

Jul-Aug 2015

Q - ZINE

BI MONTHLY NEWS LETTER
Chennai Branch



National Institution for Quality & Reliability

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ZED C
Discussion
21st Jul

– Hon'ble Prime Minister
Shri Narendra Modi
August 15th, 2014



C.Y. Krishna



Dedicated to Quality

National Institution for Quality & Reliability

Round Table House, First Floor,

No.80, Nungambakkam High Road, Chennai 600 034.

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From Chairman...



Warm wishes,

NIQR AGM was conducted for the financial year 2014-15 at Hotel Radha Regent on 1st August. Eighty nine members attended the AGM this year, which is the highest in our history. The meeting provided a great opportunity to interact with all the members present and share our thoughts on various aspects concerning our organisation. There were several suggestions provided by our members on various issues and I take this opportunity to assure the members, all efforts will be taken to improve our functioning. It needs a special mention on the efforts our Secretary Mr. C.V. Gowri Sankar who compiled a movie on the events at NIQR for the past one year, which was played at the AGM. It was well appreciated by all members present. Congratulations to our secretary for the commendable effort.

I am delighted to share with you the good news; our Institution has been invited by Quality Council of India to partner in the venture initiated by Govt. of India i.e., ZED programme (Zero effect, Zero defect) for upgrading SME's in our Country to World Class. QCI and NIQR will collaborate on the nation-wide propagation of the ZED Campaign and implementation of the ZED Maturity Assessment Model focusing on Indian Prime Minister's vision of "Make in India" with Zero Defect, Zero Effect covering all sectors including industry, healthcare, education and government public services. It is a great opportunity for our Organization to participate and showcase our capabilities at the national level.

Until next issue,

With kind regards,
S.RAJASEKARAN

From Secretary...



Warm wishes,

We had good rains in Chennai, but the overall rainfall is not satisfactory in the rest of South India. Hopefully the rain gods will make up the deficit in the remaining part of SW Monsoon.

With excellent support from all of you, we were able to organise good no. of lecture meetings on a variety of subjects. We have successfully organised the annual Prof CYK Memorial Lecture on "Statistics for Managers", lectures on "Cyclone Forecasting", "The New Beginning of Life" and "Yoga for Health". We made a small contribution to the society by organising an awareness program about organ donation on 13th Aug 2015, the World Organ Donation Day. We were appreciated by the participants of the Yoga lecture cum demonstration program for making it a family affair.

We are very fortunate to get an article from one of the very senior NIQRians, former National President Mr. V.R. Janardhanam, who had settled abroad. We are also grateful to Mr. C. Athi Pagavan, Vice Chairman, NIQR Trivandrum Branch for the article on Reliability in Space.

Soon we will be starting training programs in Irungattukkottai industrial belt for member industries of SIMA and we have plans to organise Contemporary Shop Floor Management training program in Ambattur Industrial Belt with AIEMA.

I sign off thanking the four corporates who were the event sponsors for the Prof CYK Memorial Lecture and Dr. N. Ravichandran, E.D. Lucas TVS for his wonderful quotes in Tamil which decorate the bottom of the pages.

With kind regards,
C V GOWRI SANKAR

Welcome

NIQR welcomes the Individual Life Members
who joined during Jul-Aug 2015

Mr. VIVEKANAND. R. K - Vyasa Business Academy

Mr. SHANKAR. K - Astormueller Shoes Pvt. Ltd

Mr. RAMKUMAR. G - PCFCT

MR. THIAGARAJAN. V - WABCO India Ltd

DR. MOGANAMURUGAN. S - Saveetha University

MR. SURESH. S - IGCAR, Kalpakkam

Chennai Branch Activities

NIQR Chennai Branch AGM



The 27th Annual General Body Meeting of NIQR, Chennai Branch was held at 6.30 PM on Saturday, the 1st August 2015 at Hotel Radha Regent. 89 members attended the AGM this year, which is the highest in our history. The proceedings started with the invocation song.

Mr. S Rajasekaran, Chennai Branch Chairman welcomed the members. After the confirmation of the minutes of the 26th AGM held on 23rd August 2014, Mr. C V Gowri Sankar, Chennai Branch Secretary presented the annual report for 2014-2015. Mr. C Sundaravadivelu, Chennai Branch Treasurer presented the audited statement of accounts for the period 01-04-2014 to 31-03-2015. After approval of both, Mr. V Raghavan, Chennai Branch Vice Chairman proposed the vote of thanks.

Lecture Meeting held on 29th June 2015 by Dr. S R Ramanan



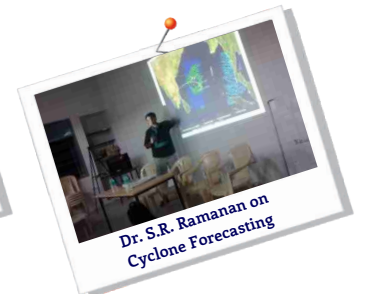
The Evening Lecture for the month of June was organised on 29th June 2015 at Meenakshi Sundararajan Engineering College, Kodambakkam.

Dr. S R Ramanan, Director (Sc. 'E') Area Cyclone Warning Centre Regional Meteorological Centre, Chennai was the speaker and the topic was "Cyclone Forecasting" (The Genesis, Intensification, Track and crossing of the cyclone). Mr. S. Rajasekaran, NIQR Chennai Branch Chairman presided over the session and Mr. C. Sundaravadivelu, NIQR Chennai Branch Treasurer introduced the speaker.

Dr. Ramanan started off with a broad outline of the present scenario of meteorology in different regions of the world and emphasised that India is not far behind other countries in meteorological predictions. He gave a few examples to illustrate how Meteorology serves as a platform for international cooperation.

With interesting pictures, he explained the effects of different types of cyclones and the tracking methodology. He dwelt at length about land subsidence and storm surge. The Q & A session was informative and he signed off with the details about the El Nino effect.

Dr. S.R. Ramanan, a post graduate in Physics from Annamalai University, got his Ph.D from the Madras University in the field of Agricultural Climatology. He has worked as a forecaster in Northern Hemisphere Analysis centre in New Delhi and at Aviation Meteorological Office of Chennai Airport. In 2002, he joined the Area Cyclone Warning Centre at the Regional Meteorological centre at Chennai. He is a recipient of the "For the sake of Honour Award" from the Rotary club in 2006.



CYK Memorial Lecture



NIQR Chennai Branch had organised the Prof. C. Y. Krishna Murti Memorial Lecture Meeting on 4th July 2015 at Radha Regent Chennai. Mr. D Veeraraghavan, Executive Director, Astra Global Pvt. Ltd., was the Chief Guest. Dr. A Sanjeeva Rao, Former National President started the proceedings with details of Prof CYK's involvement as one of the founder members of NIQR & QCFI and recalled his nostalgic memories with Prof CYK. Mr. G Rangarajan, National Secretary, gave an account of his long association with Prof CYK as his student and also read out the message from CYK's daughters thanking NIQR for organising the event.

Mr. D Veeraraghavan in his Presidential address dwelt at length on liability & reliability in today's manufacturing scenario and wanted NIQR to take up more of reliability training, seminars, lectures.

Mr. C Sundaravadivelu introduced the speaker of the day Mr. S. Mohana Krishnan, Vice President – Mfg. (Retd.) Sundaram Clayton Ltd, Chennai.

After recalling his fond memories with Prof CYK, Mr. S. Mohana Krishnan gave an inspiring lecture on “Statistics for Managers”, explaining the basic strength of 7QC Tools, linkages between 7QC tools and importance of stratification in all statistical analysis.

The meeting was attended by 82 members.

In his vote of thanks, Mr. C V Gowri Sankar, Secretary Chennai Branch made a special mention of the four corporates whose sponsorship made the event a grand success.

Good Evening All

We, the four daughters of Prof C. Y. Krishna Murti, are indebted to the NIQR for arranging these lectures in memory of our father. We are also heart fully thanking all the efficient and experienced people who give these speeches. We are feeling bad for not able to attend this event. We will do attend from next year. We thank you all once again. We heard through Mr. Sanjeeva Rao who introduced my father to you all that today's speaker is Mr. S. Mohana Krishnan, Vice President – Mfg. (Retd.) of Sundaram Clayton Ltd. He is one of our father's students. We thank you all for this Sirs.

Thank you Mr. C V Gowri Sankar for giving an opportunity to convey our message to one and all.

D.Umalalitha - Hyderabad

V.Sujatha. - Bangalore

D.Srilatha.- USA

K.Tejabala.- USA



Lecture Meeting held on 13th August 2015 by Ms. K. Gieetha



K. Gieetha

Ms. K. Gieetha, has studied M.Sc., Counseling Psychology from Madras University and is now a Transplant Coordinator at MOHAN Foundation, to fulfill the mission to ensure that every Indian who is suffering from end stage organ failure be provided with the 'gift of life' through a life-saving organ. Her aim is to make maximum number of people aware of the concept of organ donations and live life after death.

For more information on organ donation you can call toll free 1800 130 7100 or go to www.mohanfoundation.org

The Evening Lecture for the month of August was organised on 13th Aug 2015 at Meenakshi Sundararajan Engineering College, Kodambakkam.

Ms. K. Gieetha, Transplant Coordinator, MOHAN Foundation, Chennai was the speaker and the topic was "The New Beginning of Life" (Concept of Organ Donation and Myths). Dr. Ms. Babai, Principal, Meenakshi Sundararajan Engineering College & NIQR National Council Member presided over the session and Mr. C. V. Gowri Sankar, NIQR Chennai Branch Secretary introduced the speaker.

Ms. K. Gieetha explained how organ donation is the most precious of all donations done by humans. She detailed some of the myths about organ donation like body disfigurement, religious barriers, age limit, panchayath decisions and cleared them with proper explanations. She described brain dead as "irreversible unconsciousness with complete loss of brain stem function" and explained the difference between coma and brain dead. In simple terms, coma is self breathing with a chance to regain consciousness and brain dead is artificial breathing and irreversible.

She even took this occasion to drill through in the minds of audience the importance of wearing helmets by two wheeler riders.

She explained the types of donations, i.e., tissue donation & solid donation and gave a list of organs which are harvested and the time frame for implantation.

She also gave the audience an idea of the legality of organ donation with relevant Acts passed by Govt. The session was well attended and there was constant interaction throughout the session.



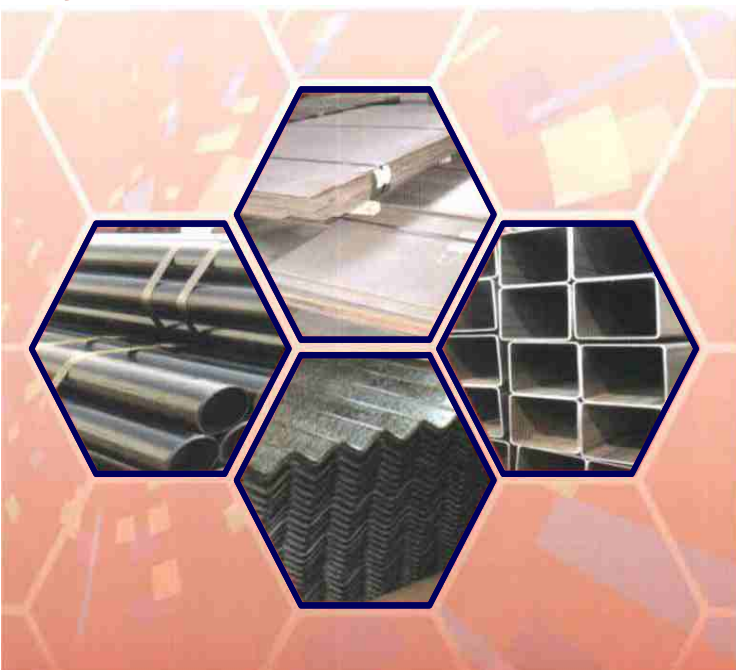
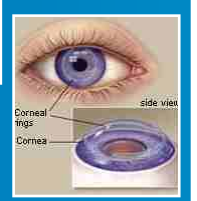
Ms K Gieetha honoured by Dr. Babai



Ms K Gieetha on The New Beginning of Life

Do you know?

Eye donations do not have same blood group conditions – Why?
The cornea which is transplanted does not have any blood in it.



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Yoga for Health by Dr. Sujatha



Lecture Meeting held on 16th August 2015

NIQR Chennai Branch organised a lecture cum demonstration program on 16th Aug 2015 at Meenakshi Sundararajan Engineering College, Kodambakkam.

Dr. Sujatha Goda and her brother Mr. Venugopal Goda were the speakers and the topic was "Yoga for Health".

Mr. S. Rajasekaran, NIQR Chennai Branch Chairman presided over the session and Mr. Gopala Pillai, NIQR Chennai Branch Executive Committee member introduced the speakers.

This morning program was well attended with participation by family members also. Dr. Sujatha started the session explaining about Yoga in general and its relevance to minimize and overcome stress; then she described eight aspects of the Ashtanga Yoga associated with the sage Patanjali, namely, Yama - moral codes, Niyama - self purification and study, Asana - posture, Pranayama - breath control, Pratyahara - withdrawing of the mind from the senses, Dharana - concentration, Dhayana - deep meditation and Samadhi - super consciousness.

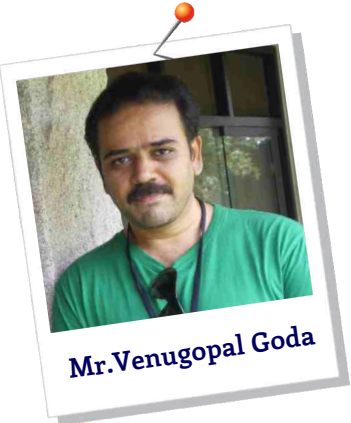
It was interesting to know that there are 84 lacs of yoga postures which can be practiced in any health condition & during Pranayama, the blood gets purified due to increase of Oxygen intake.

The speaker used lot of Sanskrit slogans in her speech to make it rich.

Mr. Venugopal detailed how he left his business interests to take up yoga coaching and explained about the potential of one's brain and how to improve usage of more brain power. He also dwelt at length about the relationship between brain & mind and conscious & sub-conscious minds.

After explaining about Amruthaghadiya, a special meditation technique to harness the power of subconscious mind to achieve goals, they demonstrated a few Asanas and Pranayama which all the participants practiced with zeal.

Dr. Sujatha Goda is the director of Power Management Consultancy and Sri Patanjali Yoga Vidya Kendram. She is the **first person holding a Doctorate in Yoga in India**, which she obtained from the Madras University. She has received many awards including 'Yoga Abhyasa Praveena Rathna', 'Drugless Therapist', 'Buddha Bodhidharma International Yoga Award' and 'Yoga Therapy Specialist (Yoga Vaidya Visarada) International Award'.



Mr. Venugopal Goda is the Director of Power Management Consultancy.

He has created & designed **Amruthaghadiya**, the most powerful meditation technique in the world to harness the power of Subconscious mind.

Venugopal has received a **National Award** for "**Best Innovative Mind Technique**" for creating Amruthaghadiya from HCHRP Co-Op international (supported by United Nations High Commission on Human Rights.)



NIQR Juries for MSEC



Dept. of EEE of Meenakshi Sundararajan Engineering College conducts every year various technical events to facilitate the students to get updated with latest technical developments. The event most anticipated for by the students is paper presentation on latest trends in various branches of engineering. NIQR Chennai Branch supports the college by providing Technical Juries for the event.

This year **Mr. C. Sundaravadivelu**, Treasurer, **Mr. N. Jagannatha Rao**, EC Member and **Mr. A. Pradeep**, EC Member evaluated the paper presentations from 24th Jun 2015 to 1st Jul 2015.

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Head Quarters Activities



AGM Head Quarters

The 24th Annual General Body Meeting of NIQR, Head Quarters was held at 7.15 PM on Saturday, the 1st August 2015 at Hotel Radha Regent. Two minutes silence was observed in memory of our former President, Dr. A P J Abdul Kalam.

Mr. R Sivanesan, National President welcomed the members. After the confirmation of the minutes of the 23rd AGM held on 23rd August 2014, Mr. G. Rangarajan, National Secretary presented the annual report for 2014-2015. Dr. R. Srinivasan, National Treasurer presented the audited statement of accounts for the period 01-04-2014 to 31-03-2015. After approval of both, Mr. K. Manikandan, National Joint Secretary proposed the vote of thanks.

The AGM came to a conclusion with the National Anthem followed by Dinner.



NIQR Membership Tariff from 1st Sept. 2015

Category	Fee Structure		Representation
	Entrance Fee	Subscription	
INDIVIDUAL			
Annual Membership	Rs. 100	Rs.500	1
Life Membership	Rs. 500	Rs.5000	1
STUDENT			
Annual Membership	Rs. 50	Rs. 200	1
COMPANY			
Large Scale : Category I - More than 5000 employees	2000	20000	8
Large Scale : Category II - 1000 to 5000 employees	1000	10000	5
Medium Scale : Up to 1000 employees and Utility & Services	1000	5000	3
Micro and Small Scale Industry / Educational and Scientific Institutions	500	5000	2

NIQR's foray into key nation building agenda “Make in India”



Quality Council of India (QCI) is an autonomous body jointly formed in 1997 by the Department of Industrial Policy and Promotion and key industry associations. It runs the national accreditation structure and gives accreditation in the fields of education, health and quality promotion. NIQR is an active member of QCI.

Mr. P. K. Aggarwal, National Vice President NIQR, attended the Governing Body Meeting of the Quality Council of India (QCI) at New Delhi on 20th July 2015. The meeting, chaired by Mr. Adil Azanulbhai, Chairman QCI was attended by the senior members from FICCI, ASSOCHAM, CSIR, CII, DST, Railways and various other departments & professional bodies.

National Institution for Quality and Reliability has been invited by Quality Council of India to partner in the venture initiated by Govt. of India in ZED programme (Zero effect, Zero defect). QCI and NIQR will collaborate on the nation-wide propagation of the ZED Campaign and implementation of the ZED Maturity Assessment Model focusing on maturing Indian Prime Minister's vision of “Make in India” with Zero Defect, Zero Effect covering all sectors including industry, healthcare, education and government public services.

A senior team from QCI comprising of Mr. Vinay Sridhar (Project Manager, ZED) & Mr. Naveen Prashanth (Associate, ZED) visited NIQR to initiate discussions to firm up the partnership. In a meeting chaired by Mr. R. Sivanesan, NIQR National President and attended by 20 of NIQR officials of HQ, Chennai & Trivandrum Branches on 13th Aug 2015, the QCI team explained the ZED model and progress made so far by QCI in this venture. Mr. R. Sivanesan thanked the QCI team for the visit and assured them of all support and participation in this National endeavor.



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“MEMBERS IN NEWS”



Dr. (Ms) Babai, NIQR National Council Member and Principal, Meenakshi Sundararajan Engineering College, has been elected as Second Vice District Governor of Lions District 324-A1 for the year 2015-2016 during District Convention on 24th May 2015 at Karnataka Sangha Auditorium Chennai. She will become Vice District Governor in 2016-2017 and District Governor in 2017-2018.

We are happy to inform that her father PMJF Ln. K. R. Sundararajan was Governor for the same District during 1969- 1970 and her elder sister PMJF Ln. Dr. K. S. Lakshmi was Governor for the same District during 2008-2009. It is unique that 3 members from one family becoming Governor for the same District.

Dr. P Ramesh, Head – Materials Lab, Lucas-TVS Ltd and Co-opted member of NIQR National Body gave a lecture on Material Science and Process Engineering in Coimbatore Institute of Technology, Coimbatore on 14th July 2015. Topic covered were Over view of Materials Science, Hazardous Materials, Process engineering, Corrosion & Protection and Quality systems. Speaker explained the recent trends in the industry, and also opportunities & research scope available for the chemical Engineers in various industries. More than 40 students have benefited from this lecture.



Dr. P Ramesh, Head – Materials Lab, Lucas-TVS Ltd and Co-opted member of NIQR National Body gave a lecture on “Engineering Plastics and Specialty Polymers – A Special Focus on Industrial Applications” at Central Institute of Plastics and Engineering & Technology (CIPET) on 8th Aug 2015. Dr. Ramesh covered various options available for metal replacements such as Engineering plastics, Composites, Carbon fibre reinforced plastics, nano materials, Thermoplastic Elastomers etc. More than 40 students and 40 Industry professionals have benefitted from this lecture.

Mr. P Kothandaraman, Executive Member of NIQR, Chennai Branch was the Chief Guest at the inaugural function of Production Engineering Association of National Institute of Technology Tiruchirappalli on 19th Aug 2015. He delivered the inaugural address on "Quality Assurance - Role of Engineers". He also conducted a special session on "Problem Solving Methods". The function was organized by the students of Production Engineering Division.



Prof. C. Uthayakumar, Principal of Jaya Sakthi Engineering college, Chennai has been conferred with “The Best Principal Award” for outstanding achievements in the field of Education by The International Institute of Education and Management in a grand function at Krishna Menon Bhawan, New Delhi on 20th July 2015. In the same function, he was also given the "Rastriya Vidya Gaurav Gold medal Award" by The Indian Solidarity Council. He received these awards from the hands of Dr. Bhishma Narian Singh, Former Governor of Tamil Nadu & former Union Cabinet Minister and Dr. G V G Krishnamurthy, Former Election Commissioner of India.

ARE WE AFRAID OF QUALITY? “MAY BE YES, MAY BE NOT”



Mr. VR Janardhanam

I was asked to write an article for NIQR news. I was wondering what I should write upon having retired from active life of a quality practitioner. Apart from my sea career, which spanned for the first decade of my career after graduation in marine engineering, I spent the next forty years with one of the foremost organizations in Chennai, TVS, which was in the forefront of quality movement from early 60's. I thought I would share my experiences in this long and arduous journey, which has seen phenomenal changes in our approach to quality regionally, and Nationally.

Till the mid 80's, Quality department in any organization was an unavoidable inconvenience. Quality was an issue only if and when a customer raised an issue. If it could be sorted out at the incoming inspection of the customer so be it. The term Sellers Market was freely used. All of us

were happy with that arrangement. If I am not wrong, the whole attitude towards quality changed with the advent of Maruti Udyog Limited. I would also like to add, it was the auto industry, which changed the quality profile of India and others merely followed suit. There were many PSUs, which produced many products. Those who dealt with HMT are aware of the agony they had to go through if they raised any quality issue. It was always, take it or leave it. I don't have to rub it in. Those who have experienced the wrath of the PSUs will vouch for me.

MUL made a difference because they set new standards and expected the vendors to meet them. MUL vendors, we can confidently say, were the pioneers who introduced new tools and techniques to meet MUL standards. Here again the vendors from South had easy march over those from other regions. When MUL went in for captive vendors to ensure timely supplies and strict quality standards, vendors around NCR got new lease of life and the improvement in quality levels was visible in the North. Otherwise the slogan was, South cares for quality, North cares for price. The real challenge came when MUL and other automotive companies demanded high quality at low cost.

Credit should go to CII for taking the challenge on behalf of auto industry and facilitating the visit of top quality gurus from Japan to guide the Indian auto units to learn and practice quality systems like TQM and TPM. This started to happen in mid 90's and the gap between existing Indian quality standards and international expectations was too wide to be ignored. It is to the credit of many motivated CEOs who were ready to put their companies under the scrutiny of these gurus and learn the basics. It was hard to swallow at the beginning. But when the results were encouraging and found acceptance from automakers, the whole Nation went gaga over these gurus. They became household names and they became kind of icons of quality. (I am avoiding names, as they were too many) These consistent efforts resulted in an Indian company winning the coveted Deming Prize. This was the first time an Indian company had won the coveted prize. The Indian industry had tasted blood. There was no stopping the Nation from adopting various tools and techniques (TQM, TPM, Lean, Six Sigma, Balance score card and what have you) available all over the world to raise their quality standards.

The liberal approach to foreign investment paved the way for many foreign automakers to set up shop in India and the rest is history.

We should know it has taken nearly 30 years of hard work and application to be where we are. Can we say we have arrived? Is our quality in level with the Japanese or Koreans or Germans? Tough to say. We may be in line in parts. But quality does not work in parts, it is Total. How is the Total Quality approach? We will look at it on another occasion.

MR.V.R.JANARDHANAM

Former National President, NIQR
Replies, if any, can be sent to
“vrjanardhanam@yahoo.com”

Reliability Assessment of Systems for Space Applications



Mr. C. Athi Pagavan

Introduction

The main difference between Ground based System and Space System is repairability / maintainability. Space Systems are unattended/non repairable ones. They are mostly complex in nature and reliability plays a major role in it. The Reliability Assessment gives confidence on the Space Systems for its intended function. This paper gives the various reliability assessment techniques that are being followed for Space Systems.

Factors Influencing Reliability

The six factors which influence reliability are:

1. Parts/Component

The selection of parts/components with well established failure rate should be used.

2. De-rating

De-rating increases the margin of safety between the operating stress level and the permissible stress level for the part/component.

3. Environment

The environment at which the systems have to undergo should be exactly defined. Based on that, the selection of part need to be done.

4. Complexity

Complexity of the system should be minimized to improve the reliability.

5. Redundancy

Redundancy needs to be considered in case of complex nature of the systems or where parts/components of the system

have too high a failure rate.

6. Diversity

This refers to having more than one functional system, where each system does exactly the same function, but use different operating principles.

Reliability Assessment Techniques

A. Reliability Prediction

This is one of the important techniques in knowing the reliability of a system. It is forecasting the probability of success based on data. This helps in identifying weak areas of design and helps in selecting the best design between alternative configurations.

For Reliability Prediction of Electronic Equipment, Military Handbook MIL-HDBK-217F is used. The quality levels of electronic parts are given below:

- ✓ Microelectronic devices : MIL-M-38510 class S
- ✓ Semiconductor devices : MIL-S-19500 JANTXV
- ✓ Connectors : JAXA-QTS-2060 C
- ✓ Relays : Established Reliability level R
- ✓ Other Passive Parts : Established Reliability level S

The two basic ingredients of reliability prediction are; Mathematical model and failure rate data used in the model. Reliability Prediction is well developed in the field of electronic components because of vast collection of data.

There are two basic methods of Reliability Prediction:

- a. Parts Count Method
- b. Parts Stress analysis Method.

The first one uses the number of parts, generic failure rate, parts type, quality level and environmental levels. It is applied during the initial design phase where in actual stress under which the

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parts are utilized is not known or finalized. The second one is based on the failure rate, quality factor, complexity of circuit, environment, stress level of component etc. This method is applicable when the design is complete and parts stress details are available.

B. Derating Analysis

Derating is the reduction of electrical, thermal stresses applied to a part in order to decrease the degradation rate and thereby prolong the expected lifetime of the part. It increases the margin of safety between the operating stress level and the permissible stress level for the part.

Failure rate of a part decreases as the margin of safety between the actual stress and rated stress is increased. Hence the reliability of system increases when the parts are operated at lower stress than the rated stress.

The derating for electronic parts is mainly done with respect to power, voltage, current, junction temperature and frequency.

Different types of components are derated by different parameters. For example Resistors are derated by power i.e., by the ratio of the operating power to rated power. Whereas capacitors are derated by reducing the applied voltage to the value lower than that for which the part is rated.

Stress Ratio or Derating factor (%) = (Operating Stress/Rated Stress) * 100

The derating guidelines followed are as per the “EEE Derating Guidelines for Space Program”.

C. Failure Mode Effects & Criticality Analysis (FMECA)

For complex Space Systems a large number of units cannot be produced for classical reliability estimation or demonstration because of time and high cost. Moreover, for non-electronic systems, reliability prediction is difficult because of the paucity of any authentic data on their failure rates. These limitations lead to the use of FMECA technique.

The FMECA is a powerful tool to analyze reliability. This analysis procedure documents all the probable failure in system within specified ground rules, determines the effect of each failure on system operation, identifies single point failures and ranks each failure according to a severity classification of failure effect. This helps to identify weak links of design.

FMECA comprises of two steps viz., Failure Mode Effects Analysis (FMEA) and Criticality Analysis (CA). FMEA is a quantitative technique by which each failure mode in a system is analysed to determine the results or effects thereof on the system and to classify each potential failure mode according to its severity. Critical Analysis is a procedure by which each potential failure is ranked according to the combined influence of severity and probability of occurrence.

The standard followed for carrying out FMECA is MIL STD 1629A. A typical FMECA work sheet is given below:

Component	Failure Modes	Failure Mechanisms	Probability of Occurrence	Effect on Criticality		Corrective Action	Conclusion
				System	Mission		

The Systematic approach of Reliability Assessment techniques gives adequate confidence for the reliable performance of Space Systems for its rated life

by **MR. ATHI PAGHAVAN**

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Remanufacturing

Introduction:

With increasing globalization and growing environmental concerns, the resource conservation is one of the major areas to focus on. Use of recycled/alternate/renewable materials in the industrial products has become familiar in any industry due to continued legislative pressures and public awareness efforts. However, as of now the recycling remains limited to simple items such as drinks containers, some steel products, plastics and paper goods etc. Globally extensive efforts are being taken to bring various sustainable recycling technologies to benefit the industries and society. Although various new recycling technologies are being developed continuously, the concept called “Remanufacturing” is gaining importance in recent days. It is considered to be the promising, sustainable and could be the ultimate form of recycling. Worldwide many automotive companies have started adopting this concept.

“Remanufacturing”

Remanufacturing is the process of disassembly of products during which time parts are cleaned, repaired or replaced then reassembled to sound working condition. A product is considered remanufactured if:

- Its primary components come from a used product.
- The used product is dismantled to the extent necessary to determine the condition of its components.
- The used product's components are thoroughly cleaned and made free from rust and corrosion
- All missing, defective, broken or substantially worn parts are either restored to sound, functionally good condition, or they are
- Replaced with new, remanufactured, functionally good used parts.
- To put the product in sound working condition, such machining, rewinding, refinishing or other operations are performed as necessary.
- The product is reassembled and a determination is made that it will operate like a similar new product.

Social and Environmental benefits

Remanufacturing has positive environmental benefits and many organizations are now using the concept of Remanufacturing. It saves the raw-material content, it has the potential to contribute significantly to a more sustainable future, and has already begun to increase materials efficiency by reducing emissions of greenhouse gases. Scope for remanufacturing has increased where industries have embraced new technologies for the restitution of components. Remanufacturing has many benefits such as resource conservation, waste minimization, ecological benefits, economics benefits etc; however it has limitations with respect to quality and reliability. Although its societal benefits are clear, there are a number of obstacles to overcome before the full benefits of a remanufacturing programme.

"Remanufacturing makes much greater economic contribution per unit of product than recycling. Remanufacturing is not simply recycling alone, it differs. The essential difference arises in the recapture of value added. Value added is the cost of labour, energy, and manufacturing operations that are added to the basic cost of raw materials in the manufacture of a product. According to studies performed at the Fraunhofer Institute in Stuttgart, Germany, energy savings by remanufacturing world-wide in a year equals the electricity generated by 5 nuclear power plants or 10,744,000 barrels of crude oil which corresponds to a fleet of 233 oil tankers. The Fraunhofer Institute also determined that raw materials saved by remanufacturing worldwide in a year would fill 155,000 railroad cars forming a train 1,100 miles long.

Implementation

Different manufacturing models are to be adopted to implement Remanufacturing concept. Many companies such as Fenco Automotive, Caterpillar, Xerox and Ford etc are already working on Remanufacturing and have adopted different strategies to get the benefits. To quote, Caterpillar is claimed to be leader in adopting Remanufacturing concept through advanced processes and product innovation. As the world leader in remanufacturing, Cat Reman is making progress possible finding new ways to reduce, reuse, recycle, and reclaim materials which once would have gone into a landfill. Their remanufacturing program is based on an exchange system where customers return a used component (core) in return for remanufactured products. Through the remanufacturing process Caterpillar reduces waste, lowers greenhouse gas production and minimizes the need for raw materials.

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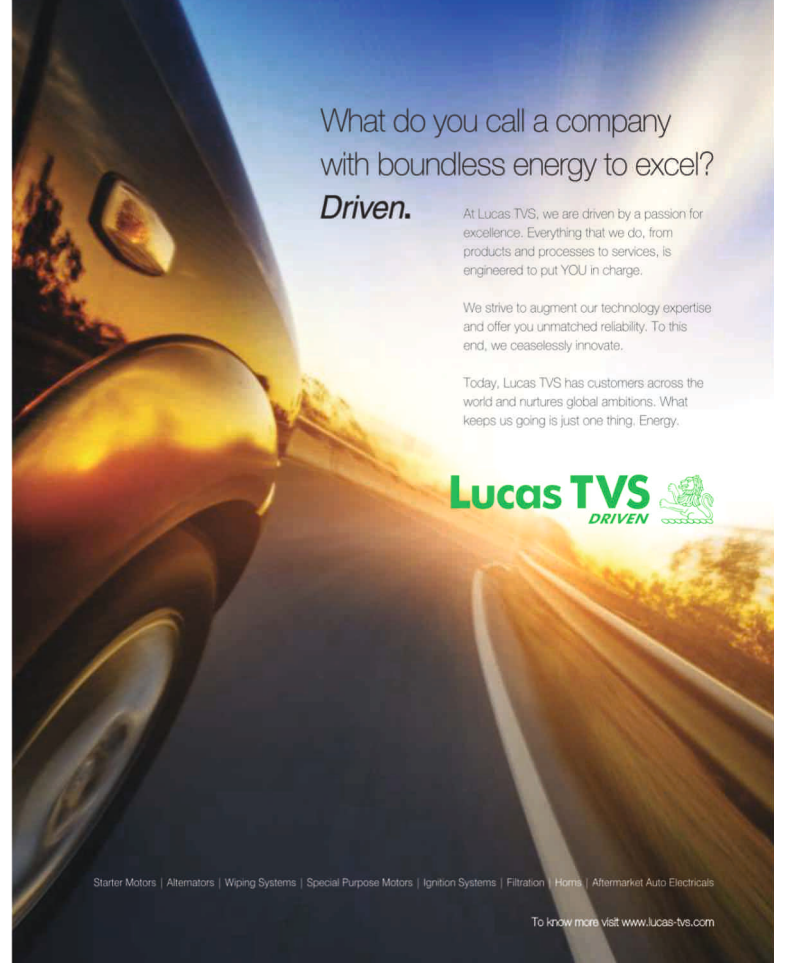
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Conclusion:

Remanufacturing is a promising concept for sustainable business growth and it is the ultimate form of recycling. Extending product life through “**Remanufacturing**” is the key to leveraging the earth's natural resources.

Remanufacturing is the process of returning to at least original equipment manufacturer performance specification and giving the resultant product warranty that is at equal to that of a newly manufactured equivalent.

– The Remanufacturing Institute

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