HOLDING BULL BY HORN

N. J. Makker MCSWA – A/26

Is there anything an Artificer can't do?

Amongst the veteran artificers, partner N.J. Makker, Shipwright A /26 is a distinguished name who is known for taking the bull by the horns. He always calls the Indian Naval Artificer Apprentices training establishments as the temples of learning where Artificers are groomed technologically and nurtured in the culture "not to say no to any technological challenge". In 1959 partner Makker passed out as a proud artificer. Starting with then erstwhile cruiser INS Delhi as an artificer 5th class, he ended the naval journey in 1969 as Master Chief Shipwright on board ship INS Tir, the midshipman training ship, and stepped in civilian life.

It was not difficult for him to anchor in a job of his liking. Up-to-date knowledge of welding technology was his major capital besides the naval experience, and his will to face any engineering challenge fetched him a job as a Production Engineer in Nestle boiler, a fire tube package boiler company with Marshall & Anderson as its foreign collaborator. Soon he realised that the job involvement there was limited to construction experience in metal fabrication by X- ray certified welding etc. and no opportunity for learning anything new. So he took on studying the Indian Boiler Regulations (IBR) Codes, which were not part of his shipwright training. Within short time another opportunity came his way. He got an offer to join as a production manager in a fire tube boiler manufacturing firm. The three-year stint there involved not only the manufacture of package boilers but also constant effort in enhancing their combustion and thermal efficiencies. The automatic combustion by low-pressure burner developed there by them could deliver much higher combustion efficiency of 85% to 90 %, the highest ever achieved by combustion. Later, partner Walia, a contemporary SWA, designed further upgrade of this system in delivering the best efficiency in similar designs of boilers in his own company.

In those days the Engineers India Limited was a big name and working there was most challenging and rewarding career opportunity. EIL was at top position in the engineering group in India. Many returning- home -NRIs often opted to work there. He joined them in 1972. Selection was very tough. Among selectors were IIT engineers, foreign returned experts in refinery, petrochemical and offshore structures, chemical engineers and applied engineering experts from navy and railways. He found it highly satisfying to work there among such experts and also few veteran artificers already there working very efficiently and successfully, starting with SWAs Bawa, Punia, Kumar, ERAs Mokha, Karir, and also EAR PN Sharma. The journey there was really challenging where they all worked among most learned and talented lot.

The experience and confidence gained in EIL helped him set up a consultancy service of his own. He quit the job and founded a company, "True Forge" at Faridabad in 1981. His company

did some highly specialised consultancy for major works of L & T, BHEL etc. where high pressure vessels fabrication was involved. Many of these were of import substitution nature. In the year1983-1984, 'True Forge' started manufacturing steam turbines and turbochargers for BHEL, Hardwar. It was started under technology license from Siemens, Germany. Suddenly, for some reasons, the supply of system components made from material 15MO3, a German Carbon Molybdenum high temperature alloy, was stopped by M/s Siemens, Germany. The problems that arose out of that sudden stoppage of the vital material taught partner Makker and his group a lesson; not to depend solely on imported supplies. Not getting bogged down at that point of almost no return, the team decided to develop these components from other appropriate materials. They got in to metallurgy of ASME raw material. According to American Society of Mechanical Engineers- ASME- code guidelines, the raw material equivalent of 15MO3 was F182 WPI, which was not accepted by process licensers, Siemens. So, 'True Forge' got into design and manufacturing activities in their new unit that was setup at Khopoli. In their research centre they produced raw material by induction melting and checked for any inclusive defects etc. Then the ingots were forged to 'one is to four' reduction ratio and ultimately 'closed die forged' to achieve highest forging structural integrity. All the products thus produced were design proof tested to above ASME codes, and finally the samples were sent for stringent examination by the Siemens technology group; the material was accepted.

That is the time they started another unit at different location as sister group of "True Forge" and they continue to supply their products to BHEL, Hardwar even today. They now describe themselves as R&D and Manufacturing Group, custom developing several new products in small batch quantities. In house design studies are carried out by them through design processing. These processing details are linked to design basis by design analysis, formulation etc. indicated by the 'codes' and customer specifications and finally designed by experiments. ASME and DIN construction codes based on 'Design by Analysis' further strengthen the code formulation and the final design is by actual experiments. These design features describe Finite Element Analysis. Strain gauge studies are done to gain information on elastic to plastic range and stress distribution locations and general patterns of stress distribution. This is further supplemented by carrying out burst test studies by selecting proportional samples etc. Flash Forge design group has carried out large number of such studies to determine conclusive designs in forged and fabricated assemblies. Their core expertise in advanced material design and development is built on complex processing technologies with detailed applied engineering features.

In 1991 they got an offer from Rastriya Ispat Nigam Ltd. It was going to be a big long-time business at Vizag. They registered a new advanced engineering firm "Flash Forge" at Vizag to widen the scope of work. The city of Vizag offered a big scope as it was a city where a steel plant was coming up, where there were shipbuilding activities, where the dockyard expansion

plan was in place. There was an opportunity of big-time business there. Flash Forge got entry in Naval Dock by mere chance and made gold of that opportunity by their studious approach, perseverance and untiring hard work.

The HP piping, operating at 400 bars, in a Russia -supplied submarine, Sindhu Ghosh had developed severe cracks in piping end fittings. The Russians had refused to replace the supply and the Indian Navy was disparately looking for a solution. They were keen on getting the defects rectified but no credible source was available that time. National Metallurgical Laboratory (NMRL) was asked to prepare a failure report but nothing was forthcoming. One day on a flight from Vizag to Delhi, Commodore Chandran was sitting next to Partner Makker. As a normal courtesy Makker passed his 'Flash Forge' card to him and reading it Cmde. Chandran mentioned the submarine problem to him. Immediately Makker showed his keen interest in development of such fittings. On return to Vizag, a visit was arranged for Flash Forge team to Sindhu Ghosh along with the Manager, Submarine Auxiliary shop. From that point, there was no looking back for 'Flash Forge'. The failure Analysis by the team revealed the corrosion on the welded end fittings, primarily initiated along the heat affected zones of welds due to very high heat input and very thick weld joints those had resulted out of earlier repairs to the joints. It was analysed that sudden sharp transition in the external shapes called, the notch effect, gets further aggravated due to saline environment. The effect of the stress corrosion was easily evident due to heavy leakage.

Partner Makker got down to studying American Society of Mechanical Engineers Code guidelines. The guidelines recommended that the design of piping systems of austenitic materials be approached with greater overall care for general elimination of local stress raisers. It needed careful examination, material selection for fabrication and welding quality, and also associated erection. On receipt of NMRL failure report the Naval design & QA group found the Makker team report similar with more narrative. On further additional checking and several additional macro tests and design evaluations by strain gauge studies etc. by the team, they suggested that 316 Ti materials are more suitable for this type of applicability because the Molybdenum in 316 Ti resists corrosion caused due to acidic fumes generated by submarine's stored batteries, particularly in tropical conditions.

Immediately the Naval CQA group advised them to prepare the complete qualification document details and get it approved by DME, and Chief of materials. The naval design group further suggested that the type of lifesaving design details be best shared by a joint meeting. Meetings with Russian specialists were arranged by DME and their proposal was generally accepted. After they submitted detailed redesigned shapes, design processing document was finally approved by Russian engineers with the note that the design be proof tested to the burst limits. The job success of the team was so much appreciated by the naval authorities that 'Flash

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Forge' was security cleared for access to the secretive ATV project of Nuclear Submarine. Meanwhile, under the expansion plan, 'Flash Forge' found openings in Mazagon Dock, where Scorpene class submarine production was in progress. They opened office at New Mumbai and started participating in Scorpene submarine construction activities.

Recently they have also got a contract for implementation of their latest project; providing Hydrogen based clean energy for recommissioning the outdated steam locomotives in the shunting yards. The company's analytical design has helped them in creating Fuel Cell Shunting Locomotive, perhaps first by any Indian company.

Their customer base is very wide. It encompasses Atomic Energy, Aerospace products, defence services, advance supercritical boiler components for BHEL, railways, refineries, EIL, L&T and Alstom etc. They are manufacturing heat exchangers for advance refinery services in Titanium-Cupronickel, Alloy 625 and duplex alloys.

Partner Makker is functioning as 'Chief Technologist' in his group of companies. He attributes his success to the initial training and bringing up he received as an artificer apprentice and the experience he gained in service. He gives equal credit to his own ever eagerness to learn new things. He minces no words in summing up that artificers' application engineering experience focuses on design processing and their detailed exposure to document analysis acquired during its operational performance is their most important asset. According to him these are the attributes of artificers being certainly better than structured engineering taught by routine university systems of those days. He also adds that his current work success is the result of several other engineers and naval officers working in his organisations. His company's naval engineering group is currently led by Cmde. VK Wadhwa, VSM, Captain Kishore and several other naval Commanders working from company's various locations.