



# Q-ZINE

## Bimonthly Newsletter

### National Institution for Quality & Reliability Chennai Branch

JAN - FEB 2018

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### *From Chairman...*



Dear NIQRians,

Hope you are all finding the New Year with lots of Prosperity and Confidence....

Our 16<sup>th</sup> Quality Convention is fast approaching. We are planning to have this event as the best in class event which will help our industrial community to understand the future in much better way. The whole convention is planned to focus mainly on the Future of Indian Industrial eco system in the light of fast changing digital technology and mobility technology. For the first time in the History of NIQR, we are organizing this convention along with the Exhibition. This will go a long way to help both our industry and also for the visibility of NIQR.

As you all know, executing such a big vision takes lots of effort in terms of planning, networking and finally executing. Such an effort cannot come from a single individual or a group. It needs to be the collective effort of all of us. Unless we all dedicate ourselves to this cause and walk an extra mile, we will not be successful in our mission of making NIQR big and the Convention Very Big. Lots of work is being done towards the above, request everybody's seamless participation.

Let our Quality Convention "Digital Quality for Disruptive Future" be disruptive to NIQR also....

K. Manikandan

### *From Secretary...*



The year 2017 had been a milestone year for NIQR Chennai branch; with all your support, we were able to publish our bi-monthly newsletters in time; the number of Evening Lectures was increased in June 2017 to two per month and we have sustained it till now with proper focus and planning. On the education front, we are organising a National Conference on "Electric Mobility - Opportunities and Challenges" in SRM University, Vadapalani on 22<sup>nd</sup> February 2018.

In the premiere program of NIQR, we have so far sensitised 9000 minds with our Awareness program on Industry 4.0 in Industries and Institutions. In the digitalizing of our processes, we have progressed well in the membership module and have taken up the training module. There were lot of glitches so far; we are overcoming by enthusiastic learning.

We have taken up the planning work elaborately for the smooth conduct of our biennial National Conference; we hope to make it a grand success with inputs and support from all of you.

C. V. Gowri Sankar



**NIQR welcomes the new members  
who joined during January February 2018**

**Individual Annual Members**

**1 Member**

**Institutional Member**

**Hindustan Institute of Technology & Science**



## Chennai Branch Activities

### Monthly Evening Lecture Programs

#### December 2017

On 30<sup>th</sup> December 2017, Mr. S.S. Balasubramanian, Head India Development Centre, THORS India Pvt Ltd delivered a lecture on "eLearning" at NIQR Conference Hall.

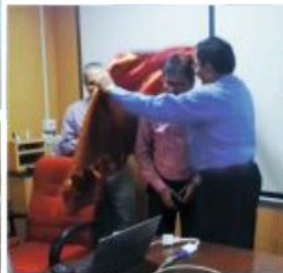
Mr. C. V. Gowri Sankar welcomed the gathering and introduced the speaker.

Mr. S.S. Balasubramanian started comparing eLearning Vs classroom learning comparing them to cell phones Vs pay phones at the call cabins. Similar to Cell phones allowing you to communicate any time and usually anywhere, by having a properly configured phone, eLearning allows you to learn anywhere and usually at any time, by having a properly configured computer. The speaker explained the aim of any training program; developing different types of skills – namely, Cognitive Skills, Interpersonal skills & Psychomotor Skills; and explained how e-learning addresses these diverse domains. He showed how eLearning is growing globally and is expected to touch 240 Billion USD by 2023; India is on track with the global growth with the Government's Make in India and Digital India initiatives.

He explained how eLearning addresses the basic requirements of training; and dwelt on types and benefits and limitations of eLearning; he elaborated on Designing eLearning User Interfaces and detailed the five phases, namely Analysis, Design, Development, Implementation and Evaluation of ADDIE, the Instructional Design Model. The short video on fixture design showing the potential of eLearning kept the audience spellbound. He rounded off with the THORS Value Proposition. Prof. C. Uthayakumar ECM, NIQR Chennai Branch summed up the proceedings and appreciated the passion of Mr. Bala for making it easier and interesting for the audience in a short duration. As usual, the Q&A session turned out to be one of the longest and meaningful ones.

Mr. P. K. Aggarwal, National President, NIQR honoured the speaker with a shawl, Mr. S. Rajasekaran, National Vice President, NIQR honoured the speaker with a memento and Mr. Abhilash Chakravarthy, speaker for next session honoured the speaker with a laminated memento. The NIQR Chennai Branch Nov-Dec Newsletter was released by the speaker on the occasion.

Mr. Gowri Sankar thanked the participants.



Mr. S. S. Balasubramanian, ECM of NIQR Chennai Branch is a Mechanical Engineering Graduate from College of Engineering, Guindy and has 40 years of experience in Automotive and Farm Equipment sectors.

He held various positions in Quality Assurance function in leading industries like Brakes India, Ashok Leyland, Axles India, Tractors and Farm Equipment Ltd and Delphi TVS Diesel Systems Ltd. Currently, he is heading THORSIndia, which is the Indian Operation of THORS LLC, Medina, OHIO, US, an eLearning solution provider.

## Monthly Evening Lecture Programs

### January 2018

On 6<sup>th</sup> January 2018, Mr. R. Abilash Chakaravarthy, Special Director Projects, Infant Engineers Pvt. Ltd. Chennai delivered a lecture on "Additive Manufacturing" at NIQR Conference Hall.

Mr. C. V. Gowri Sankar welcomed the gathering and introduced the speaker with the help of a presentation showcasing the speaker's rare skills on drawing and his vast collection of awards and certificates during his college days.

Mr. Abilash started the session by explaining the difference between conventional manufacturing and additive manufacturing especially in material requirement. He detailed the process of 3D printing and the major three types, namely, FDM (filament spools) SLS (powder cartridge) and SLA (resin cartridge).

His explanation of the process flow of 3D printing from conceptualizing to printing and infill % (the amount material that is actually needed to withstand a specific load) were well received by the audience.



Mr. Kothandaraman, ECM NIQR Chennai Branch summed up the proceedings and appreciated the efforts put by Mr. Abilash in cracking the myth of 'max-filling max-strength'. He also added that he has made Mr. S. Rajasekaran a proud father.

மகன்தந்தைக்கு ஆற்றும் உதவி இவன்தந்தை  
என்றோற்றான் கொள்ளும் சொல்

The Q&A session, as usual, lasted for nearly 30 minutes and the speaker answered all the questions calmly, especially on infill %. Mr. P. K. Aggarwal, National President, NIQR honoured the speaker with a shawl, Dr. V. Swaminathan, National Vice President, NIQR honoured the speaker with a memento and Mr. K. Manikandan, NIQR Chennai Branch Chairman presented a laminated memento to the speaker.

Mr. Gowri Sankar thanked the participants.



Mr. R. Abilash Chakaravarthy is a mechanical engineering graduate from Panimalar Engineering College. He got into additive manufacturing during his second year in the college. He was one of the first 10 students who were trained and worked as interns in Global Automotive Research Centre, Chennai in the field of destructive and non disruptive testing of car parts and certification of the cars for road approval. Currently, he is Special Director Projects, Infant Engineers Pvt. Ltd. Chennai.

## Monthly Evening Lecture Programs

### January 2018

On 30<sup>th</sup> January 2018, Mr. S. K. Shivasubramani, Psychologist, Government of Tamil Nadu delivered a lecture on "Emotional Mastery in You..." at NIQR Conference Hall.

Mr. C. V. Gowri Sankar welcomed the gathering and introduced the speaker.

Mr. Shivasubramani outlined the subtle difference between emotion and feeling in a human being. He was candid in expressing his view that in reality there are no negative or positive emotions and only emotions exist; often, we only try to distinguish whether it is positive or negative. There are many ways to understand one's emotions and use it for his/her success, happiness and growth.

Learning and empowering ourselves with the very idea Stimulus-Response relation is useful in mastering our emotions, emotional traits of personality as well as life! **EMOTIONAL MASTERY** is an art and very well part of science i.e. using your awareness to bring in your inner ability; to exercise control over your emotional state without letting it (or anything else) affect you! He demonstrated with the audience some simple yet powerful ways of controlling emotions.

He concluded wishing the participants to command their emotional states from **NOW..!**

Dr. V. Swaminathan, National Vice President, NIQR honoured the speaker with a shawl, and Mr. K. Manikandar, NIQR Chennai Branch Chairman honoured the speaker with a memento and Mr. Arunachaleeswaran, DGM, Fritzmeier Motherson Cabin Engg. Ltd. honoured the speaker with a laminated memento.

Mr. Gowri Sankar thanked the participants.



Mr. S. K. Shivasubramani, B.Tech, M.B.A, M.A, M.SC, Dip. in C. Psy, Dip. in BMP is a Psychologist working with Government of Tamil Nadu. He is a consultant to JJB, SCPCRC and other private organisations. He is an Emotional Mastery and Excellence Coach for Entrepreneurs, Bureaucrats, Politicians and Seekers, Counseling Psychologist/Psychotherapist, Practitioner- Hypnotherapy, Neuro-linguistic programming, CBT, gestalt for relationship management & more.

## Monthly Evening Lecture Programs

### February 2018

On 10<sup>th</sup> January 2018, Mr. M. Prasanna, B-Tech Information Technology, Panimalar Engineering College delivered a lecture on "Ethical Hacking" at NIQR Conference Hall. Mr. C. V. Gowri Sankar welcomed the gathering and introduced the speaker with the help of a presentation showcasing the speaker's rare skills on drawing and his interest in music. The audience appreciated the efforts.

Mr. Prasanna started the session with a two-liner "The only truly secure system is one that is powered off, cast in a block of concrete and sealed in a lead-lined room with armed guards"; and at the end of the session the audience were fully convinced with the statement. Slowly and steadily, he built the tempo; what is system, network, weakness, access and of course hacking. The process flow of hacking explained in detail by the speaker was fantastic and simple to understand; the real-time hacking for password cracking done at the end was well appreciated by the audience; the audience left murmuring - "easy to understand 'change the password often', but is it practical".



Mr. V. Raghavan, Vice Chairman, NIQR Chennai Branch summed up the proceedings and lauded the process flow of hacking described by the speaker. He was happy that the talent hunt of youth for knowledge sharing initiated recently by NIQR is yielding good results.

Mr. S. Rajasekaran, National Vice President, NIQR honoured the speaker with a shawl, Mr. Bharani Perumal, ECM, NIQR Chennai Branch honoured the speaker with a memento and Mr. R. Abilash Chakaravarthy, Special Director Projects, Infant Engineers Pvt. Ltd. Chennai honoured the speaker with a laminated memento.

Mr. Gowri Sankar thanked the participants.



Mr. M. Prasanna is pursuing his B-Tech Information Technology in Panimalar Engineering College, Chennai. He is currently in the eighth semester doing his project work. He is a Karate Black Belt but very quiet; understands computers both hardware and software very well; also very good in Doodle Art, Key Board and Photography....

## INDUSTRY - 4.0 Awareness Program: No. 35

The 35<sup>th</sup> Program in the series was conducted at Confederation of Indian Industries, Velachery, Chennai on 29<sup>th</sup> January 2018. The participants were senior level managers of the TQM Forum of CII Chennai Zone.

Mr. Santhosh Varghese of CII TQM Forum welcomed the gathering. Mr. R. Ananda Kumar, G.M - Quality Control, Schwing Stetter (India) Pvt. Ltd introduced the speaker Mr. C. V. Gowri Sankar and spoke briefly about NIQR's mission of sensitising 20000 minds on Industry 4.0 by end 2018.

The program was from 2.00 to 5.00PM. The faculty impressed on the participants the rapid pace of technology development in recent times; the need for learning additional skills to stay on top of the industry and for individual career development. Having already seen some of the videos in YouTube and WhatsApp, the participants appreciated the speaker's comments for the videos; they understood the necessity of learning new skills.



## INDUSTRY - 4.0 Awareness Program: No. 36

The 36<sup>th</sup> Program in the series was conducted at Central Institute of Plastics Engineering & Technology (CIPET) on 30<sup>th</sup> January 2018. There were 120 students from 3<sup>rd</sup> & 4<sup>th</sup> year.

Dr. Palanivel, Principal of the college presided over the function and Mr. A. G. S. Neelagaantan, in charge-Placement Cell introduced the speaker, Mr. C. V. Gowri Sankar and briefed the students about the importance of the topic.

The program was from 10.00 to 1.00PM. Two minutes silence was observed at 11.00AM for Martyrs' Day. The faculty briefed the students about NIQR and its activities and its mission 20K. The students were very happy and participative when the potential of India Today and its challenges and opportunities were presented by the faculty. The students were very much enthusiastic to learn about additional skills required for career development.

After the program, Mr. K. Palanivel Raja, Principal Director & Head expressed his happiness and desire to organise a Conference with NIQR soon.



## One day Training Program on New Seven Tools

NIQR Chennai Branch organised a one day training program on New Seven Tools of Quality for shop floor executives on 20<sup>th</sup> December 2017 at NIQR Conference Hall. There were 13 participants from eight organisations.

Mr. N. Jagannadha Rao, EC Member, NIQR Chennai Branch was Coordinator and Faculty for this one day programme.

1. The importance and use of New Seven Tools for solving higher level problems was explained.
2. The participants identified higher level problems from their respective organisations. The participants were grouped into three teams and each team compiled a list of Higher Level problems and selected one problem for application of Tools.
3. First Affinity Diagram was explained. Each team worked on the selected problem and prepared and presented an Affinity Diagram using idea cards as can be seen from the photos enclosed.
4. Then each of the remaining tools was explained and the Teams prepared the respective diagram. At the end, Arrow Diagram was explained with an example.

The participants took keen interest in working as a team and doing the exercises on the preparation of each diagram. The program was well received by the participants.

The programme concluded with the distribution of participation certificates by the faculty.



## Guest Lecture on "Poka Yoke" in RMK Engineering College

NIQR Chennai Branch has plans to start a Student Chapter in RMK Engineering College, Kavaraipettai, Chennai. More than 200 students have enrolled so far as student members in NIQR. The Principal requested to arrange for a guest lecture to give more exposure to students about NIQR and encourage them to enroll as members of NIQR. With this objective, a Guest Lecture was organised on 8<sup>th</sup> February 2018.

Dr. K. A. Mohamed Junaid, Principal, RMKEC welcomed the gathering of 225 students and staff and explained about activities of NIQR especially in arranging guest lectures useful to the members. Dr. V. Sivakumar Assistant Professor, Mechanical Engineering Department introduced the speaker, Mr. C V Gowri Sankar, Secretary NIQR Chennai Branch

Mr. C V Gowri Sankar narrated the long history of thirty odd years of NIQR and explained the niche roles it has played at appropriate times besides being the premier centre for training shop floor personnel in all matters relating to quality. He specifically pointed out the genesis, growth and expansion and the quality work that the student chapters perform. He dwelt at length on his pet and mission subject of Industry 4.0 and took the opportunity to present a comprehensive survey of the future of Indian industry and the knowledge and skill that are expected of a fresher after college as he enters industry.

The importance of POKA YOKE in mass production, especially in auto sector was explained starting with an exercise on counting number of 'f's in a text. He briefed the audience about the Ten Types of Human Mistakes and various errors possible during mass production. He then explained the three methods of Poka Yoke, namely the contact method, the fixed-value (or constant number) method & the motion - step (or sequence) method.

The difference between warning Poka Yoke and control Poka Yoke was explained with examples. In the end he gave many real life instances / situations to impress upon the young minds the importance and necessity of preventing rather than correcting mistakes. The audience enthusiastically responded with lot of interaction.

The students and faculty members thanked the HOD for arranging a lecture on a useful topic and expressed their desire to have lectures on various TQM concepts in future.

Dr. V. Sivakumar proposed a vote of thanks



## Head Quarters Activities

### QCI - NABET - NIQR

#### Excel Lean Auto Cluster, Hosur Project

NIQR has successfully completed the Excel Lean Cluster Project in Hosur & Bengaluru.

QCI - Auditors have conducted the Mile Stone Based Review (MBR-4) from 14-12-17 to 16-12-17. The audit was completed successfully without any observations across all the nine units (6 in Hosur and 3 in Bengaluru).

This was made possible due to personal involvement of CEOs and their teams under the guidance from NIQR Counsellors. The team members from each unit had effective interaction with the Auditor. The CEOs were very receptive to Auditor's feedback. The Auditor complimented the level of understanding of Lean Tools and the progress made.

He suggested minor improvements in application documents prepared for various Lean Tools.

After completing the IV Phase, activities pertaining to sustenance are in progress.



### Annual Competition on Six Sigma Case Study Presentation

NIQR HQ organised the third Competition on Six Sigma Case Study Presentation on 27<sup>th</sup> January 2018 at Hotel Radha regent, Chennai.

In the inaugural function, Dr. A. Sanjeeva Rao, former National President, NIQR welcomed the gathering. He detailed the purpose of NIQR organizing 6 sigma case study competitions. He also expressed happiness at the large registration of 23 teams, nine delegates from various organizations and one observer. He also mentioned that based on the performance of teams, awards will be given in three categories namely Platinum, Gold & Silver.

The Chief Guest, Mr. P. K. Aggarwal, National President, NIQR inaugurated the competition and addressed the teams on the importance of 6 Sigma projects to be taken by various organizations. He also explained the great role being played by NIQR in organizing various programs on Quality related topics for the benefit of employees and organizations. He conveyed his best wishes to all the teams.

Dr. V. Swaminathan, National Vice President, NIQR introduced the jury members and Stream Managers. Further he explained the details of timeline norms to be followed by the teams.

Dr. A. Sanjeeva Rao and Mr. Anandakumar -GM Quality Engineering -Schwing Stetter India & EC Member NIQR HQ were the juries for Stream1 & Dr. S. Rajkumar, VP Operations, Rane Engine Valves Limited & Mr. R. Mohanakrishnan, Past National Treasurer, NIQR were the juries for Stream2.



The case study presentations started as per time schedule at 10 AM and concluded by 4 PM. Mr. N. Jagannatha Rao & Dr. N. Rangaswamy played the role of Stream Managers for stream 1 and 2 respectively and Mr. R. Gopinath compiled the results along with Dr. V. Swaminathan. In the Valedictory Function, Dr. V. Swaminathan welcomed the Chief Guest, Mr. B.C. Datta, Asst. Vice President of Corporate Affairs in Hyundai Motor India Ltd and other dignitaries and delegates.

Feed back about the program was shared by three team members, one delegate and one Observer.

All the respondents appreciated the way in which the whole program was organized and were happy to learn various steps of 6 sigma methodologies and application of tools.

There were also suggestions to conduct this program at national level. Mr. K. P. Vivekanand, Secretary, Puducherry Branch, NIQR suggested to conduct the same in Puducherry.

Dr. A. Sanjeeva Rao on behalf of the judges shared about the overall performance of the teams and highlighted that the overall maturity level of teams in systematic application of Six Sigma Methodology, relevant high level tools and quality of presentations have significantly improved. All the projects had significant impact on their respective businesses.

The Chief Guest Mr. Datta, in his valedictory address, complimented the participating teams.

He appreciated NIQR for its tireless efforts in promoting quality. He also suggested to the organizations to utilize the services of NIQR for betterment of employees' work life as well as organizations.

Mr. N. Jagannatha Rao announced the results and the awards were given by the Chief Guest.

10 teams were awarded Platinum, 9 teams Gold and 4 teams Silver.

Dr. V. Swaminathan proposed a vote of thanks.



## Dr. Kazuyuki Suzuki Endowment Lecture

NIQR Head Quarters had organised the Dr. Kazuyuki Suzuki Endowment Lecture on 14<sup>th</sup> February 2018 at Hotel Radha Regent Chennai. Mr. K. N. Krishnamurthy, Past National President - NIQR Chennai was the Chief Guest. Mr. R. Hemant Urdhwareshe, Director, Institute of Quality & Reliability was the Guest Speaker. Mr. K. Sridharan Balaji, National Secretary NIQR welcomed the guests and Dr. V. Swaminathan, National Vice President NIQR and spoke about Dr. Kazuyuki Suzuki, his achievements and contributions in reliability. He also read out a message from Suzuki. Mr. S. Rajasekaran, National Vice President - NIQR introduced the Chief Guest and Mr. K. Manikandan, Chairman - NIQR Chennai Branch introduced the speaker Mr. R. Hemant Urdhwareshe to the audience.

Mr. KNK as he is fondly called gave an outline of Suzuki's association with India and NIQR in particular and spoke about the importance of Reliability in today's scenario. The topic for the lecture was "Reliability Engineering Strategies for New and Current Products" and the three important sub-topics the speaker elaborated were; lessons from the past, Reliability Strategy for New Products and Reliability improvement in current products. His analysis of learnings from certain NASA failures kept the audience interested; He listed out the tools to be used for new products like FMEA, Parts selection, Stress Strength analysis, Monte Carlo Simulation, Analysis led Design and Capable People and gave interesting tips on how to get the best from them for finding out the 'reliability of a new product that the designer has not used so far'. His analysis of inter-relationship diagram was well received by the audience. He concluded with some briefing about ASQ certificates.

The Q & A session was made interesting with some information by the speaker about failure analysis in India.

Mr. K. Sridharan Balaji proposed a vote of thanks.



### Hemant Urdhwareshe

He is the first Six Sigma Master Black Belt in India certified by American Society for Quality (ASQ) and is one of the most qualified, knowledgeable and experienced quality professionals in India. He has conducted Six Sigma Black and Green Belt programmes for many reputed companies such as Ashok Leyland, Tata Motors, Fleetguard, TACO, Alfa Laval, Menon Pistons, DGP Hindoday and Eaton Technologies, Semco, Madura Fashions and Lifestyle. He has also conducted many other workshops on Reliability Engineering and FMEA at Tata Motors, Tata Johnson Controls, Grundfoss India, Greaves etc.

He is the first person in India with 5 or more quality certifications from ASQ. He has published many articles on the subjects of quality, reliability and Six Sigma. Hemant has Experience of more than 40 years in the field of quality engineering, reliability and quality management at CIL and consulting/training for various other companies.

## Developing Personal Mastery

### Developing Personal Mastery

Engineering profession in the next decade will undergo dramatic changes, driven by not only technological developments but also societal transformation. This tectonic shift will pose challenges to all the stake holders, educational institutions, government, teachers and students. Each one of them needs to gear up itself to address the challenges. It also calls for change in mindsets so that the transition is smooth and successful. Developing personal mastery, it will be argued, is central to the quality of higher education and educating future engineers. This article looks at developing the personal mastery among the educators in higher education to educate future engineers.

### Transformations of Engineering Education

Educator is the fulcrum, on whom quality of future education lies, particularly in highly knowledge centric area like engineering education. The engineering profession has a trans-organizational character. There is a need for a dramatic and fundamental transformation of the educational process. The reformation in engineering education suggest that social and political changes cannot be successfully adapted and adopted if current faculty are not actively encouraged and supported to develop their personal mastery.

### Opportunity and Challenge

Engineering institutions today are facing a challenge they have never faced before. They must prepare engineers for solving unknown problems and not for addressing assumed scenarios. Therefore, the emphasis should be on teaching to learn rather than providing more knowledge.

### Need for Personal Mastery

Technical excellence is the essential attribute of engineering graduates, but those graduates should also possess team, communication, ethical reasoning, and societal and global contextual analysis skills as well as understand work strategies. At the application end of engineering practice, there is a growing disconnect with engineering education that begs for enlightened industrial engineering leaders and there is a need for a new generation of faculty able to bridge the gap more effectively. The engineering profession will be more likely to capture the imaginations of young people, thus moving engineering to the forefront as educating engineers rethink about their personal

mastery. Educating engineers will be among the most creative, energetic, and dynamic professionals in the world to educate the young engineers of next generations.

### Personal Mastery

Personal mastery is the discipline of personal growth and learning. It goes beyond competence and skills, though it is grounded in competence and skills. It is continually expanding people's ability to create the results in life they truly seek. Personal mastery is not something we possess. It is a process. It is a lifelong discipline. People with a high level of personal mastery are acutely aware of their ignorance, their incompetence, and their growth areas.

The authors have identified nine characteristics of personal mastery namely Vision for themselves, Performance with Purpose, High Energy, Storytelling, Fanatic Discipline, Lifelong Learning, Trusted Relationship, Simplicity and System Thinking.

### Vision for Themselves

Successful people have a very clear idea of what they believe they can become what they think they are capable of, a 'vision for themselves' that exists long before the reality is created. Visualize great outcomes for the lessons they taught, expect students to be inspired for life, set high expectations in all domains of student contribution and don't be afraid to dream the impossible dream.

### Performance with Purpose:

It can truly be said that happens until there is vision. But it is equally true that a vision with no underlying sense of purpose, no calling, is just a good idea – all "sound and fury, signifying nothing". Having a reason for doing something is so important for the questioning mind. We have evolved way beyond the 'because I say so' mentality. That doesn't work very well for engineering educators and it works even more poorly for students. At the level of focus, educators just need to be constantly relating anything that they are actually doing to a bigger purpose.

Learning Mathematics are poorly understood by students mainly because they are poorly communicated by us as engineering educators. One metaphor that comes in handy is the 'Weight Training For Your Brain' approach.

**Mathematics is weight training for the brain.**

Exercising the brain makes it stronger, faster, and more powerful. There may be a few students who don't believe that Maths does this, but there won't be any that will argue with you over the benefits of having a stronger, faster and more powerful brain.

**High Energy:**

The single most attractive personal attribute is energy. Engineering educators with high energy give the impression of increase for all their followers. The impression of increase is just that: students perceive educators as being able to bring more to their lives.

More ideas, more knowledge, more fun, more money, more qualifications, better feelings, more security, more confidence, more poise, more power, more control, more wisdom. Engineering educators with high personal mastery give the impression of increase routinely, without even being aware of it. Their students want to be around them - they won't leave them alone, they follow them around at lunch, they stay after school, they bother them at every break time.

**Story Telling:**

The moment educators start sharing their personal story with the class, they instantly snap to attention. Students seem to have Story Radar. For that matter, so do the rest of us. Some of the stickiest ideas in the world are stories. The world's religions are built on powerful stories. Our culture is defined by the stories we tell—in movies, in books, in the media. Human beings just have a natural affinity for stories. Stories are the currency of our thoughts.

In order to be respected, they need to tell their stories. Students have got to know what educators have done, what educators believe in, what educators stand for. Students have got to want what educators have got.

**There are three reasons why this is crucial:**

1. Students will respect educators more if they know something about educators.
2. Students will be interested in the learning topic if educators personalize it.
3. Major payoff that stories provide: inspiration. Inspiration drives action, as does simulation.

Stories cause mental simulation. Mental simulation can also build skills.

Stories are effective teaching tools. Story is part entertainment and part instruction. Story reflects core message. Telling a story makes it relevant to educators and therefore relevant to students by association. Because the story never ends, it develops. And that's what keeps people interested.

All the great communicators; teachers, preachers, politicians, business leaders, statesmen were great story tellers.

**Simplicity.**

The educational system is very complex system consisting of many variances, unknowns, and uncertainties. Complexity can easily undermine confidence and responsibility. Simplicity has near universal agreement from leading thinkers in the world about its importance. Simplicity is the force that has powered the Apple brand to success and also driven politicians to win elections and world-changing social movements.

The process of prioritization is the heart of simplicity. It's what we call "finding the core." Simplicity doesn't mean dumping down, it means choosing. Some concepts are more critical than others. And as the teacher, you're the only one who can make that determination.

Educators can communicate a lot of information in compact fashion. For instance, take the classic Bohr model of an atom. Educators explain it by saying, "Electrons orbit the nucleus the way that planets orbit the sun." It's like the solar system but on a microscopic level. Simplicity makes ideas stick by keeping students lean and focused. The model of a simple idea is not a sound bite, it's the Golden Rule—a one-sentence idea that's sufficiently profound that you could spend a lifetime living up to it.

**Systems Thinking**

System thinking is a discipline for seeing the "structures" that underlie complex situations. As we enter the "age of interdependence",

- humankind have the capacity to create far more information than anyone can absorb,
- to foster far greater interdependence than anyone can manage
- to accelerate change faster than anyone's ability to keep pace.

**All are concerned with a shift of mind from**

- seeing parts to seeing wholes,

- seeing people as helpless reactors to seeing them as active participants in shaping their reality
- reacting to the present to creating future.

People have to develop the ability to see the whole and establish a frame work for seeing inter-relationships rather than individual things- for seeing patterns of change rather than static "snapshots". System thinking forms a rich language for describing a vast array of interrelationships and patterns of change. Ultimately, it simplifies life by helping us see the deeper patterns lying behind the events and details.

#### **Fanatic Discipline**

Fanatic discipline is defines as consistency of action towards one's own vision. Consistency with long term goals. Consistency with performance standards above what is required. Consistency of method. Consistency over time.

True discipline requires independence of mind to reject pressure to conform in ways incompatible with values, performance standards, and long term aspirations. The only form legitimate form of discipline is self discipline, having the inner will to do whatever it takes to create a great outcome, no matter how difficult.

Discipline is not the same as measurement. Discipline is not the same as regimentation. Discipline is not the same as hierarchical obedience. Discipline is not the same as adherence to bureaucratic rules. Educators with high personal mastery are fanatically driven, infected with an incurable need to produce great results.

#### **Lifelong Learning**

In addition to producing professionals who have been taught the advances in core knowledge and are capable of defining and solving problems in the short term, educators must teach students how to be lifelong learners. Lifelong learning is the "lifelong, life wide, voluntary, and self-motivated" (Department of Education and Science 2000) pursuit of knowledge for either personal or professional reasons. The term recognises that learning is not confined to childhood or the classroom, but takes place throughout life and in a range of situations. Learning can no longer be divided into a place and time to acquire knowledge (school) and a place and time to apply the knowledge acquired (the workplace). Need to learn, arises from a "learning gap" between what is known and what needs to be known. Learning involves a fundamental shift or movement of mind. Lifelong learning is an activity to fill up the "competency gap" between what you want and what is your current competency level to achieve what you want. It cannot be learnt without the willingness to practice. The willingness to act towards what you

want, to risk, to fail.

#### **There are three things important for practicing**

1. Self discipline
2. Comfort with repetitiveness
3. If required, comfort with being alone.

#### **Trusted Relationship**

The biggest crisis in our world today is one of believability. It makes it tougher to build a successful business, find and keep a job, or convince anyone to do or believe in anything. There is nothing people care about more than being able to build better relationships with the others around them. There was a phrase for this new skill . . . human relations. It started to be used to describe the ability to get along with and influence other people.

The most important global currency isn't made of paper anymore— it's made of relationships. People trust and choose to believe people they like. The key to success is your ability to earn trust.

"The more people trust you, the more they buy from you."-David Ogilvy

#### **Conclusion:**

Why are educators teaching this stuff, when students could easily learn this on the internet, from books, through games etc.?

*Well, it's because educators are an inspiration, students want something educators have got, students see educators in action, talented, and pick up the fact that they believe in themselves, they work hard, they think differently, they simplify the complexity, they have great personal energy, they are trust worthy, they are fanatically driven, infected with an incurable need to produce great results and they tell great stories..*

*The educators of next generation should develop mastery to be globally competitive over the length of his or her career. The message here is that our greatest contribution as engineering educators are that 'we must be what we want students to be.'*



**Dr. N. Asokan,  
Ex-Dean,**

Sree Sastha Group of Institutions

## RCM and FMEA

(RCM - Reliability Centered Maintenance & FMEA - Failure Mode and Effects Analysis)

Every day, the flights of different airlines from Europe land in Chennai at midnight around 1'0 clock and undertake the 11 hour non- stop travel back to Europe in the next two hours. What checks & preventive maintenance these aircrafts undergo in that short span of two hours? Have we ever thought about it? Such a high reliability becomes possible because of RCM - Reliability Centered Maintenance approach.

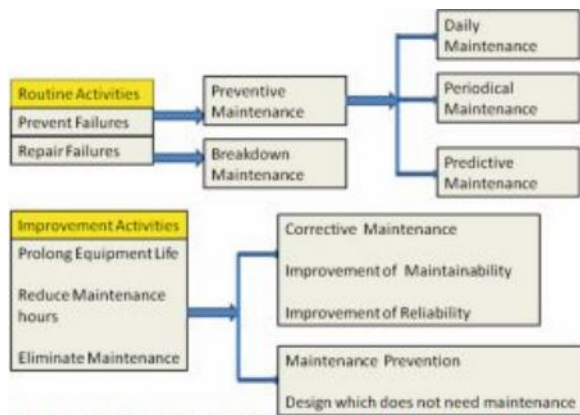
In this paper we shall look in to our conventional maintenance approach, how RCM differs from that and the importance of FMEA in that.

Breakdown means that there is a functional failure in some component in the equipment which may be set right either by repairing or by replacing.

Maintenance does not stop with just repairing and preventing the failures. They should also indulge in improvement activities such as improving the equipment life, Maintenance Prevention (MP) etc.

Maintenance to be shared by three set of people - Routine simple maintenance by Production Dept, Specialized Maintenance by Maintenance Dept and External expert service where required

### Application of Maintenance Type in a situation



Break down causes two effects – Production (it may be significantly affected or not affected) & Effort to set the equipment back (effort may be large or small in terms of cost, time to repair etc). With these in mind, the following table may be used as quick reference for application of appropriate maintenance method in a situation:

|  | Effort to set the equipment back will be large | Effort to set the equipment back will be small |
|--|--|--|
| One or more of the parameters such as P,Q,S will be significantly affected     | TBM , CBM (S)                                  | IR (A)   |
| One or more of the parameters such as P,Q,S will not be significantly affected | TBM (B)  | BM (C)   |

### Reasons for breakdown in an equipment

- \* Natural/Forced deterioration which was not noticed and attended in time

This is due to lack of production personnel in routine maintenance (CLRIOA) of equipment. CLRIOA stands for Cleaning, Lubrication, Retightening, Inspection, Operational check and Adjustment. When this is not done, symptoms of breakdown get unnoticed at an early stage and become a major problem at later stage. This increases the work burden of Maintenance personnel and their attention becomes poorer.

### Failure to prevent recurrence of breakdown.

This is due to inadequate expertise in on- site failure analysis, corrective action & horizontal deployment.

- \* Equipment was not operated/maintained as specified

This may be due to lack of skill of Production/Maintenance personnel, inadequate & improper written standards in CLRIOA, non-updating of such standards periodically based on breakdowns, ignoring the scheduled replacement of a part for the reason that Production is not releasing the equipment, reducing even the justified maintenance expenditure for the reason of cost cut etc

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- \* Predictive Maintenance is weak  
Predictive maintenance is judging the equipment abnormality based on changes in the measured values of certain characteristics like temperature, pressure, noise, vibration etc when the same is monitored periodically.
- \* Inherent design weakness of the equipment

### Planned Maintenance Methodology

#### Support & Guidance to Operators on routine maintenance

Preparation of routine maintenance standard for usage by operators

Training on Equipment Mechanism & elements to operators

Training on correct usage conditions

Training on detection of abnormalities, acting on them, reporting them

#### Evaluation of equipment failure status and current conditions

MTBF & MTTR details of equipments from History Cards & deciding goals

#### Reversing the Deterioration, Improving/correcting design weakness

Breakdown Report, Why-Why Analysis, PM Analysis, QM Analysis, OPL, Kaizen for all critical failures

Corrective Maintenance to extend life and Maintenance Prevention sheets

#### Creation of Information Management System

Computer based information system to extract details on Periodic Maintenance schedule & adherence, spare parts inventory

Stratification of failure data in terms of machine, systems etc to develop expertise

#### Creation of a Periodic Maintenance System

Periodic Maintenance work standard, schedule, standard updating, Actions based on Periodic Maintenance observations

#### Creation of a Predictive Maintenance System

Diagnostic technology, instruments and training, selection of equipments and parameters for predictive maintenance,

#### monitoring the trend of parameters

Quality Maintenance to reduce defects

Understanding the relation between equipment /component condition and product quality in concurrence with QA department and to develop standards for the same

#### Evaluation of effectiveness of planned maintenance system

Monitoring the various Maintenance indices such as MTBF, MTTR, Break down hours, Maintenance cost, spares inventory, OPLs, Kaizens, Why-Why analysis done, Maintenance Prevention sheets prepared, Schedule adherence of TBM and CBM, unsafe acts and conditions identified & corrected, number of QC components identified etc.,

## RELIABILITY CENTERED MAINTENANCE (RCM)

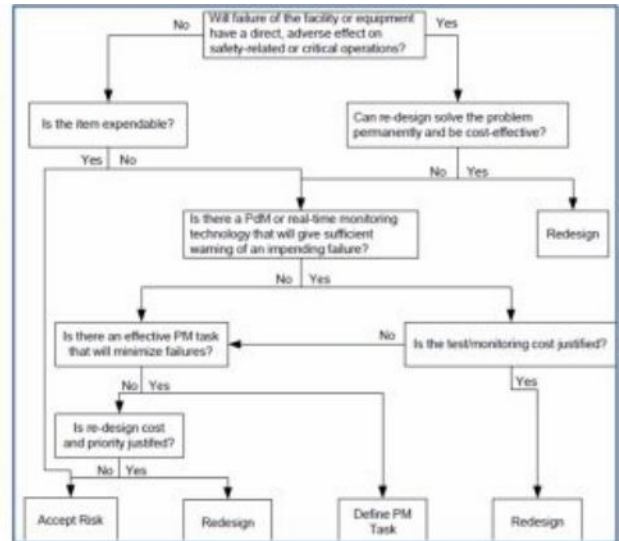
RCM evolved during late 1960s and early 1970s in the aircraft industry as a result of a number of major reliability studies concerning complex equipment. Stanley Nowlan, an aeronautical engineer and Howard Heap, a mathematician submitted their report titled "Reliability Centered Maintenance" on 31 Dec 1978 to the United States Secretary of Defence. John Moubray devised RCM II involving Cross Functional Team.

Two notable and surprising findings from the Airline Industry Reliability Program were that:

- scheduled overhauls had little effect on the overall reliability of a complex item unless the item had a dominant failure mode; and
- that there were many items found for which there was no effective form of scheduled maintenance.

**SURPRISE!**

**When preventive maintenance was slashed, safety and reliability improved dramatically !!!!!**



RCM recognizes that inherent reliability largely depends on design than maintenance and the design to be improved by maintenance feedback.

RCM efforts are towards failure mode identification in the equipment and improving it for reducing the probability of failure and cost.

It should be noted that, RCM approach will be severely hampered if the issues of Basic Equipment Condition, Operating Standards and Accelerated Deterioration are not addressed first.

So in essence, it implies that in an equipment in a good condition, the design takes care of the reliability and the unnecessary maintenance can only harm the equipment. It can be readily visualized when a road side mechanic doing carburetor cleaning of your two wheeler with his dirty cloth. RCM wants the maintenance to be done as per the logic tree below:

Thus RCM advocates to take the risk of breakdown if consequences are not severe, to do Predictive /Preventive maintenance where it can be definitely effective and to do redesign otherwise. FMEA is soul of RCM but Maintenance personnel are not sufficiently exposed to FMEA technique. This situation should be changed and industries should train their maintenance personnel in FMEA. This will ultimately eliminate unnecessary name sake preventive maintenance.

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**National Institution for Quality & Reliability**

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