

Current Status in Chinese Welding Industries

Dongguang Park

Harbin Welding Institute, Harbin 150080, China

1 Organization

1.1 Chinese Welding Society (CWS)

Chinese Welding Society found in 1962, is a national mass academic organization and the official IIW member society in China, which has 28 special subsidiaries and sets up branch office in each province in China. CWS has established close relationship with other organizations.

Objectives of CWS are that of:

- To promote the development of welding science and technology;
- To promote the domestic and international exchange and cooperation in welding and allied processes field;
- To provide technical assistance in the form of consultancy and training.

CWS services more than 20,000 members all over the world. Its membership consists of engineers, scientists, educators, researchers, welders, inspectors, welding foremen, company executives and officers, and sales associates. Interests include automatic, semi-automatic and manual welding, as well as brazing, soldering, ceramics, lamination, robotics, safety and health.

CWS plays an important role with its main functions of:

- Holding of national and international conferences and exposition on welding technology and allied processes;
- Training of welding personnel
- Technical advisory services and information transfer
- Representing China joining international activities

1.2 China Welding Association (CWA)

China Welding Association found in May 1987, is a welding trade organization and nonprofit independent corporation in China. It consists of 710 member bodies with a rate of 86% industry enterprises and 14% research, education bodies involving welding.

CWA implement its objectives by means of:

- Playing a role of 'Bridge' and 'link' between enterprises and the government and reflecting desire of enterprises and cooperate with the government in industry management;
- Promote the progress of welding technology;
- Increase the level of management and economic result;

- Coordinate professional relationship and uphold common interests and legal rights of its membership;
- Investigating and collecting the fundamental data over industries;
- Providing technical assistance to its member body by organizing technology exchange, extending advanced technique and management experience;
- Undertaking the other tasks such as standardization, training program, welding exhibitions and fair; It also put forward its proposal with regarding to government policy for industry development;

1.3 Chinese Committee for Welding Standardization (CCWS)

Chinese Committee for Welding Standardization was found in June 1985. The organization is under the lead ship of China State Bureau of Quality & Technical Supervision (CSBTS). The technical scope and field engaged by the organization are equivalent to that of ISO/TC44.

The organization performs its function on following respects:

- Preparing the welding standard system and putting forward the program and annual plan relative to welding standard preparing, revising and reviewing;
- Organizing and execute the annual plan;
- Organizing the technical review activity to welding standards;
- Taking the responsibility of welding standard application, execution and explanation;
- Undertaking domestic management with respect to ISO/TC44, which may include: making a national statement to a cycled ISO documents or investigating each proposal;
- Evaluating welding standards for quality supervision purpose;
- Providing technical inquiry and service to industry during the application of welding standards.

1.4 Harbin Welding Institute

Harbin Welding Institute was found in 1956. It has become the largest and unique national comprehensive research body concerning welding in China. The institute carried out more than 500 research programs in the past 40 years with regarding to subjects on behaviors of welded metallic materials, welding technique for welded structure, new welding consumables, welding technology and equipment, welding automation and control welding robot application, surfacing processes, thermal cutting, NDT technique etc.

Besides of engaged in welding research and development, the institute also play an important role in welding industry by undertaking the secretariat tasks of CWS, CWA and CCWS. The two national quality supervision and test center for welding consumable and cutting machine & tool are located in the institute too.

In order to extend their advanced research outcomes, the institute begin to set up production base by establishing three welding technical companies involving manufacture of mechanized & automated welding equipment, electrodes, welding solid wires and flux cored wires, flux, powder, brazing and soldering filler metals etc.

2 Recent Main Activities

In the past two years, we have made a great progress. We have successfully sponsored the 6th Beijin-Esen Welding Exhibition last year, which had attracted more than thirty thousands people to participate. We also acquired the IIW formal authorization at the beginning of 2000 and became the first Authorized National Body outside of European countries.

- **The 6th Beijin-Esen Welding Exhibition**

The 6th Beijin-Esen Welding Exhibition will be organized in Shanghai from 14 to 17 Nov 2000. The fair was co-sponsored by Chinese Welding Society, German Welding Society, Korean Welding Industry Cooperative, American Welding Society and Japan Welding Engineering Society. This fair became one of the largest five Welding Shows around the world. The 286 exhibitors from 14 countries and area, present their latest technology, equipment and products on 723 exhibition booths. This Welding Show was expanding its exhibition area by some 20,000 sq.m. Meanwhile, an international welding conference was also sponsored jointly by CMES and CWS.

- **The Chinese Authorized National Body (CANB)**

China has acquired the IIW formal authorization by all votes in the IIW working meeting in Paris during January 23-27,2000, and became the first Authorized National Body outside of European countries. It will, of course, provide successful welding qualification and training program according to ISO standard in China. We are able to train our welding technical personnel according to international specification and issue the international certificates. There are more than 120 welding engineers received their IIW certifications by translation manner.

- **National CO₂ Welding Technique Application Conference**

The conference was jointly sponsored by CWS and CWA in 8-10 May 2000. More than 300 delegates took part in the conference. 8 experts from university, institute and industrial company offered investigating and technical reports concerning CO₂ welding technique and development in the country.

- **99'(Tianjin) Welding Week**

There were three main sections held during the week:

- **The 9th National Annual Assembly**

The 9th National Annual Assembly was held on October 23rd-24th, 1999. There were nearly one thousand representatives from Chinese factories and institutions took part in this meeting. We also issued one symposium with the 309selected thesis from the 409 contributions. In the conference, 12 main reports were presented by some famous experts including Dr. Lobanov from The E.O. Paton Electric Welding Institute, and more than 150 papers were issued at the 8 sub-colloquium.

- **Welding & Cutting Show**

Chinese Welding Society and China Welding Association held the show. There were more than one hundred factories attended this show and the exhibition area is 3500m². 181 companies

jointed the exhibit and shown their most advanced welding equipment, welding material and other relative products. Some manufactures also held technical lectures during the exhibition. Nearly ten thousands people visited the show.

— Welding Performance Competition

CWA and CWS held the competition together. The main difference for the competition was that is in an open manner, every one involving the competition could communicate each other. It was proved that such an activities have greatly promoted the communication between the technicians and improved the welder' skill.

3 Current Situations

3.1 Welding Consumable

China has become the largest welding consumable country for ages, and its production is over 1.1 million tons last year. Although this is a great progress, comparing with other industrial countries, the manual welding materials still take the majority, see table 1.

Table 1 Welding Consumable Structure in Different Countries and Area,(%)

Country (Area)	Electrode	Solid Wire	Flux Cored Wire	Welding Materials for SAW
China	78	10	0.33	10
Japan	19.4	38.4	29.3	12.2
USA	29	31	30	10
West Europe	26	56	7	11
Tai Wan Area	54	27	9	10

● Covered Electrodes

At present, nearly 500 manufactures produce about 460 classifications of covered electrode. The total production of the covered electrode had continuously keep in 900,000 tons in recent two years with 100,000 tons of them being export to 40 different countries and areas.

The table 2 shows a figure of the story.

Table 2 Annual Production of Covered Electrodes Since 1985,(in ton)

Year	Production	Year	Production
1985	330,000	1993	780,000
1986	490,000	1994	720,000
1987	520,000	1995	600,000
1988	480,000	1996	600,000
1989	420,000	1997	700,000
1990	410,000	1998	870,000
1991	420,000	1999	900,000
1992	710,000	2000	900,000

- **Solid Wires for Gas Shield Arc Welding**

More than 150 enterprises engage in manufacture of the solid wire in the country. Nearly 50 sets of the equipment in making solid wire were imported from oversea and the 150 domestic production lines get into service meanwhile. The capacity of solid wires has been up to 300,000 ton annually by increasing the production 20 times of that 15 years ago, see table 3.

Table 3 Annual Production of Solid wires Since 1985,(in ton)

Year	Production	Year	Production
1985	4,000	1993	32,000
1986	5,000	1994	45,000
1987	7,700	1995	70,000
1988	8,500	1996	72,000
1989	12,000	1997	80,000
1990	19,000	1998	90,000
1991	20,000	1999	100,000
1992	26,000	2000	110,000

- **Flux Cored Wires**

In the 1980's, the first foreign flux cored wire line was introduced into China under the background of implementing high effective welding in shipbuilding, and 28 enterprises start importing other 20 lines from UK, USA, Japan, Ukraine, Germany and Italy in 1993. In addition 18 lines made in China have also been put in service. Therefore, our flux cored wire capacity grows up to 20,000 tons each year. In despite of this, the annul production of flux cored wire is still keeping at a low value by 3000 tons in 1999 and 4000 tons in 2000.

- **Wires and Flux for Submerged Arc Welding**

The number of flux manufactures is more than 30, and the consumable for SAW also take a quite low rate by 10~12%. The total sum of consumables is near to 12,000 tons last year with 5000~6000 tons of wire and 6000 tons of flux respectively.

3.2 Welding Equipment

Chinese welding equipment industry has facing a baptism. One of significant evidence is that nearly 20% of enterprises resigned from the field last year. The number of enterprises is less than 900 comparing with the sum of 1500 two years ago. There are more than 150 types of welding machines in some 45 series and over 500 classifications in the country. The table 4 gives a figure of welder situation produced by 85 manufacturers in 1999.

Table 4 Statistics for Welders of Some 85 Manufactures in 1999

Product Type	AC Arc Welder	DC Arc Welder	Auto/semi auto Welder	Special Welding Equipment
Quantity	78216	23096	34444	6234
Percentage	51.7%	15.3%	22.8%	4.1%
Total	151356			

In addition, China also input welding equipment with a value near to 145 million USD, which is analyzed by inference, took almost half of the Chinese market.

3.3 Welding Standardization

In the background of entering WTO, one of the most important activities in China recently is to adopt “international standard”, of which the exact meaning isn’t simply covered by ISO standards but also including those standards being popular all around the world. China State Bureau of Quality & Technical Supervision (CSBTS) is a general administration, which is in charge of Chinese standardization affair. Chinese Committee for Welding Standardization takes the responsibility of these common standards involving welding definition, welding process, welding consumable, test methods and thermal cutting. There are about 160 standards prepared under the management of the committee. The Chinese welding standard system, to some extent, is quite similar to those of ISO, AWS and JIS. The system structure is shown in table 5.

Table 5 Welding Standard System in China

Standard classification	Quantity	Standards referenced by		
		ISO and EN	AWS and JIS	Others
Basic Standard	21	15	3	1
Welding consumable	29		18	
Brazing and Soldering	13	4	4	
Test method	64	7	12	23
Welding Process	8	1	3	3
Welding Safety	1		1	
Thermal Cutting	22	7		1
Total	158	34	41	28

China also plays an active role in international standardization by joining ISO standard working group and IIW select committee for welding since 1998. Some of important ISO standards (such as ISO 3834, ISO 9606 and ISO14731) have been adopted (or are subject to adopt) as China National standards.

3.4 Welding Training

The quality of work involved in welding depends on the skill of the welder to a high degree. The ability of welder is therefore important factor in ensuring the quality of the welded product. The training program to welding personnel draws a great attention both from government and industry in China because of the huge application (more than 80%) of manual welding.

In the past 30 years, there were several training systems in the country due to vast territory and widely scattered industry. With the opening to outside, China began to establish a welding training system equivalent to international system by introducing training courses and program from Germany in the middle of 1980’s. In May 1987, a special sub-committee for welding training was found in CWA. The organization consists of 93 number bodies, including two training institutes and 47 training center and stations. Up to now, more than 70000 persons received the training course under the system.

Harbin Welding Training Institute, found in 1984 at the background of scientific and technical cooperation project between Chinese government and German government, is the largest training base in the country. The institute qualified the first Authorized Training Body (ATB) certification since China acquired Authorized National Body (ANB) last year. Nearly 8000 persons trained in the institute and more than 4300 of them accepted European certificates.

On the other hand, some training bodies are also able to provide training course and issue certificates according to different requirements and specifications including ASME code, API code and JIS standard.

3.5 Publications

The main publications involving in welding in China include Welding Handbook, Welding Standard Corpus and Welding Thesis etc. Those publications usually published regularly by CWS and CCWS.

There are several kinds of welding journals including Welding & Joining, China Welding (English edit), Welding Abstracts and Transaction of China Welding Institution available from Harbin Welding Institute.

4 Underway and Upcoming Programs

4.1 Welding Town Construction

Harbin is an important city that located in northeast of China. The city enjoys a famous reputation of 'welding center' in the country because of the most important university, institute, manufacturers and organizations involving welding in the city. The city starts a magnificent aim of 'International Welding Town' by establishing the welding technical bases for innovation, research outcome transformation, application and training. This project has got plenty support both from government and industry, and three steps will execute by accomplishing:

- National Engineering Research Center of High Efficiency Welding Technology in 2000;
- Numerical-Controlled Plasma Cutting Machine Manufacture Base in 2001;
- Welding Automatic System Integration Technology in 2003.

4.2 Welding Week' 2001

Welding Week' 2001 is recognized as the biggest event in the field of Chinese welding industry this year. There will be serial activities held during the week, and the six main sessions are:

- The National General Assembly of CWA (from Oct.14 to 16);
- The International Welding Show (from Oct.15 to 18);
- The Welding Performance Competition (from Oct.16 to 17);
- The 10th National Annual Assembly (from Oct.17 to 19);
- The Welding Night (Oct.17);
- The Conference (or Meeting) held by sub-committees or working groups

Compare with the Welding Week in 1999, Welding Week' 2001 will be more open and in a large scale. The subject of the Welding Week is determined as "Current Status and Developing Stratagem of Welding Technology on Chinese Manufacture Industry in New Century". Some of foreign colleagues will be invited to participate the event. We are also expecting more success to the coming day.