

Quality in Ship building

Quality as Quality Assurance in Ship building or repair or retrofitting is all about preventing mistakes or defects in the process of manufacturing thereby ensuring that the end product meets the requirements and avoid problems when delivering ships or marine products to our customers.

There are procedural as well as administrative activities that try to ensure the above objective in QA.

The goals of **QA** are two in number - namely to produce a product which is "fit for purpose" and second in doing it "Right the first time" so that costly rework and mistakes can be avoided. On the other hand Quality as Quality control (**QC**) is focused on the final product and focuses on defect identification. Quality control fails if Quality Assurance does not work.

Having defined the above two terms let us come to some ground realities.

During the years 2013-14 India witnessed some serious accidents leading to loss of life - like faulty cable catching fire and releasing toxic gases; Malfunctioning of valves in the CO2 fire fighting system etc., in Ship and Submarine building in India due to poor quality and workmanship practices.

We should be lucky that such major accidents have not yet happened here. Given the state of events and the current thinking prevalent everywhere, it is only a matter of time, before one more serious accident is waiting to happen.

Lack of quality in our ship building or other departments elsewhere, leads to:

1. Loss of life and subsequent incarceration by concerned agencies.
2. Losing on competition as we end up correcting mistakes thereby losing time and ending in delayed delivery.
3. Loss of health and good interpersonal relationships between various departments, due to more time spent rectifying the defects.
4. Loss of prestige, confidence, self esteem and all round bad name leading to closing or downsizing the Business, which is the natural result.
5. and finally inability to attract the best and motivated talent available in the country to work with us due to the above bad name.

A number of articles in various National and International News magazines point out the same problem all pervading throughout India and else where, from which we are not immune.

Each one of us are individually responsible for the above state of affairs and it is our responsibility to rectify the same at our end.

A root cause analysis for these failures leading to a loss of quality and what we can do to improve it are enumerated below, remembering that we are basically a Technology driven Ship building Industry waiting to produce a number of Weapon platforms in the future for Indian Navy and other agencies :

[1] Substantial loss of or absence of Academic and Technical skills in the Engineering community :

The above problem has its roots in the general problem of Higher Engineering education in the country being in a dilapidated condition with HSL forced to induct from the same pool

who are academically very poor.

Further, prevalent thinking in the Engineering community about not needing to be current in their field of Engineering and not striving to become better in their basic Academic foundations is not very encouraging and very depressing to say the least. A number of problems are being encountered everyday due to this problem alone, every where.

Good Academic knowledge in one's own field and at least some understanding of other branches of engineering, is a foundation that serves as a good building block using which complex problems can be solved even when the solutions are not known before hand. Such a good foundation also leads to improvement in quality of life due to fewer problems remaining to be solved and more time left for other equally important tasks thus enriching the individual in an overall sense.

The other most important benefit is an improvement of health and the increasing will to live each passing day.

After all who likes being diseased with more and more problems to solve adding more stress to the existing load ?

This lack of good foundation now manifests everywhere, in terms of :

- shortage of fundamental skills like Writing specifications, Letters, Emails or other documentation which are all a form of communication with the outside world (the need for which incidentally is not just needed for those in Design but also in other departments),
- Inability to understand technical requirements, selection of material, problem resolution at site, Workmanship in the field etc.,

among many of us leading to a serious deficit in Quality of work and workmanship and loss of time and money.

Case in point being the effort for Design collaboration sought by HSL for the recent 1200 Pax vessels. For more than two decades we are dependent on outside help than trying to do it ourselves for complex designs. Ensuring that in-house capability survives and thrives will go a long way in improving our overall quality, although for which to happen, other issues need to be addressed apart from Technical capability. A serious endeavor to improve our indigenous design capability alone, would bring considerable benefits to the organization as well as saving much needed forex reserves for the country.

It is now well documented how Chinese products and yards produce low quality ships at lower prices which we shun routinely (products built for ONGC for example). The South Koreans and the Singaporeans compete with the low cost, low labor Chinese yards by being more Technically sophisticated "**in terms of Design and Quality**", than the latter, which is how they survive the Chinese onslaught. It in fact has become their norm of the business.

A number of resources on the Internet like www.edx.org, www.udacity.com, www.coursera.org, online.stanford.edu etc., are available which encourage "**Life long learning**" using the concept of "**Massive Open Online Courseware (MOOC's)**", to achieve this outcome, for any individual and self will is what all is necessary for one to utilize them. Hence the above reasons should be a strong motivation for every one of us to change for the better, striving to be more technically and managerially competent with each passing day.

[2] Inadequate usage of Information Technology (IT) to transform our processes and

inability to leverage this most important Engineering Field in bringing about an improvement in quality:

Many of us in the Core Engineering field can transform our work processes to cut down re-work by seriously investing in continuous IT education and leveraging available resources in terms of Software or Hardware, to decrease the time needed for information processing and improve the quality of our ships.

In any project, Information processing is in itself a serious task requiring considerable time.

We are not investing in this field due to probable lack of realization as to what it can do to us in terms of getting the work done quickly and improving quality (for example using tools like Aveva Design software, ERP software, Leveraging advances in the fields of Relational Database Design and Big data, Computer Networks and Network security etc., to name a few).

Because of this lack of understanding we do not treat our Bits and Bytes in terms of Digital currency, equally as worthy as our physical objects or material we make *or* procure, are. But this again requires the same change in mindset and motivation that was enumerated in Para 1 above.

No amount of spending on IT resources would bring about an improvement in quality, without such a change in mindset or a force which marshals this change.

[3] Lack of Team work or Humane attitude - when it comes to understanding the Physical and Mental needs of our fellow Engineers in terms of the time they need to spend, to resolve quality related issues arising out of our apathy ridden, lifeless and poor quality work and attitude, be it either in terms of correcting letters, or specifications, re-writing emails or rectifying physical defects in the ships staying late at night.

We just do not realize that quality comes only with team work and a humane understanding about everyone in the team, the lack of which only makes us vulnerable to the same forces that we unleash onto others, in the long range. We just blithely think that we will not be vulnerable.

Further, It is only a matter of time before the best of us will walk away from us leaving all of us in an abyss, which has continued to happen in the last decade for everyone to see.

[4] Inability or lack of a process to measure the outcome of Trainings we impart to our Engineers at all levels of functioning. This inability or lack of a process of evaluation to measure the outcome of Training thereof, leads to loss of money and does not improve quality as the Training utilization is not measured, corrected or improved **and leveraged for the end result** for which it was undertaken in the first place.

[5] Finally the Lack of a substantial or robust policy frame work in the organization for motivating Individuals to improve their technical Skill-set is also a serious stumbling block. An example of the above is the idea of some of the new Diploma Engineers to somehow get an Engineering degree even if with second class from some obscure "no name University" in some state (which administers degrees with absolutely no oversight whatsoever), so that they will stand to be considered for promotion due to this degree for the next level. This is nothing short of self defeating.

It is not without some reason as to why ISRO or BARC survive and continue to flourish even to this day and have prestige to work for, despite International Technology denials and embargoes on them. The solutions discussed above are a sufficient cause for them to survive

and bring prestige to India.

The above issues are not brought out to put a blame on one individual or a place, but only to highlight the systemic failure so that collectively something can be done for a positive outcome. In this context it is worth reading **ref [9]** below by every Engineer, which is as relevant to India as it is to America.

Change in personal behavior is always and especially hard given our thinking of our jobs being secure in a government organization. However If the above reasons do not motivate us to change, then such thinking is what comes back to haunt us.

In summary the following measures should be considered for implementation to improve quality in ship building and other areas:

- Encouraging Academic excellence in the form of certifications like **IntPE (International certified Professional Engineer), PMP etc., and linkage to future promotions.**
- Compulsory IT training to all Engineers and non-technical staff **with an exam based evaluation culminating in completion of a shipbuilding project** each year. This should be made compulsory **and linked to all future promotions.** If ongoing and future Investments in ERP, Aveva Marine Design software etc., are to be successful then this linkage should be mandatory and be strictly followed for all Engineers irrespective of the departments in which they work.
- Performance based increments with a transparent process to measure Performance.
- A streamlined process of Reward (which should be Substantial) and Punishment scheme(which might be less punitive) to positively encourage Individuals to improve their capability.
- A rotation of all Engineers across various departments in a phased and determined manner to ensure that everyone understands all types of problems to give a holistic outlook.
- A code of Engineering ethics be formulated and emphasized time and again. The 'Code of Ethics' aims at maintaining high standards of personal and professional conduct, developing professional competency and integrity, ensuring ethical conduct in fulfilling social responsibility to the society, the nation and the global community. It is mandatory that all Professional Engineers (PEs) conduct their professional practices and their individual behavior in an ethical manner and hence this requirement for formulation. A reference code of ethics is given in **ref[11]** below.

Finally individually and well as a team, by striving to address all of the above issues we can substantially improve quality, build better ships, in time and make this place a better place to work for. It is time for all of us to ponder on the above issues, without which we only have a bleak future.

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