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QR VIEWS

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"Zero Effect, Zero Defect" Model

With "Make in India" gaining momentum, the MSMEs in India have to gear up to face the benchmark for quality as desired by foreign companies coming here to establish their manufacturing units. To meet the quality need of the country the Quality Council of India (QCI) with Department of Industrial Policy & Promotion (DIPP) is taking a lead role in making the MSMEs aware of the requirement by evolving a "Zero Effect, Zero Defect (ZED) model". The aim is to help them evolve and grow by providing them with adequate training and funding to move up the value chain and produce quality products. The qualifying companies will be assigned star rating (1 to 5) based on their competence levels, technology and quality based on 61 parameters. The "ZED" mark focus two aspects viz. Customer & Society. The "Zero effect", focus on society by concentrating on aspects of Zero air pollution, Zero liquid discharge, Zero solid waste and Zero wastage of natural resources. The "Zero Defect", focus on mainly Zero non-conformance and waste. In short "ZED" is not only a certifiable standard but a journey towards excellence. I am happy to inform NIQR members that our Institution will collaborate with QCI on the nation-wide propagation of the ZED campaign and implementation of the model enabling the vision of "Make in India" to happen in its true spirit.

C. Athi Pagavan
Vice Chairman, NIQR Trivandrum Branch

What Is Photogrammetry?

EDITOR'S NOTE

This week, QR Views will be looking at some of the key technologies on display at the Coordinate Metrology Society's annual conference (CMSC). The CMSC, took place this year July 20–24 in Hollywood, Florida, is the gathering place for users, service providers, and original equipment manufacturers of close tolerance, industrial coordinate measurement systems, software, and peripherals.

Photogrammetry was first applied to high-precision dimensional metrology in large-scale manufacturing during the mid-1980s. Since then, the technology of image-based 3D measurement has changed dramatically, with digital cameras making possible fully automatic, noncontact 3D measurement of objects large and small. Throughout this evolution the fundamentals of photogrammetry have remained the same, and the purpose of this short article is to provide a general overview of photogrammetric technology.

THE BASIC PROCESS

The basic process of photogrammetry centers on the conversion of two-dimensional (2D) coordinate (x,y) information of object-feature points, which have been recorded in two or more images of a photographed scene, into three-dimensional (3D) coordinates (X,Y,Z). This is illustrated in figure 1.

Imagine that three images of an object are recorded with a digital frame camera from three different viewing directions, such that feature points P1 to P5 appear in all images. Intuitively, it's clear that if the positions of the camera stations S1, S2, and S3 are known in a 3D reference system, with the X, Y, and Z axes as illustrated, and the directions of the three imaging rays to a feature point are also known, then the position, say P1, will lie at the point of intersection of the three rays at coordinates (X1, Y1, Z1). This part is straightforward. Unfortunately, the matter is complicated because we generally don't know the precise locations of the camera stations, and we don't directly measure the spatial directions of the imaging rays.

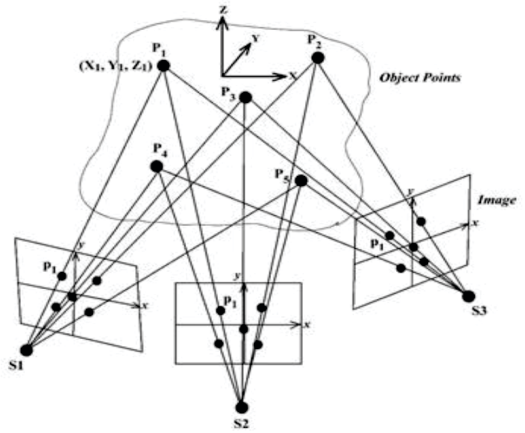


Figure 1: Photogrammetric orientation: X,Y, Z coordinates determined from intersecting rays

This is where the science of photogrammetry comes in. If you imagine figure 1 as illustrating the mutual intersection of three bundles of imaging rays, then this assemblage of camera stations and object points forms a 3D shape. The bundles will only fit together in one way if the corresponding rays for each point are going to intersect perfectly. To achieve this mutual intersection of all matching rays, it's necessary to recover the same relative orientation between the images that existed at the time of photography. This reconstruction of the spatial orientation of images to yield the true shape, as represented by the object points, is termed "photogrammetric orientation." The situation described is no different in principle to the way the human brain re-creates 3D scenes from stereo-imagery, for example, as it does with a 3D movie. But with photogrammetry, any number of images, any number of points, and a wide variety of camera viewing directions are accommodated in the 3D coordinate determination.

In order for the bundle of rays for each image to be established, it's necessary to determine the angular relationship between the rays, which all pass through the perspective center of the camera lens. This is where the requirement to measure image coordinates comes in, for although we might be measuring the 2D location on an image, we're actually determining the angular direction of each ray with respect to the camera's pointing axis. This is illustrated in figure 2. By thinking of the image measurement process as forming a bundle of rays with known relative directions, we make it easier to visualize the mutual fitting together of these bundles to form a 3D shape. This shape can have arbitrary scale (move the cameras stations apart, and the shape enlarges) and an arbitrary 3D coordinate system. The assignment of scale, or size, and orientation and position of the intersected points P1 to P5 in a chosen XYZ coordinate system is termed "absolute orientation."

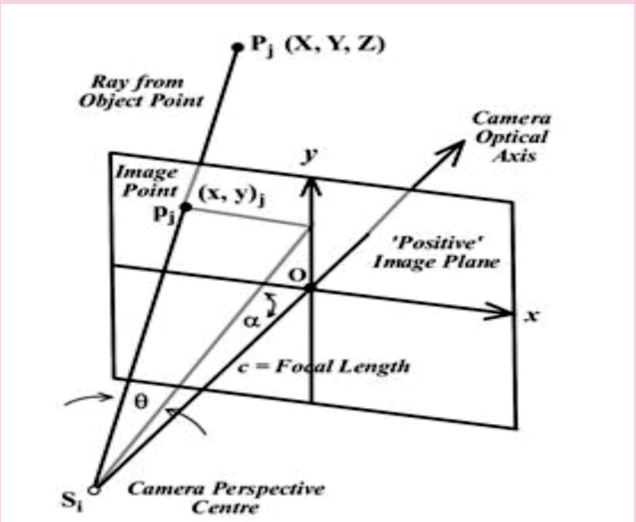
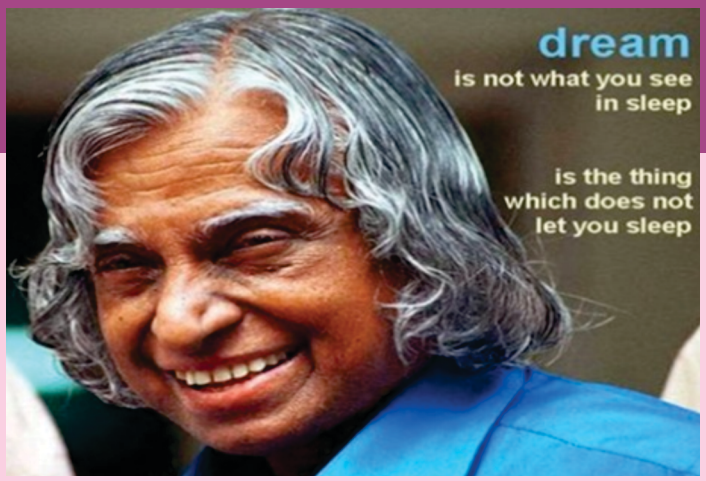


Figure 2: The camera as an angle measuring device

The photogrammetric determination of a 3D feature point, which is generally a target in industrial measurement, can be viewed as a four-stage process, the post-photography phases of which are fully automatic.

P. Muthuganapathy
Editorial Board

TRIBUTE TO Dr. APJ ABDUL KALAM



As a tribute to Dr. Kalam, our former President of India we bringout the Extracts from his address in the Second National Conclave for Laboratories at Yeshwantpur, Bangalore on 17 September 2013 on the heading, " Brand Evolution of Products through Quality Assurance".

" I am delighted to participate at the Second National Conclave for Laboratories at Bangalore. I greet the Confederation of Indian Industry – Institute of Quality and National Accreditation Board for Laboratories (NABL) for organizing such a conclave.

"I am happy that the National Conclave has been positioned to serve as one common platform to share, discuss and evolve policy on all critical and emerging issues relating to testing and calibration laboratory practices that is the foundation of quality assurance and systems.

Innovation framework by Finland

During my recent visit to Finland, I had an opportunity to meet the people from different walks of life in Finland, the political system, educationist, entrepreneurs and venture capitalists. When I met the Prime Minister of Finland, he talked to me about how they overcome the challenges of 1992 crisis situation.

In this context, Finland has made quality education is available to all citizens free of cost. Next they encourage innovation as primary focus of higher education and research. Risk taking is highly encouraged and appreciated and built the institutions that can primarily provide the venture capital for innovators and their ideas without any collateral security. With this innovation framework, ideas becoming patent, patents becoming technologies, technologies have become products and systems for the global market like Nokia. The per-capita income of the country is $35,500. Finland's investment in R&D, at 3.4% of GDP, is one of the highest in the world and they are going to increase to 6% in the near future. The education system, innovation promotion system, industry partnership with venture capitalist and educational institutions with full political support has enabled Finland to achieve a rank of 4 in Global Innovation index and 3 in Global Competitiveness index. Whereas India is in 64th ranking in the Global Innovation Index, and in global competitiveness index India is 59 in 2012-13.

How can India reach within the top 10? It is possible only by creative education, innovation, entrepreneurship and venture capital system considering idea as collateral in an integrated way. It is indeed a big message to the CII and NABL to focus on improving the overall the Global Innovation Index and Global Competitiveness index through their quality testing practice.

Evolving the quality culture: My Experience

During the 1970s, I was working with my team in ISRO in Thumba near Thiruvananthapuram in the design, development and launch of the first Satellite Launch Vehicle of the nation, SLV-3. First time in India, it was an important project to be completed within a time frame of seven years. It had 64 systems, 20,000 sub subsystems and more than 100,000 components. Design, development and realization of hundreds of components encompassing several new disciplines for the country was a big challenge in technology, management and quality assurance.

Learning for quality: Looking back, I see how we learnt day by day on the quality aspect needed during the life cycle of the project. We initiated innovative concepts of quality mechanisms, standards, procedures and documentation. Let me first tell you one most important factor needed for ensuring quality. That is the quality of people, attitude and commitment to the given tasks with focus only on mission success. Spotting the talent, selecting the right persons for the right tasks and facilitating them to perform in a free environment are the fundamental requirement for quality. At that point in time, we were in the preliminary stage of development of the new technology related to spacecraft and launch vehicle and the concept of quality for space system was in very nascent stage.

Developing quality culture: Initially, quality was synonymous with inspection of materials, processes and components. From there, we had to evolve methods of quality control, quality assurance, product assurance, flight readiness and mission readiness. The integrated action on the shop floor and the laboratory by the quality assurance team will ensure reliability of the system. Today they have become common practices. But then at that time it required enormous efforts to make people accept the quality discipline and inculcate standard practices in the overall scheme of development and realization of launch vehicle and spacecrafts. The main challenge was to ensure overall mission quality and reliability at every step involving thousands of parts, sub-assemblies and assemblies, their integration and validation. A total life cycle quality environment through concept – design – development – realization and flight testing was established by our team so that we translated our designs as reliable products for the mission.

Quality is built in design: After the completion of the design phase, we divided the whole activity into three parts: device, subsystem and system. Device reliability should be 99.999%; subsystem reliability should be 99.98% and the overall system reliability should be 99.5%. The sub-systems were developed by both work centres within VSSC and certain industries. While studying the quality of products designed by different agencies, I found a unique phenomenon. Some sub-systems after design and development were able to get qualified for flight after 4 tests. In some cases series of tests were involved before it gets qualified for flight. In one case, the system was not cleared even after 15th test. A system review team was formed. It established an important aspect that whenever the sub-system had gone through detailed design, systematic design review, the system manager was in a position to realize the product within a few tests. Wherever, adequate time had not been spent in detailed design, series of tests and modifications were required, leading to large number of iterative development processes. Based on this experience, in ISRO a policy was made that the time spent in design should be 60%, development should be 20% and the testing should be 20%. I am sure, with the test and evaluation experience of product designed by various competitive industries and NABL should be able to advice to the customers in this direction.

The Quality Leverage

The best way to achieve quality is to build it in the design stage itself. The scope for building quality into a product decreases as we move along the product life-cycle from design to manufacturing to servicing and product support. Therefore, for world class quality, it is essential to have indigenous R & D and design. .....

With these words, I greet the participants of Second National Conclave for Laboratories being held at Bangalore a success in promoting competitiveness of the industry by ensuring the global quality assurance. My best wishes to all of you success in the mission of creating made in India brand.

May god bless you".

YOU ARE WITH ME

I walked and walked on the
sands of Thumba and Veli

When I walked shores of Thumba
The Arabian Sea enriched me with Sriragam
I was not alone, my friends, you were always with me
You did not allow, tears roll on my cheeks
your soft touch from your beautiful hands
always gave me strength

I failed sometime in my missions,
You lifted my spirits with your unique
devotion of hardwork

Whenever we succeeded together many a time
You elevated me
I was not alone, you were with me always, my friends
Even when I am away from you,
our hearts communicate

You are my University, the gift of Almighty
I am with you, to give my gratitude
as you made me
And thank you my friends

God bless you, my VSSC friends

Dr. Abdul Kalam

WRAP UP

Last quarter was an eventful one for the Trivandrum Branch. We were able to organize a lecture program on Quality Management Systems in automobile industries by Sri.MK Vinodkumar of BVC Chennai at ACE College of Engineering as a part of student chapter activity. There was interesting lecture by our beloved chairman Sri.Ignatious CA on Nuero Linguistic Programming (NLP). Certain examples told during the lecture like imagining a wonderful moment in your life and visualizing it in front of you can help us overcome depressions and day to day stresses. A lecture programme at Amal Jyothi College of Engineering was arranged during this period. Lecture on quality engineering in Aerospace fabrication was delivered by me and Sri.V Ramachandran. NIQR, Trivandrum Branch can hopefully expect another student chapter coming in this college in the near future.

We could attend NIQR head quarter interaction programme with Quality Council of India(QCI). It was about 'zero defect zero effect' concept being propagated by Government of India to boost industrial growth through increased production of reliable products and services that would attract global market. Simple principles wherein NIQR can join hands for this activity include identifying a cluster of industries in an area and training them to achieve levels of quality not only to meet specification but also to delight customers. Control of wastes in all senses at source will provide greener environment. This will lead to zero effect production.

Annual General Body meeting is being scheduled in the month of October. I hope more members would participate for AGM and make it a brainstorming session for the branch to climb new heights in the future year to come.

KR Mohan Ananthanarayanan
Secretary, NIQR Thiruvananthapuram Branch

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