Before one can speak about the present "Quality Control in Structural Steel Fabrication," we must look at the history of our industry and why it is a topic today.

The testimony of the strength of steel and the fabricators ability to control quality are in evidence all around us. Millions of tons of steel in bridges and buildings which were fabricated, in some cases, two generations ago are giving service far beyond the designers dreams. This is partly a result of the design and the material used and the manner in which the majority of steel members were fastened, prior to 1955.

As we all know, A-7 was the structural material available and almost any steel in any fabricators yard was A-7. Riveting was the way in which material was held together and normal shop practices were developed in riveting shops all over America. As a matter of fact, the industry, from 1900 to 1940, stood still and a shopman placed in one shop or another knew exactly what to do and how to do it. There also was a pride in workmanship which, even though still exists, is not as prevalent as it used to be. Although the sledge hammer is still an important tool in our industry today, in many respects it was the tool through the first half of this century.

In the 1950's, welding began to influence the design and fabrication industry. The impact of welding, coupled with new steels such as A514, A588, A572 and others is still being felt in our industry. With welding and the new steels, new designs were possible which gave the owner more beauty in his structures at less cost. It also brought to the fabricator problems which were non-existent before. Welding is treated somewhat like hypnotism. We know it works, but we all don't know why. Consequently, we are all concerned about the welding of two pieces of material into one. When we all learned to understand and have faith in welding A7 or A36, along came A514 or 100,000 strength steel. A new learning period was required.

Into this boiling pot came the Interstate Highway System, and the governmental control which is not only natural, but necessary. In order to protect my tax dollar and yours, the government, through various state and federal agencies, decided to demand inspection and get what was being paid for. I submit that this has, in fact, not in itself created quality, but has created mountains of paper which says that quality is there.

What has the fabricator done over the past 10 years to help, not only himself, but to give the owner better quality? If he was smart, he got into quality control. We, as fabricators, are responsible for our product. In most cases, we are not responsible for design, but we are for workmanship in accordance with specification. Not everything in a fabricating shop is done as it is supposed to be done. Pieces are cut short, welds are made wrong, and perhaps dimensions aren't held. The important thing for the fabricator is to have the ability to find these areas and resolve them. Most dimensional problems can be worked out with adjoining members, poor quality welds can be replaced, and splices can be added.

I submit that many fabricators have come a long way in putting in motion the mechanics necessary to police themselves. However, we then found ourselves with delays resulting, not from errors being found, but in resolving how to correct them. Days may go by while sketches and letters are processed, and even summit meetings are held. Meanwhile, back at the ranch, money keeps being spent.

At this point, the American Institute of Steel Construction got involved and set up a committee entitled "Quality Criteria and Inspection Standards." The first two years, the Committee set up In-House seminars across the country, in order to alert, reinforce and make our own members understand the need for quality. From these seminars, feed-back occurred, indicating that there was an interpretation problem at the operating level between shop personnel and customer's inspectors or agents acting in behalf of the customer.

The Committee then started on the Quality Commentaries. These commentaries cover the various operations which take place in a fabricating shop i.e., there is a chapter on:

1. Preparation of Materials
2. Fitting and Fastening
3. Welding
4. Dimensional Tolerances
5. Surface Preparation and Painting

In each one of these areas, there are normal shop practices which have never been formally adopted as A.I.S.C. approved practice. The normal shop practice is explained and the reasons given for its use. Where this practice may lead to a conflict, the A.I.S.C. gives a recommendation for settling the difference. I don't feel specifics are necessary here, other than to state that terms such as:

1. "Smooth and Flush,"
2. "Square," and
3. "Full Bearing"

have led to many arguments on the floor of the Shop. We discuss where we are in conflict or how we, as an industry, interpret various sections in A.W.S. or S.S.P.C. For example, under S.S.P.C., the interpretation of Commercial #6 vs. Near White #10 blast cleaning.

The commentaries are complete and have been issued to all member firms of the A.I.S.C. They are in use now. This month the A.I.S.C. will issue a general bulletin advising our mailing list of their existence and availability at A.I.S.C. headquarters in New York.
The comments are being updated continually, and changes will be issued approximately every six months.

I have given you more depth in our industries attempts to control quality than perhaps it is necessary. However, we feel the A.I.S.C. should be the recognized authority in quality criteria and inspection standards, as we are in the engineering area.

None of this effort could have been accomplished without the interest and enthusiastic support of the Plant Operating People. They make up the committee and the task forces which work on the commentaries. The highest level of engineers also sit on these committees and review and approve the writings prior to submittal to the Board of the A.I.S.C. for final approval.

There is an air of professionalism in the plants today that did not exist ten years ago. This professionalism is reflected in the establishment of personnel departments, Quality Control departments, Welding Engineers and other departments that did not always exist and were not, in years past, needed. It is obvious that the involvement of the A.I.S.C. in this area has led to quality at the shop level in most plants today.

If one entered our plant at Hammond, Indiana he would find the following:

1. A Welding Engineer
2. A Welding Foreman
3. A Quality Control Supervisor
4. In-house X-Ray equipment
5. In-house Ultrasonic equipment
6. Three qualified U.T. Inspectors
7. Magnetic Particle Inspectors and the equipment
8. 3 Dimensional Inspectors

On every job of large size, we write a separate Quality Control manual, stating in many cases dimensional criteria in excess of the specifications. The booklet lists the various types of non-destructive testing which will take place and the paper work which will be used to record and give evidence that it was, in fact, done.

Let's talk about a term which does not seem to have a place in our computerized, large company, big union, federal government world. Many of the efforts, particularly those of the Federal Government, gives one a feeling of a slight lack of trust. We are suppliers and most of us have a history of satisfactory performance. Those that haven't given a proper product or service aren't with us, and paper work didn't put them out of business. Integrity exists in my world and yours. It exists in our Plant Management and in their subordinates and men. The steel stamping of the A.S.T.M. number on a sheared plate does not give you any more assurance that that plate is what it is supposed to be than if it was not stamped. Whether that plate is what it is supposed to be, rests with the Management of the Company you do business with. I submit that a day spent at that plant, where they show you how they order steel, how they store it, how they carry forward their identification marks, and how they put it in the fabrication process, will tell you whether they have the integrity of your structure foremost in their mind.

The responsibility for quality is the fabricators and we welcome it and want it. Those agencies which require evidence of our Quality Control are what we want. To put one or five men in our plant as Inspectors, does not give you a foolproof way of assuring quality. We are the only ones that can give it to you.

The size of our Quality Control staff at our Hammond Plant should not be taken as what is necessary in all plants. This is a product of size, of plant and number of contracts being run. Some of us have been in large plants with good quality and small plants with a lack of quality or vice versa.

To get quality at the plant level involves a training of supervisory personnel in the changes which have taken place in the design of fabricated bridges and buildings since 1950. The importance of fit, preheat and procedure for welding is critical and is recognized as such in fabricating plants across America. The mental attitude of the supervisor is an extension of his superior. I submit that Quality, like Safety, starts at the top. Given the proper leadership, plant personnel will be able to produce quality.

We are concerned with the big picture; the one of intent. I believe a man, with a reasonable understanding of construction, can go through most fabricating plants and determine if the proper attitudes exist regarding quality. Without the emphasis from the top, the Quality Control department cannot keep up. It starts in the Material Receiving Yard and goes all the way through the fabricating process. Our goal is not to catch mistakes; it is to prevent them. Once an error or omission is found, we apply a degree of acceptability based on the end use of the product.

Perhaps the biggest area of concern for the fabricator, and the one which leads us to this total involvement, is that today's specifications are absolute. That is, we are continually faced with rejection or threat of total rejection for any out of spec condition. An undercut situation on a secondary member is not the same as a notch on a tension flange of a large girder. But, chances are, the undercut will be caught by outsiders and the notch caught by our own Quality people. I have said previously today, but I want to say it again, we, the fabricator, are responsible for quality, not you, not an outside agency, but us.

Those of us in the A.I.S.C. know and feel it is right and proper. We believe those agencies which require us to show how we control quality and allow us to demonstrate our ability and hire others to only verify that we have, in fact, done what is required, are moving in the proper direction. How much easier for owners, engineers and architects if the contractor was able to not only show his expertise in construction, but his expertise in controlling quality. We, in our industry, feel that this will happen. It is happening. The large structures that now dot the skyline in Chicago were done with only "witnessing inspection," that is, an outside agency verified that we performed the Quality Control in accordance with Quality Control Manuals that were written by the fabricator and submitted to the architects and engineers for their approval.

I hope I have given you the feeling of our total industries involvement in this important area. If I haven't,
then I have not done the job I set out to do. The answer
to stopping a riot may lie in more police and the answer
to poor quality may lie in more inspectors, but we must
know we are treating symptoms, not causes. The Ameri­
can Institute has gone to the causes of quality and has
launched a program which, over a period of time, will
enable it to become the recognized authority in matters
of Quality Criteria and Inspection Standards.