QUALITY STANDARD IN WELDING AND HUMAN FACTOR

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All the world over in industrialised countries, especially with wide acceptance of ISO 9000 standard, quality is not a matter of doubt or discussion. Cost, delivery period and services are the criteria. But then, in the Indian scenario, how far can be we assume the same. The "high points" of quality standard are a matter of satisfaction & pride. On the other hand, "low points" can be so low as to arouse a feeling of disgust as well as despair among welding fraternity. One starts wondering why this is so after 50 years of activity, and the presence of the B.I.S. & I.I.W. The answer lies in the inadequate efforts & facilities for education, training & refresher courses. Even today a large part of workforce has not had any formal/systematic training which would normally include a little of theory & basics of welding. For that matter, many have not had the benefit of schooling. Can we deny that quality of output in many shops depends on these persons. How can we blame them? Such a situation is a harsh reality, and it implies that efforts of the professional body have to be directed at grass-root levels. The small scale sector needs help and the professional body has to join hands with industry, through the CII, to provide assistance in a planned manner.

Human Factor–Education & Training

The three requisites of world-class manufacturer are people, technology and equipment. While each one is important, Indian Manufacturing Industry, over the years, have given far less attention to the human factor than to technology and equipment, especially imported ones. Mr. Andrew Carnegie said :

"Leave my factories but take away my people, and soon grass will grow on my factory floors. Take away my factories, but leave my people, and soon we will have new and better plants."

The essence of new technology and equipment in welding has been, and will continue to be, reduction in workforce for achieving the three-fold objective of :

(a) lower manpower and hence lower cost of wages per unit of output;

(b) higher productivity;

(c) greater quality assurance in the higher output.

But then the smaller workforce needs to be far better educated and trained than ever before to carry out the functions efficiently. This is an area which has remained neglected to a varying degree, depending on the size of the industrial unit. The situation has been worsened by three unfavourable factors :

(a) absence of degree courses for engineers, and availability of only limited diploma courses for welding technicians.

(b) perhaps, indifference at the top management level to the need for not only trained personnel for the shopfloor, but also the need for re-training.

(c) the inadequate role of the professional body in this area, with far greater attention/time given to seminars – regional, national and international.

Quality Standard

The liberalized, globalised scenario has created growing awareness to the need to build a world-class industry. Despite the

drastic and abrupt change, a number of industries have succeeded in their efforts, primarily because of their inherent strength in areas of technology, combined with R&D which have been built up in earlier years. These industries quickly adapted themselves to face the challenge by reorienting their thinking, planning and working to rise to the international standards in quality and cost. TISCO is a shining example. There are many more in the fields of automobiles, pharmaceuticals and information technology. Larsen & Toubro Ltd. is a fine example in the engineering & fabrication industry.

There is no room for any compromise on quality front. And on the price front, the competitive dimension is gaining ascendancy. And for both quality & price to be controlled at competitive levels, the need to upgrade the workforce assumes special importance. In fact, the workforce becomes the competitive edge for companies which are thrust into the global market place. For the workforce to become the key to success, the workplace must become a learning environment. Factories have to be looked upon as places of learning for process/product improvement. But then this becomes a reality only when the top management provides facilities & programmes for training & reorientation of the workforce on a regular basis as a part of the overall corporate HRD programme. Furthermore, the top management has to start treating the workforce as an asset similar to the physical assets which receive greater attention on account of the huge investment. But then all that plant & machinery will fail to bring the desired results if the workforce does not match the requisite standard for quality, productivity, and innovation, in the global competition. Today, technical development & results of R&D work will remain on paper or in the R&D laboratory, unless we build up a team of technicians with requisite knowledge to adopt the results for large scale operation in fabrication. Thereafter, based on shopfloor/site experience, the process of modification/adaptation has to be initiated, and this again is a matter of continuous effort through team work. Thus, whatever may be the degree of modernisation/automation in welding, a knowledgable & trained workforce is a must for success in any manufacturing organisation.

Loss of Trained Manpower

At this juncture when the entire industrial & overall economic scenario is causing concern due to a fairly long slowdown, our stock taking of the situation and the requirements of trained manpower, should not overlook the current trend of "Voluntary Retirement Schemes". This is all the more serious because the intensely competition-driven global market place is compelling numerous large undertakings, leaders in the field of welded fabrication, to cut down on overhead expenses towards salaries. But then, objectively viewed, the need for such harsh decisions cannot be disputed. How then do we reconcile the two contradictory situations, viz., generation of fresh manpower when the highly trained and experienced manpower is being dispensed with through VRS. And then thinks of the fact that many or most of such personnel are at the peak of their working careers, with at least five years or more of useful service & contribution to industry still left in them. This aspect is bound to complicate matters relating to manpower generation and supply, and hence the HRD programmes have to be made flexible to adapt them to the fast changing scenario. This implies that the courses have to be :

(a) broad-based & versatile for the majority;

(b) specialized for the selected few who may be assured of appropriate placements of higher responsibilities, in India or abroad.

It may not be far-fetched to look upon these specialized courses as "EXPORT-ORIENTED" to some extent, with many qualifying for gainful employment in developed or developing countries.

Trends in Quality Standard

The current trends in welding are based on :

(a) growing awareness of need to adhere strictly to the code requirements;

(b) code requirements them selves being updated and made more stringent to take care of service conditions, as a result of practical experience gained after the previous revision of the code;

(c) ensuring that preheating, interpass and post weld heat treatment, are adhered to in every detail through proper controls;

(d) greater attention to human factor in a planned manner from the standpoint of (i) health & safety, (ii) education & training, and (iii) team effort;

This is in addition to :

(a) selection of proper consumables;

(b) joint preparation and fit up;

(c) clean liness of the joint area;

(d) careful handling of electrodes and adoption of redrying schedule.

All these trendes are determined by the need to achieve higher quality standards combined with cost effectiveness, so as to face global competition in the fast changing scenario. In order to be able to meet the challenge, Indian Welding Industry ought to move fast on two fronts, viz. :

(a) Innovation and/or changes and additions in the existing technologies & practices;

(b) Training of the workforce in using such techniques aimed at higher standards of quality & productivity.

It has to be a massive team effort, with full awareness and active participation at all levels from top management to engineers & welders in particular and workmen in general.

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EDUCATIONAL

Test your Knowledge: Weld Joint Geometry*

Question 1 through 8 refer to Fig.1

1. The weld face is

a. 1 b. 2 c. 3
d. 6 e. 7

2. The weld root is

a. 1 b. 2 c. 3
d. 6 e. 7

3. The type of weld shown is

a. Double bevel-groove
b. Single bevel-groove
c. Double V-groove
d. Single V-groove
e. None of the above

4. The weld reinforcement height is

a. 1 b. 2 c. 3
d. 4 e. 6

5. The weld toe is

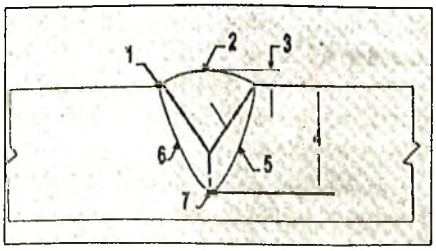
a. 1 b. 2 c. 3
d. 5 e. 7

6. Number 6 shown in the figure is

a. weld root
b. fusion face
c. groove face
d. weld interface
e. depth of fustion

7. Number 5 between the arrow is

a. weld root
b. fusion face
c. groove face
d. weld interface
e. depth of fustion



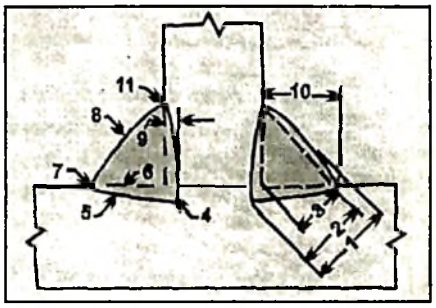
8. Number 4 shown in the figure is

a. weld size
b. joint penetration
c. theoretical throat
e. both a and b

Questions 9 through 13 refer to Fig.2

9. The weld face is

a. 7 b. 8 c. 6
d. 11 e. 10



10. The welds shown in the figure are

a. concave fillets
b. conical fillets
c. convex fillets
d. T-fillets

11. The theoretical throat is

a. 1 b. 2 c. 3
d. 10 e. 9

12. The weld toe is

a. 11 b. 8 c. 10
d. 7 e. Both a and d

13. Number 6 shown in the figure is

a. weld root
b. fusion face
c. groove face
d. weld interface
e. depth of fustion

Answer: 1.b, 2.e, 3.d, 4.c, 5.a, 6.d, 7.e, 8.e, 9.b, 10.c 11.c, 12.e, 13.b

* *Adopted from welding Journal Vol-81, No.4, April 2002*

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