

**ACHIEVING QUALITY EXCELLENCE FOR EXPORTS
IN SMALL & MEDIUM FOUNDRIES/ COMPANIES**

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PERSONAL PROFILE:

Bachelor Of Engineering (Metallurgy), KREC, (now National Institute of Technology), Surathkal, Karnataka.

Member ICME (UK), Member IIM; Member IIF, Past Chairman, IIF Greater Mumbai Chapter and Former Member, National Committee on Foundry Dev (Ministry of Science & Technology), Republic Of Nigeria.

Professional work experience: Total 42 Years.

India (19 Years): In heavy grey iron, steel and alloy steel foundries as Metallurgist, Production In-charge, Chief Engineer, Works Manager responsible for quality and production of machine tool heavy castings, heat & wear resistant cement plant castings, railway iron steel castings for exports, heat resistant furnace castings, steel fabrication (deemed exports), machine building etc.

International Exposure on export development/ import substitution (in India):

Export of heat & wear resistant castings to cement plants in Iraq, proof machined castings for milling machines to UK; machined Iron & steel railway castings - bogie bolster, side frame, Axle box & brake components, to Sri Lanka, Iran and Sudan

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& Korea; burner castings to Iraq & France; Clutch castings to USA; development of precision structures & mechanical equipment for deemed export from France; development of turbine pump precision castings for Morocco. Turn Around of a large grey Iron machine tool foundry in 1973-75 and a couple of Iron & Steel foundries in 1985-88 were other key achievements.

Experience Abroad (12 years- Nigeria):

Set up and run two modern (first time in Nigeria) Iron, Steel & Alloy Steel Foundries as Technical Director/Managing Director, producing import substitution castings & components for auto, cement, rubber plantations and other industries for Blue Circle (UK) Group, Peugeot, GM Nigeria, Michelin Plantations, Excide etc with quality acknowledged as comparable to European standards.

Own Business (11 years- India): Afro Projects & Exports & Millennium Exports:

Development of iron castings for vertical turbine pumps, sourcing of cast, forged and machined components of railway equipment, fork lift and tractor parts for European & English buyers including pre-shipment inspection, quality system management & product development as well as Foundry projects, Equipment & Technology transfer for West African buyers.

Past & Present Buyers: Spenco Engineering, sparex and GenTech in UK; Schulte, Axtone (Keystone), Still, Artur Schade, Integral Accumulators, Walther Meskendahl in Germany; and HTC Holding/Global Supply (Zetor) in Slovakia.

WHY EXPORTS:

There are many questions: why exports, what are the advantages, opportunities & threats; what is needed to do export, how to market it and how & where do we start?

Every one these days dreams of entering to export business. This really enhances marketability of the products and speaks very high of the quality levels. Domestic market usually has lots of ups and downs due to internal demand fluctuations. For this reason many companies want to develop 30-40% export to sustain domestic fluctuations. This no doubt is a good strategy.

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Intentions may be good. But how many companies are really ready and geared up? This is the question the team has to ask for themselves. Logically one has to think the following issues in detail.

Is the product quality really up to global bench mark, reliable and consistent? Is the product cost effective and is well packaged? Is it possible to meet international buyer's quality expectations and can meet delivery commitment? Will be able technically and administratively communicate effectively? Can we provide needed service in a professional way? In short, have a culture, attitude and to deal with the overseas buyer? And if there be an inadequate capability, is there a will to learn what ever needed to get there?

QUALIFYING FACTORS:

In short if the answer to many of the above points in the above paragraph is positive, the company is adequately qualified. Other factors are adequate awareness of safety, environmental practices, good house keeping, a professional business acumen with ethical business culture and of course spare capacity.

Any normal manufacturing facilities is just enough. Need not necessarily be world class facilities for world class products. More than the manufacturing facilities, control systems are most important.

EXPORT MARKETING:

Export marketing in real terms is not just hard selling but creating a confidence that the buyer can depend on the timely supply of consistent quality & reliable product from the supplier and that they feel comfortable doing ethical business. What is important is the strong will to gear up to what ever it takes to achieve the objectives.

WHERE DO WE START?

Naturally the next step could be to do a self assessment in terms of facilities, process, quality, staffing, admin, marketing, communication capabilities. A brief SWOT analysis to understand the organizational strength/

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weakness, opportunity & threat may be very useful. Decide on what market to start with. One may choose the region to suit the product standards.

Long journey begins with marketing efforts: Create an impressive web site linked to powerful search engines, a few catalogs (if necessary) and install e mail /internet. Establish personal contacts by mails (attach web site), phone calls, develop a link, an Indian or otherwise (a known face that introduces the element of trust). Advertisements in foreign magazines, participation in International Trade Fairs / exhibitions may give an initial break through. EEPC, offering ample support/ opportunity to market could be your good bet to start with.

CUSTOMER EXPECTATIONS:

Manufacturer must essentially be an ISO company with reasonable setup /quality with some export exposure (preferable, but not essential), offering very good price, must have spare capacity, willing to develop & invest in infrastructure when necessary and must be willing to build a long term relationship. Manufacturers must be willing to offer fully machined or even sub-assembled parts (no choice so to say).

MAJOR CHALLENGES:

New comers in small or large companies face number challenges at every step of export development. Every buyer wants parts outsourced at best cost attractive enough to replace the existing the supply chain. There is no compromise on material, quality, delivery, traceability and quality systems, painting, mechanical protection, handling, packing etc.

Biggest challenge is the way we produce, transport, machine and inspect the parts here as against the way buyer's quality dept checks the parts v/s checked by our systems here in India.

ROLE OF QUALITY MANAGERS:

Quality managers have important role to play. Quality of their products / service is measured by their ability to stop scrap materials from producing & shipping to buyers. Buyers lose our faith if we fail to deliver on this

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responsibility efficiently. Our aim is to achieve excellence in managing quality, efficiently, diligently, reliably and create a confidence in buyer's mind.

QUALITY AUDITS:

International Buyers have very high degree of quality consciousness and are very concerned about the reliability of products, quality consistency and on time delivery. In this context they usually carry out detailed quality and facility audit at different stages of co-operation.

QUALITY RELATED CONCERNS:

Product quality has 3 distinct considerations. The chemistry of the basic raw material, dimensional configuration including finish requirements and confirmation of the process to ensure that the component has designed properties. Does the process employed can ensure repeatability of dimensions, material handling in & around and out side the factory is damage proof and is there a system of traceability in case of detection of the defects? These are buyers genuine apprehensions.

Buyer always has doubts whether the component he is sourcing has the right material, giving right functional performance and that the buyer can rely on the manufacturers for the right quality, on time delivery and process capabilities to ensure consistent quality throughout.

PRE ENQUIRY STAGE AUDIT:

This is a quick tour of the manufacturing and quality assurance facilities for a quick judgment. If the audit results are ok, enquiries are sent.

PRE ORDER QUALITY AUDIT:

Once the price is ok and manufacturer is short listed for ordering, a detailed quality audit is conducted. Similar audits are also a possibility during the process of development or as a routine audit to see compliance of the earlier audit remarks.

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During such quality audit the buyer wants to ascertain if the manufacturer has safe methods of material identification (batch, heat, serial numbers, colour code etc), separation of the parts of doubtful or questionable quality, storage of rejected parts & easy access to rejected parts (a separate rejection room with lock and key), is there a possibility of inter mixing of materials during the processing.

In short, any possibility (may be 1 in 1000) of wrong material getting mixed up during cutting, transportation, forging, heat treatment, machining, inspection, storage stages, how good are the transportation method from one place to other, is there a possibility of material falling off from the bins and damaging the parts & also lead inter mixing of the parts etc.

Any signs of unidentified rejection not in designated place might lead to suspicion of the safe processing systems. Same consideration also goes for heat treatment and surface conditioning.

PREPARING FOR QUALITY AUDIT:

SECURITY / OFFICE:

Audit starts from your security gate. Inform the gate staff about visitor and timings. Visitors are to be cleared quickly at the gate. Please keep cycle/ motorcycle stand & parking area in orderly condition.

Please provide safety helmets to the visitors. Product exhibition area must be clean and dust free. Keep all the products on the display free of dust protected against rust, oxidation and corrosion. Items on display must be best, shining and impressive. Raw casting, forgings must be re shot blast and kept on display every time you are expecting an important client.

RAW MATERIAL STORAGE & STORE:

Usually the audit starts from raw material storage. General presentation of the area is important. Materials must be properly segregated based on size, material grade and stored in proper racks, clearly mark heat number,

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colour coded at the ends and along the length. Rejected steel (ie off grade steel) must not be stored near to the stock of accepted steel. All bins must be tagged with material identification ie heat no, grade and qty in the bin.

LABORATORY – CHEMICAL, MECHANICAL & METALLURGICAL:

Labs must be kept clean, neat, orderly; samples must be properly identified with heat numbers, grade and stored (min 6 months) with ease of locating them. This includes chemical, tensile and microscopic samples. All test certificates must be preserved for a period of 1 year and soft copies for min 2 years. Lab reports & registers must be up to date with all latest test entries. All lab equipment, measuring tools must have calibration certificate and calibration labels indicating date of next calibration.

TOOL STORAGE:

Tool must be properly stored with regular paint, oiling and cleaning, protected from rain & weather against deterioration. Tools be properly identified with name of the owner, drg no, die / Pattern / Parts no etc and segregated party wise. Tool register must be maintained for all the tools in stock.

PRODUCTION SHOP:

Production shop floor must be neat & orderly, clear of any jobs, dirt & waste etc. All material must be identified with in process tags with heat no / batch no and stage of operations. No unidentified material be found on the shop floor.

All rejections must be marked in Red. Items pending for decision for rejection must be separately stores with appropriate marking away from good parts area or rejection area.

All job cards / Process cards to remain in place and up to date duly signed. All machines to show control plans for the respective operations. All parts must be properly transported from place to place in appropriate bins, marked batch wise properly.

No rectification by welding is permissible without the prior permission from the buyers in writing in most cases. All furnaces must have temperature controllers duly calibrated. Heat treatment register must be maintained with batch no, items loaded with heat treatment cycles. Temperature recorders must show the heat no, batch no and

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the jobs loaded to appear on the printout. All furnaces must be free from oil leakage and oil spillage on the shop floor.

Non moving items if any on the shop floor must be identified as a samples, stocks or excess stock waiting for next schedule. All in-process, semi finished or finished goods must be properly stacked and kept in presentable form.

Please clear off rejection area regularly. Big stock of rejections in rejections area does not help for good impressions. It must be made clear to the technicians & supervisors not to flock around the visitors. Instead they should keep doing their specified jobs.

PRE TOUR BRIEFING:

Please commence visit with staff introduction with power point presentation showing your company /customer profile. Show glimpse of your quality, control, recording system and other relevant documents including PPAP docs, first sample formats, job card, inspection format, daily maintenance startup procedure, production, inspection, finishing and final inspection etc. This is not compulsory, but it speaks of systems.

PROVISION OF SAFETY TOOLS:

Overseas buyers pay utmost importance to safety and security. It is necessary to provide safety helmets not only to the visitors but also to your staff.

Similarly please provide safety boots; safety goggles to machine operator; welders, grinders etc, hand gloves to welders, grinders & materials handlers etc and ensure & insist that these tools are used. Please brief all supervisor and operator to comply with the use of safety tools especially when visitors are expected.

After having said so much about the company, the visitors witness what one is actually saying and what is being practiced on shop floor when they are around.

Create a good impression and let the visitor go with a confidence that the buyer is in professional safe hands by giving some business.

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Export business really offers excellent opportunity not only for self development, quality up-gradation of its products, in the systems, but also in overall management.

GERMAN PRACTICES FOR SUSTAINED QUALITY:

Quality aspect considered in all these deliberations is of global OEM norms. German quality is considered as bench mark for engineering products and we all must strive for best to be achieved.

Most companies have basic infrastructure in terms of machinery, equipment & inspection tooling that are needed to do jobs to German quality norms. Export is not just the purgatives of those who have world class facilities. My experience has proven time and again that even small units can be successful in reaching high levels of quality to meet export requirements.

TARGET DRAWINGS/ REPORT FORMATS:

All parts must have a target drawing marking all controlled dimensions, a control plan, process sheets, format of self certification (as per EN ISO 10204 3.1/3.2) for the part in terms of metallurgy and a dimensional report of the part with specified limits of tolerances. The target drawing for 1st part inspection is very elaborate, covering all dim, parting shift, radius and chamfer, surface finish, surface roughness, oiling, surface coating, scratches, dents, damages etc. Target drawings for bulk production need not be very elaborate and just include critical features of the part.

DIMENSIONAL TOLERANCES:

Ideally all parts must have dimensions within the specified range as specified on the drawings or on the control plans. They must normally be in compliance with ISO specification (ISO 1452). Machined / ground surface finish as per the specs on the drawings. No tool marks, dents, scratch marks; complying to chamfer, fillet radius; neat & clean free from dust, grease, turnings, sand particles, free from burr and sharp edges.

All parts must be properly oiled, protected against corrosion, free from mechanical & handling damages and must be identified with serial no, heat code, batch code for future traceability in case of customer complaints or part failure. Part must be compliant with material specified on the drawings ensuring the hardness and mechanical

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properties. All parts must be properly packed & transported to the destination so that they reach the end user in perfect conditions. Above all, parts must be good & uniform in appearance and getup.

All these requirements to be met on all parts look very Herculean job to start with and they seem too difficult to achieve (psychologically). But if you try to accept the needs of the parts and work to achieve them these become very easy.

To comply to such high standards, efforts are needed from start to end i.e. engineering, control plans, tools, jig fixture, dimensional control tools with desired accuracies, machines & machine tools (accurate with good maintenance) etc. You will need good quality system to get best results, adequate skills for machining and in measurements. Operators, Supervisors and Inspectors are key elements of controls.

QUALITY ON LINE, A SIMPLE TOOL FOR QUALITY:

It would be very difficult to achieve (correct dimensions on each dimensions on all parts manufactured) such high standards, unless we work on simple, innovative and user friendly practical methods. This cannot be achieved by handful of quality control staff and inspectors. First of all every one must understand what we are talking about and what we mean to achieve. With out the specific understanding of the task, one is unlikely to achieve any success. This is easy and feasible, if all players at every level put in small contributions. Taking total responsibility & care of the operations we perform and checking our out put (jobs) "100% good" is the only contribution every one need to do.

"I WORK, I CHECK" OR "I MACHINE, I CHECK" CONCEPT:

We go by the old, simple and well proven concept "I work, I check" or "I machine & I check". This simple technique is called "**Quality on Line**" ie we do not achieve desired dimensional accuracy; we do not proceed with production (or machining). The operation must stop at this point. Bad machining " Stop Machine" is the only way to achieve. This must be understood by operators, supervisors, inspectors, engineers, managers and owners. A logical sequence to avoid repeat of error is:

Machine >> check 1st piece >> size OK to tolerance >> Proceed with repeatability test >> first 5 parts OK >> proceed with production >> if not, find fault >> investigate >> Reload and repeat the steps until dims are OK.

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Unless all players honestly follow this practice on the shop floor, one is unlikely to achieve 100% results.

TRAINING THE OPERATORS AND INSPECTORS:

This is an essential part of achieving best results. Ask them a few simple questions. What have you understood by “I machine I check” method of “on line quality” system, what is their job & job responsibility, what is their duty towards quality, are they really obliged to quality in their work, is it their mission to get 100% right and can they achieve 100% accuracy in what ever they machine, repeatedly? Ask them what support they need to get 100% good. Please ask each one of them to prepare a list tools and facility to enable them to do 100% checking. Review the list of tools from every one and once agreed, make these tools available as soon as possible. This method is feasible where operation time is less than checking time. It is not feasible to check all dims on 100% jobs. But over the time it will be clear what to check and what not.

FACTORS RESPONSIBLE FOR BAD MEASUREMENTS/ READINGS:

Poor skills of measurement, poor judgment, inadequate practice, faulty instruments (without periodical calibrations), improper, inadequate range or least count of instrument used, fall and mishandling of measuring tools etc. Skills will have to be built by continuous practice. Manufacturing error in gauges & tools not identified by the user or inspection dept will lead to wrong quality.

RESOURCES REQUIRED FOR “ON LINE QUALITY” SYSTEM:

Please ensure necessary measuring tools in plenty on each machine, to inspect the jobs in less than 50% time of cycle time, de-burring tools, chamfering tools, air gun, water absorbent cotton waste, oil station etc on each machine, measuring instruments i.e. digital micrometer, venier, height gauge with 1 micron least count, height master and CMM for high precision components (stationed at a centralized place).

Snap/slip/plug gauges are ok for dim tolerance up to (+) (-) 100 microns for 100% measurements on all parts. Parts with dim tolerance up to 50 microns must be checked 100% using digital micrometers/ dial bore gauges with 1 micron least count. All threads must be checked with thread pitch gauge for GO and NOGO (NOGO not to enter more than 1-1 1/2 threads ie one to one and half rotation).

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We must have standard comparators for bore, length and diametrical measurements. Every instrument must be calibrated, 1st piece inspection is a must, followed by first 5 pcs repeatability test. There after measurement on 1 pcs in 5 pcs will be ok. Please set initial zero error at the beginning of operations. Defective instruments will have to be rejected and removed from the line, red making done, even deliberately damaged to show that instrument is bad.

SUMMERY& CONCLUSIONS:

It is not essential to have great facilities for making high quality products. Ordinary looking companies can achieve high standard of quality needed for exports. It is the quality systems that is key rather than world class facilities.

If a precise “On Line” quality system is practiced in all stages development and if inspection is done with all the sincerity, the sample approval first time is guaranteed beyond doubt and can achieve high quality in bulk supply.

It is important that the inspection method is nearly same at both ends. It is the initial thrust that is needed to take off on such system and once system stabilizes subsequent flight is smooth.

This is not a new system, an age old, tried, tested and proven method practiced all over the world. This is even common in many Indian companies too.

The system deserves a serous try and I assure you that you will find astonishing results. Sincere thanks to organizers of 59th IFC for this opportunity and thank you for your patience.
