
Welder Training and Certification - Role of IIW India

R. Banerjee

Executive Director, IIW India

INTRODUCTION

The Indian Institute of Welding (IIW India) is a professional body devoted to the promotion and advancement of welding science and technology in India. Established in 1966 it has twelve branches and chapters spread throughout the country. It has over 4000 welding professionals and 300 industries as members. IIW India is a member society of the International Institute of Welding (IIW) and has been accorded the status of an Authorised National Body for the training and certification of welding professionals by the International Institute of Welding.

Welding is a widely used skill offering opportunities for careers in the fabrication and construction industries as well as for self employment in small scale enterprises.

The major process used in fabrication is welding. The process is used in fabricating everything we see around us like buildings, bridges, flyover, cars, locomotives and coaches, ship, airplanes, general machineries, consumer durables and defense equipment. In fact for every ton of steel used about 5 kg of weld metal is required to be deposited by different welding processes.

With the rapid growth in the Indian economy and steel consumption there is a corresponding growth in welding activities. This has generated a huge demand for skilled and qualified welders and other related knowledgeable

professionals in the fabrication and construction industries. Availability of competent and skilled people in welding at all levels is today recognised as a major constraint for the Indian fabrication and construction industry.

In response to this need, IIW India has taken a number of initiatives in recent years for human resources development in welding. In particular, for training and certification of welders the institute has established the following programs.

- Accredited by the International Authorisation Board of IIW to conduct International Welder courses which are globally recognized and accepted.
- The institute has launched IIW India's National Welder Training & Certification Scheme at the national level.
- The institute has been empanelled as an 'An Assessing Body' under Govt. of India's Directorate of Employment & Training, for all Fabrication Sector courses under its Skill Development Initiative.

The present article attempts to project the role that IIW India is playing to meet the industries demand for competent and qualified welders, through developing courses for the different welding processes, approving welder training centres, training the trainers and providing independent testing, examination and certification facilities through its Authorised Examiners.

STEEL CONSUMPTION IN INDIA AND DEMAND FOR WELDERS

The sustainable level of per capita consumption of steel is about 300kg / person / year in a developed economy. When a country is in infrastructure creation mode, the consumption goes up to even 1,000 kg / person / year and finally may stabilise at around 300 kg. The per capita steel consumption for China is 220 kgs and that for South Korea is as high as 950 Kg presently. Compare this with India's steel consumption of 45 kg/person/year.

India presently consumes about 60 million tons of steel every year, most of which is used for fabrication and construction activities. Steel is used for creating infrastructure - roads, bridges etc, for building power plants, petrochemical and refinery complexes, for railways rolling stock & track, manufacturing ships, locomotives and cars etc. The declared Government plan of massive priority investment in infrastructure and construction envisages much higher steel consumption. The estimate is that of steel consumption in India reaching 100 million tons by 2016.

Apart from the bulk demand for welding personnel to match the growth in steel there is need for people with greater technical knowledge and expertise to match the requirements of advanced materials and processes. Advancement in technology has led to the use of improved quality, higher tensile and low corrosion steels, increased large scale

use of stainless steel in construction and transportation segment including railways and use of other materials of construction and fabrication. There is also continuous development of welding processes for higher quality and productivity along with reduced cost. Environment, health and productivity considerations are also changing the fabrication procedures dramatically.

Obviously, there will be a corresponding growth in welding activities. There is a great demand for qualified and knowledgeable welders and other related skilled professionals in fabrication and construction industries, such that expert welders / welding professionals have become a sought after commodity. It is estimated that there is a demand for 2,00,000 skilled welders in industry today.

CODES AND STANDARDS IN FABRICATION AND REQUIREMENT FOR WELDER CERTIFICATION

Codes are necessary to assure reliability and safety of equipment and structures. Codes provide rules for design, manufacture (by forming / welding) inspection and testing of fabricated equipment and structures

Examples of codes

- ASME Boiler and Pressure Vessel code

- AWS Structural Welding code
- API pipe welding code
- EN 15085 Fabrication of Railway vehicles and components

The rules require that all welders have to be approved and certified to work on any coded fabrication.

Thus a welder has to acquire all the following to be effectively employed and for career enhancement in the industry.

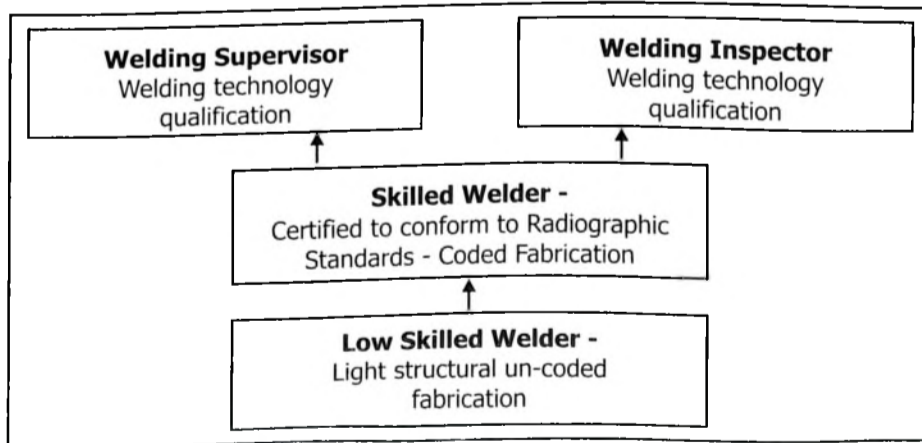
- **skill,**
- **knowledge and**
- **certification / qualification**

Further, the welder has to be trained in the different welding processes used in fabrication relevant to his plant/ industry and acquire certification for each type of process. The major welding processes being

- Manual Metal Arc Welding (MMAW)
- Gas tungsten Arc Welding (GMAW) - also known as TIG
- Gas Metal Arc Welding (GMAW) - also known as MIG / MAG
- Flux cored Arc Welding (FCAW)
- Submerged Arc welding (SAW)

Career Progression of a Welder

In general there are the following types of welded fabrication and except the first category a welder requires to be properly trained and certified to work on them.



- Light Structurals (non-critical)
- Medium & Heavy Structurals
- Pressure vessels (Fired and unfired)
- Piping and pipelines

As would be apparent the routes for career progression for a welder, after acquiring necessary skill certification in various processes are to become either a welding shop supervisor or welding inspector. Both these require further education, training and qualification.

Requirements of a Welding Supervisor / Inspector

- He should have good practical knowledge of the relevant welding processes to guide the welders regarding cause of welding defects and their rectification.
- He is basically required to supervise the overall fabrication process including cutting, bending and assembling of plates, establishment of welding procedures, distortion control, pre and post heating procedures, inspection and testing of welds and components etc.
- An idea on the methodology of quality assurance and quality control is also required from the Welding Supervisor / Inspector, and he should lead the team for successful implementation of these techniques.
- The Welding supervisor / Inspector should have good knowledge the procedures and implications of
 - Non-destructive testing
 - Destructive testing

Thus it is necessary provide a comprehensive system for welder education, training and certification/ qualification so that workmen coming into this trade can reach their full potential.

VOCATIONAL TRAINING SYSTEM IN INDIA

Welder training is part of the vocational training system in India. Vocational training being a concurrent subject under the constitution, the Central and State Governments share responsibility for effective implementation of the vocational training system in the country. At the national level, the Directorate General of Employment and Training (DGE&T) under the Ministry of Labour and Employment (MoLE), is the nodal body for formulating policies, laying down norms, standards, conducting trade tests and certification of vocational training under the aegis of the National Council of Vocational Training (NCVT). The vocational training system under MoLE is one of the most comprehensive systems in the country.

Institutional Training

The State Governments through Industrial Training Institutes / Industrial Training Centres (ITIs / ITCs) impart institutionalized vocational training under Craftsman Training Scheme, which is one of the flagship programs run by the DGE&T.

The craftsman training is provided to youth with the objective to prepare semi-skilled workers for industry. The educational qualification required varies from class VIII to class XII depending on the trade. The duration of training varies from 6 months to three years. The trainees after completion of craftsmen training appear in the All India Trade Test to get National Trade Certificate awarded by the NCVT, which is recognised for the purpose of recruitment to the sub-ordinate technical posts at the shop floor level within the country as well as abroad.

At present there are around 8,700 ITIs

in the country, approx 2000 in the public sector and balance 6,700 in the private sector with a capacity to train 35,00,000 candidates in various trades. Approximately 25% of the ITIs provide courses in welding but majority for only basic gas and manual metal arc welding.

The capacity of the ITIs, although adequate previously is not sufficient to meet the demand for trained labour in the phase of 8% plus growth the country is achieving over the last few years. In addition there is need to upgrade the ITIs to meet the demands of the latest technologies and new skills and also locate ITIs in rural areas rather than present urban areas.

To this end the Government has taken a program added 1500 more ITIs and upgrade 500 existing ITIs as Centers of Excellence and already 800 new ITIs have been added and 100 upgraded. One of the routes is through public private partnership whereby private industry is offered management of government institutes.

In the above context IIW India is collaborating with Bipradas Industrial Training Institute, Krishnanagar, W.B. for up-gradation of its facilities and courses under the public private partnership scheme. IIW India Hon. Secretary General is Chairman of the Institutes Industrial Management Committee.

On the Job Training - Apprenticeship Training through Industry

Another important training scheme of DGE&T is apprenticeship training imparted under the Apprentices Act 1961 in industrial establishments to school leavers and ITI graduates with the objective to prepare skilled workers for industry. The educational qualifications vary from class VIII pass to class

XII pass depending on the trade. Duration of training varies from one year to four years. All India Trade tests are conducted under the aegis of NCVT and successful candidates are awarded National Apprenticeship Certificate, which is a recognized qualification for recruitment to the shop floor within the country and abroad.

At present, welding training provided by ITIs and through the apprenticeship training schemes is inconsistent in quality and trainees vary in competency. Further the requirements of the NCVT trade tests do not match the requirements of the industry particularly for any coded fabrication. Thus the fabricator has to invest in further training of the workmen to make them suitable for his job requirements.

Private Training Institutes

These may be classified into the following categories :

1. Training institutes run by welding product companies e.g. ESAB Welding Institute & ADOR Welding Institute, who provide quality training in the different welding processes with modern equipment and prepare the candidates for radiographic quality welding in plate and pipe. Although the training report of these institutes is well recognized by the industry but they are unable to provide formal certification as per any code which is a handicap for the students.
2. Training institutes run by charitable institutions like Don Bosco. They have a large network of over 100 institutes spread throughout the country of which around 50 have provision for welding training. However except a few which have good facilities the others provide

only basic training. The advantage of these institutes is that they are able to subsidize the training cost to the students through aid / donations received from various foreign and national organizations and provide a disciplined atmosphere for the students.

3. Private training institutes run on commercial basis. Most of these are set up as human resource suppliers for welding and allied trades to the gulf countries and Singapore/Malaysia. They offer tailor made training courses to prepare the candidates for employment in specific industries abroad. However most of them do not provide a comprehensive training program to meet code requirements nor any sort of certification.

ROLE OF IIW INDIA

Taking into consideration the above background IIW India have adopted the following strategic objectives :

1. Obtain accreditation from the International Institute of Welding to operate their International Welder Training courses in India.
2. Launch IIW India's National Welder Training and Certification Scheme at the national level.
3. Empanel as an Assessing Body for all Fabrication Sector courses under DGE&T's Modular Employable Skills (MES) Skill development Initiative.
4. Conduct tailor made in-house courses for welders, covering theory and practical skill, based on specific requirements for a particular industry through the IIW India branches.

International Welder courses

To promote Education and Qualification

in welding in India in line with International Standards which would be globally recognised and accepted ANB India had applied for and become an Authorised National Body (ANB India) of IIW in July 2007 to operate their International System for Education, examination and Qualification of welding personnel. The courses cover all levels starting from International Welding Engineer down to International Welder.

The International welder courses cover the main welding processes of MMAW, GTAW, GMAW & FCAW at the levels of Fillet Welder, Plate Welder and Tube (Pipe) welder. The training programs are conducted at IIW India Approved training Bodies (ATBs) and follow the IIW guidelines with respect to syllabus and practical test and theoretical examination requirements. The assessment tests are conducted by ANB India's Authorised Examiners at the ATBs. Successful candidates are awarded International Welder diplomas for the relevant process and level. They also receive ISO 9606 or EN 287 certificates which are accepted globally.

Till date about 40 candidates Trained at Don Bosco, Cochin and Quivan Technical Institute have been awarded International Welding diplomas and certification as per EN 287. These diplomas and certificates provide an opportunity for young people to receive due recognition and value for their skill outside the country and also serve as a bench mark for standard of welder training programs at the national level.

The IIW accreditation also authorizes ANB India's authorized examiners to conduct Welders Approval Testing and Certification to meet the industries demand for certification of experienced welders already engaged in welding job to meet their own quality system

requirements e.g. ISO 3834 or to comply with customer's or collaborators requirements. The certificates maybe issued as per ISO 9606 / EN387 / ASME sec IX or IS 7310.

Apart from this ANB India also has the International Welding Practitioner, International Welding Specialist and International Welding Inspection Personnel diplomas within their scope. These courses cater to the next rung of progression for the shop floor welder and are meant for Specialised welding machine operators, welding foremen and supervisors, welding inspectors and very importantly welding instructors. It is acknowledged that the most important factor in any training is the quality and competency of the instructor. This is particularly true for welding.

IIW India's National Welder training and Certification Scheme.

IIW-INDIA's NWTCS has been prepared to meet the demand by industry for welders, trained and certified to a level of competency commensurate with the requirements of any of the welder qualification and certification specifications or codes i.e. IS:7310/IS:817, ISO:9606-1, BSEN:287 & ASME Sec IX/AWS D1.1.

The scheme covers requirements for 'Training & Certification' or 'Certification' only and is operated by the IIW-INDIA National Certification Board.

To operate the scheme IIW India's strategy has been to inspect and approve existing welding training institutes as Approved Training Institutes (ATIs) provided they have the required standard of practical and theoretical facilities and faculty as specified in the scheme.

Scope of the Scheme

The scheme defines the requirements

for IIW-INDIA to certify welders at different skill levels Basic, Standard & Advanced for MMAW (SMAW), GTAW & GMAW processes.

Also the theoretical and practical training facilities and program requirements for a Welders Training Institute to be approved as an IIW-INDIA Approved Training Institute (IIW-INDIA ATI) to operate the Scheme in two parts.

- Part 1 - Main Scheme which defines curriculum and certification requirements for different courses along with ATI requirements.
- Part 2 - Provides lesson plan and course notes to IIW-INDIA ATIs for delivery of the training.

Features of the Scheme

- Provides theoretical and practical curriculum for each course.
- Specifies viva-voce test for theoretical assessment of MMAW basic level and objective type written tests for standard and advanced level MMAW, GTAW and GMAW courses.
- Provides practical test requirements for certification against each course.
- Specifies form for recording welder

test details (WPS + PQR).

- Specifies criteria for acceptance of test pieces.
- Certification tests to be conducted by IIW-INDIA Authorised examiners.
- Trainees at an IIW-INDIA ATI may continue from a lower level course to a higher level course through internal assessment of the ATI for final certification test by IIW-INDIA examiner.
- Specifies National Register of IIW-INDIA certified welders to be maintained.

Additional Course Features

- Training in gas welding and cutting specified in MMAW basic course and Brazing and Braze Welding in MMAW standard course curriculum, although these are not included in certification requirements.
- Optional provision of training in FCAW process on carbon and stainless steels is given in GMAW advanced level curriculum although this is not included in certification requirements.

Courses under NWTCS

The recommended duration for the different courses as given above are indicative only and will depend upon the actual facilities available with the ATIs, the duration of theoretical and practical instruction every week and the capacity and motivation of the students to absorb the instructions and learn. The durations indicated are based on full time course with about 42 hours of theory teaching and practical every week with adequate infrastructure support.

Approved Training Institutes

By adopting the IIW-INDIA National level welding Training & Certification scheme along with the technical collaboration from IIW-INDIA, will enable the ATI to improve the consistency of training programme to acceptable national level. This is an opportunity for all welding training institutes in the country to standardise their training syllabus and award certificates to their trainees under the IIW-INDIA banner, which will have immediate industry recognition and acceptance. The students are likely to be attracted to training institutes which

Courses under NWTCS				
Sl. No.	Course Name	Material	Course Code	Duration
7.1.1	MMAW Basic Level	Carbon Steel	MMAW-B	6 weeks
7.1.2	MMAW Standard Level	Carbon Steel	MMAW-S	3 weeks
7.1.3	MMAW Standard Level Radiographic	Carbon Steel	MMAW-S (R)	1 week
7.1.4	MMAW Advanced Level	Carbon Steel	MMAW-A	2 weeks
7.2.1	GTAW Standard Level	Carbon Steel & Stainless Steel	GTAW-S	3 weeks
7.2.2	GTAW Advanced Level - Module I	Carbon Steel & Stainless Steel	GTAW-A 1	2 weeks
7.2.3	GTAW Advanced Level - Module II	Aluminium	GTAW-A 2	2 weeks
7.3.1	GMAW Standard Level	Carbon Steel & Stainless Steel	GMAW-S	3 weeks
7.3.2	GMAW Advanced Level - Module I	Carbon Steel & Stainless Steel	GMAW-A 1	2 weeks
7.3.3	GMAW Advanced Level - Module II	Aluminium	GMAW-A 2	2 weeks

provide quality training acceptable all over India for employment.

IIW ATI requirements

- Specifies general facilities including practical training area and class rooms.
- Provides equipment requirement for each course.
- Specifies qualification and experience requirements for practical and theoretical instructors.
- Specifies functions and responsibilities of the instructors.
- Minimum Instructor : Trainee and Equipment : Trainee ratios specified.
- Part II of the scheme will provide detailed lesson plan and course notes to the ATIs.

Implementation of NWTCS

- Agreement signed with the Centurion Group of Institutes, Orissa for them to operate IIW India's NWTCS program at their 3 centres at Parlekhemundi, Bhubaneswar, Bolangir.
- 118 trainees in 2 batches certified for MMAW Basic level.
- Agreement signed with Don Bosco Tech India to operate NWTCS program for welder training in 50 of their technical training Institutes all over India as IIW India ATIs.
- Another 18 welder training institutes appointed as ATIs.

GOVT OF INDIA DGE&TS MES-SDI SCHEME

Genesis of the Scheme

While India has a large population, only 10% of the Indian labour force have acquired vocational skills whereas the percentage in industrialized countries varies between 60% to 96%. Only about

3.1 million vocational training seats are available whereas around 12.8 million persons enter the labour market every year. At the same time, 63% of school students drop out before Class X or even Class VIII and thus have limited access to skill development through regular trade courses in ITIs and thus have poor employability. Apart from educational entry requirements the long duration of the courses in the formal training system pose an impediment for a person of limited resources to acquire skills for livelihood.

In response to the above situation, on the 22nd May 2007, the Ministry of Labour & Employment launched the Skill Development Initiative (SDI) to address the needs of the following target groups with a minimum age limit of 14 years and no upper age limit.

- Early school drop outs and unemployed.
- Workers seeking certification of their skills acquired informally.
- Workers and ITI graduates seeking skill upgradation.
- Previously child labour and their families.

It is planned to train 1 million people in the first 5 years of the scheme and then 1 million annually thereafter.

Key features of the scheme

1. DGE&Ts MES-SDI scheme has been developed to provide vocational training to school leavers, existing workers, ITI graduates, etc. to improve their employability by optimally utilizing the infrastructure available in Govt., private institutions and the Industry.
2. Existing skills of the persons can also be tested and certified under this scheme.
3. Demand driven short term training

courses based on Modular Employable Skills (MES) decided in consultation with Industry. MES is the 'minimum skills set' which is sufficient for gainful employment.

4. Central government will facilitate and promote training while industry, private sector and State Governments will train the persons.
5. The training under SDI scheme will be provided by various Vocational Training Providers (VTPs) under Central Government, State Governments, Public and Private Sector and Industrial establishments.
6. Flexible delivery mechanism (part time, weekends, full time, onsite/offsite) to suit needs of various target groups.
7. To ensure impartially, testing of skills of trainees is to be done by independent assessing bodies, who would not be involved in training delivery.

So far 1161 short term training courses based on modular employable skills (MES) in 52 sectors have been identified and 6084 Vocational Training Providers registered. Welding is one of the important trades and falls under the Fabrication sector.

IIW India as an Assessing Body

IIW India had applied for and has been empanelled as an Assessing Body by DGE&T under the MES / SDI scheme from June 2009 for all courses under the Fabrication Sector in all States and Union Territories in India.

To conduct assessment of candidates at various VTPs located throughout the country the council has set up an MES Assessing Body (MAB) under the Education Committee. The MAB has appointed State Co-ordinators and Authorised Assessors in various regions

Name of sector	Name of course code	Name of the courses
FABRICATION	FAB 101	Basic welding (Gas)
	FAB 102	Basic Welding (Arc)
	FAB 103	Gas Cutting
	FAB 204	TIG Welding
	FAB 205	MAG CO2 Welding
	FAB 206	Fabrication Welding
	FAB 207	Pipe welding (TIG & Arc)

MES Assessments conducted		
Year	No. of Assessments Done	No. of Candidates Assessed
2009-10 (from Nov'09 - Mar'10)	4	107
2010-11 (From Apr'10 - Jun'10 & Nov'10 - Mar'11)	17	550
2011-12 (from Apr'11 - till date)	4	186
Total	25	843

with responsibility to carry out the assessment as per advice received from the respective Regional Directorate of Apprentice Training (RDAT). At present the MAB has 8 state co-ordinators and 19 assessors. Further as per DGE&T requirements IIW India MAB is in the process of being accredited by Quality Council of India, NABET after audit of its organization and systems IIW India as an Assessing Body.

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The empanelment with the Government of India, DGE&T has given IIW India further recognition and national status as a certifying agency in the welding field.

CONCLUSION

From the foregoing it will be seen that IIW India has been consistently pursuing its mission of human resources development in the welding field in India as fulfillment of its national role. While there has been considerable progress in the various programs taken up by the institute, both at the national and international level, much still needs to be done and the institute is working steadfastly in pursuit of its objectives.

ABOUT THE AUTHOR



Mr. Ranajoy Banerjee had done B.Sc (Metallurgical Engineering) from Beneras Hindu University in 1966. He thereafter joined Indian Oxygen Ltd (now BOC India Ltd.) in welding division and served the company in various capacities and retired as General Manager – Research and Development in 2004. From 1990-1994 he was the Chief Executive of Maharashtra Weldaids Ltd. – a Joint venture of Indian Oxygen Ltd.

He has over 40 years experience in development, manufacturing, quality control, application of welding products. Presently he is having parallel appointments with IIW – India as Executive Director, responsible for over-all functioning of the institute and Chief Executive Officer of IIW – ANB responsible for international welding education and certification in India. He is a fellow of IIW – India and past General Secretary. He was past Chairman of CII Technical Sub committee on welding and past member secretary of DGTD panel on Welding. He has presented a number of papers and key note addresses at various conferences and seminars and delivered the prestigious Sir L. P. Mishra Memorial Lecture in IWC -2005 at Mumbai