of (1)
weld metal chemical composition and (2) welding
current and position. The first three digits designate the
chemical composition. Occasionally, more than three digits are used, and letters may follow the digits to indicate a specific composition. The last two digits designate the usability with respect to welding position and type of current. Table 5 shows some examples of the basic and supplemental designations that specify type of welding current and position of welding.

A5.11: Nickel and nickel alloy covered electrodes for SMAW are classified according to the chemical composition of their undiluted weld metal. Table 6 shows the requirements for some widely used classifications.

A5.20: Carbon steel flux-cored wires for FCAW are classified with designators combining (1) minimum tensile strength, (2) welding position, (3) usability characteristics (incl. suitable shielding gases). The classifications can be suffixed to designate diffusible hydrogen similarly to A5.1. Table 7 shows the requirements for some widely used classifications and supplemental designations.

A5.29: Low alloy flux-cored wires for FCAW are classified with designators combining (1) minimum tensile strength, (2) welding position, (3) usability characteristics, (4) weld metal chemistry and (5) applicable shielding gas. The classifications can be
suffixed with the extra notch toughness designator (J) similar to that in A5.20 and with the diffusible hydrogen designators similar to those specified in A5.1. Table 8 shows the requirements for some extensively used classifications.

This article on classification systems will continue by describing the specifications for A5.18, A5.28, A5.9, A5.14, A5.17, and A5.23 in the next issue.

How Kobe Steel complies with customer requests for G grade filler metals

Like the A5.5 specification summarized in Table 4 above, other classifications, such as A5.20, A5.29, A5.22, A5.18, A5.28, A5.9 and A5.23, can specify a supplemental designation with the G suffix. As declared in the annex of A5.5, this allows a useful filler metal that would otherwise have to await a revision of the specification to be classified immediately under the existing specification. However, such G classifications are specified with very limited information about filler metal characteristics. This means, then, that two filler metals, each bearing the same G classification, may be quite different in some certain respect (chemistry for example).

Many KOBELCO brands, particularly the low-alloy filler metals, bear the G-classification because of unique chemical and mechanical properties designed to meet strict customer requirements for specific applications. Users that need more information on a particular KOBELCO filler metal of that classification for a certain application should refer to KOBELCO WELDING HANDBOOK or contact their nearest Kobe Steel office or distributor. Then, Kobe Steel will provide an appropriate document such as technical reports and Guarantee of Quality for the user. The user may want to incorporate that information (via ANSI/AWS A5.01, Filler Metal Procurement Guidelines) in the purchase order.

KOBELCO participates in the AWS to standardize filler metals

Kobe Steel has long been participating in the activities of the AWS Filler Metal Committee for the establishment and revision of filler metal standards, in collaboration with Kobelco Welding of America Inc., a Sustaining Company Member of the AWS. During Kobe Steel’s long history of such collaboration, the establishment of E6019 per A5.1, ENiCrFe-9 and ENiMo-8 per A5.11, ERNiMo-8 per A5.14, and R308LT1-5, R309LT1-5, R316LT1-5 and R347T1-5 per A5.22 are noticeable results from the standpoint of industrial and commercial significance of the products developed by Kobe Steel.
Stricter Quality Requirements Increasingly Demanded for DC-spec. Cr-Mo Filler Metals

CMA-96MBD and PF-200D/US-511ND for 1-1.25Cr-0.5Mo Steel, CMA-106ND and PF-200D/US521S for 2.25Cr-1Mo Steel: Our New Challenges

Most filler metals suitable for alternating current (AC) may be used with direct current (DC), unless the quality requirement is strict. When requirements are strict, the matter is treated seriously, even when a particular filler metal is classified by the AWS as an AC-or-DCEP type. This is because the polarity of welding current affects the chemical composition (C, Si, Mn, and O in particular) and thus the mechanical properties - of the weld metal.

Kobe Steel has long been producing Cr-Mo steel filler metals for oil refinery reactor vessels and heat exchangers, which include CMA-96MB (E8016-B2) and PF-200/US-511N (F8P2-EG-B2) for 1-1.25Cr-0.5Mo steel and CMA-106N (E9016-B3) and PF-200/US-521S (F9P2-EG-B3) for 2.25Cr-1Mo steel. These filler metals have a high reputation in the domestic and overseas markets. Unlike in the domestic market, DC power sources are often used overseas, increasing demand for filler metals designed for DC current use with better performance in notch toughness, resistance to temper embrittlement and high-temperature strength. To meet this demand, Kobe Steel, with its reputation for filler metal technical know-how, has developed brand new DC-spec. filler metals that are more suitable for DCEP welding and able to meet stringent requirements.

SMAW covered electrodes for 1-1.25Cr-0.5Mo and 2.25Cr-1Mo steel

With the elaborate chemical composition of the weld metal, CMA-96MBD (E8016-B2) and CMA-106ND (E9016-B3) exhibit excellent room and high-temperature tensile properties, low-temperature impact toughness and resistance to temper embrittlement, as well as good usability, with DCEP currents. Typical chemical and mechanical properties are shown in Tables 1 and 2, respectively.

X-bar and J-factor, shown in Table 1, are the index of control against the susceptibility to temper embrittlement of the weld metal: the higher the index, the more susceptible the weld metal becomes, according to the most commonly-accepted embrittlement mechanism.
confirm the temper embrittlement susceptibility, Charpy impact testing is conducted for the weld metal in the as-PWHT and PWHT + step-cooling (Figure 1) conditions. Figure 2 shows typical Charpy test results of CMA-96MBD and CMA-106ND weld metals that confirm their high resistance to temper embrittlement.

SAW flux/wire combinations for 1-1.25Cr-0.5Mo and 2.25Cr-1Mo steel

With sophisticated wire electrode chemistry and a unique bonded flux, PF-200D/US-511ND (F8P2-EG-B2) and PF-200D/US-521S (F9P2-EG-B3) offer first-class performance in room and high-temperature tensile strength and ductility, low-temperature notch toughness and resistance to temper embrittlement, as well as outstanding usability, with DCEP currents.

Table 3 shows typical chemical composition and temper embrittlement index values of the weld metals. Table 4 presents typical tensile properties of the weld metals, as a function of PWHT, tested at room and high temperatures. Figure 3 exhibits the unsurpassed resistance of the weld metals against temper embrittlement, with a comparison of 55-J absorbed energy transition temperatures in the as-PWHT and PWHT + SC conditions.
AWS Welding Show 2004 heats up the welding business

The AWS Welding Show was held at McCormick Place in Chicago from the 6th through the 8th of April, 2004. This year, the AWS Show was combined with the Gases and Welding Distributors Association (GAWDA), who mounted, as a part of their Regional Conference (from April 4-5), a special pavilion within the AWS Show. This expanded AWS exposition succeeded in bringing more visitors than a single exposition by the American Welding Society (AWS) would have. A total of 6,687 people attended, which was 11.5% increase from the last Show in Detroit.

Kobelco Welding of America (KWAI) attended as an exhibitor - making its 15th appearance in an AWS Show - and continued our promotion of the new DWG Series stainless flux cored wires. We received numerous positive leads from this Show which will certainly bring us lots of new business.

The AWS Show in 2005 will be held in Dallas Texas which is Kobelco’s backyard. See you in Dallas!

Reported by Andrew Sawada, KWAI

Greetings from a new member of the IOD: Applause encourages anybody

My name is Yuji Wakayama. I came to the International Operations Department last January. Still in my fourth year with Kobe Steel, I need much more experience and job knowledge. I hope you will kindly assist me.

Before coming to the IOD, I was in Kyushu and was in charge of sales through distributors. On a busy day, I could drive as far as 500 km my car loaded with Kobelco welding consumables, working on sales to customers throughout my territory. My guiding principle was to visit users at all events and thus I developed close contacts with many users in a period of a little less than three years. Now I am in charge of the Korean Market. Though the business arena has changed from the domestic to the international market, I believe the basics of my job remain the same. I wish to introduce as many of our products as possible that will serve our customers’ purposes to the fullest extent.

My hobby is wind music. It is 12 years since I started playing the tuba. I take part in a concert once or twice in a year where we play pieces arranged from orchestra music and film music. An important factor for achieving good performances is that every player should show his full ability. However, even more important is that each player should not go-it-alone, but be aware of belonging to a band that seeks to make a piece of music in harmony with the other performers. In fact, this is the biggest attraction for members of a musical band. Once you are given applause on the stage from the audience after a performance, you never can stop being a player.

I believe that the same factors apply to business. It is a splendid thing for me to be conscious of an objective, such as the welded structure that the user wishes to make, and, together with the user and distributor, stimulate each other until we finally accomplish it. I will never forget the applause I will be given after accomplishing an objective, even though the sound will be different from the applause after a stage performance. I wish to tackle my job with such a frame of mind.

Yuji Wakayama
IOD, Welding Co. Kobe Steel, Ltd.

The AWS Show in 2005 will be held in Dallas Texas which is Kobelco's backyard. See you in Dallas!
Good bye to KWAI...

After six years assignment as president of KWAI, I have come back to Kobe Steel, Japan, in May. During my stay in the US, I had tremendous support from KWAI customers and distributors in USA, Canada and Mexico. I really appreciated the great encouragement extended to me. Thanks to the combined effect of quality product, quick delivery and distributors’ strong support, Kobe Steel has been successful to strengthen its business foundation in North America and Latin America.

My new assignment is as the General Affairs Manager of the Fujisawa Industrial Operations that is recognized as the Kobelco Welding Center consisting of R&D Dept., Welding System Dept., and the group companies for producing welding wires and conducting welding-related testing and inspection. I will tackle my new job with a new frame of mind so that I can contribute to the development of the KOBELCO welding business.

...then Hello from KWAI

I am Akihiko Alan Egami, the new president of KWAI, succeeding Mr. Kawaue, the former president. The assignment to this post was nothing but a surprise to me, because I had been working for the iron and steel business all my company life with Kobe Steel, except for the period when I was engaged in the headquarters administrative affairs for the Personnel and Planning Departments. I believe this kind of personnel relocation is unusual with only a few precedents. My most recent post was in Hokkaido, the northernmost island of Japan where there was much snowfall. Further back, I was in Singapore, a land of perpetual summer, before snowy Hokkaido! Thus, it really has been a series of physically tough relocations for me, going from a hot land to a cold land and now to hot Houston.

All the same, I am excited with my new assignment. For, the Welding Company of Kobe Steel is one of the leading companies in the world, and I am convinced that our products are the best in quality, the world over. With this new assignment, I am now given the responsibility of sales of our welding products in North America. This new challenge thrills me. I am firmly determined to bring KWAI to such a position comparable to the BIG 3 of the USA with a view to local production in the future. Let me sincerely ask you for your kind cooperation in achieving this end.

I have always had to wear a business suit to work. But here in Texas, I may even have the freedom to work in a cowboy suit! (Well, perhaps that is exaggerating a little.) Seriously, it will be a pleasure for me to meet various sorts of people and have a wide range of cross-cultural experiences. My immediate personal goal is to brush up my English so that I can cheer and shout and converse with fellow spectators at the games of the four major professional sports leagues: MLB (Major League Baseball), NFL (National Football League), NBA (National Basketball Association) and NHL (National Hockey League). My three sons have grown up and stay in Japan, and at this time I live with my wife alone after twenty odd years. Taking this opportunity, I hope we will be able to enjoy a second honeymoon together.

I plan to visit many places in the KWAI wide territory starting today! It will be a real pleasure to meet our precious distributors, who are also dear readers of Kobelco Welding Today.