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Effective Technical Competitive Analysis (TCA) in Program Management

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***Abstract* – This paper reveals the stand-alone approach called TCA to cater the rapidly growing industrial needs. Now-a-days, TCA is a key in effective program management that improvise the value analysis and value engineering to meet organisational goals. The given representation of reference flow charts to enable the reader about a typical implementation in development process. TCA can guarantee the results for Cost effective, Best-in class products developed within a very short time. This is attained by the best practices are coupled under this system to eliminate the development process flaws. Programs that are managed by this approach consider all the vital requirements for a successful product development & mitigate the non-value added tasks where the precious resources usually deployed in conventional methods.**

***Keywords*—TCA, tools, Value analysis, Value engineering, requirements, Knowledge**

I. INTRODUCTION

Programs are used as a means to achieve an organization's strategic goals. In business and engineering, new product development is the term used to describe the complete process of bringing a new product or service to market. New product development is widely recognized as a key to corporate prosperity. Developing a successful value added product requires a Technical Competitive Analysis, the same can be achieved through the below key approaches throughout the development process.

- Benchmarking
- Reverse Engineering
- Innovations

Technical Competitive Analysis (TCA) which leads to a value integrated product development. Such a product cannot be evolved if isolated from the marketplace without getting to know the actual stand of the current product development. Specialized skills and techniques are required for the development of new products with excellence among the competitors around the company or even around the world. Hence, majority of the firms distribute their new product units widely to get access of dispersed knowledge and skills which are widespread [3].

II. NEED FOR INDUSTRIES

Typically, there are two parallel paths involved in the NPD process which involves the idea generation, product design, and detailed engineering where as the other involves market research and marketing analysis. Companies typically see new product development as the first stage in generating and commercializing new products within the overall strategic process of product life cycle management used to maintain or grow their market share. Earlier a product was developed based on the concepts available whereas at present, the condition is such that a new product is evolved with value addition in the initial phase itself by using the valuable experience that we have gained from successful implementation of earlier inventions.

In a nut-shell, this paper covers TCA conceptual implementation in automotive industry where emission control systems development is the business scope. As the emission control standards are continually getting upgraded based on stringent environmental needs, the product development in this sector revives frequent manner. Present competitive scenario of effective product development need across the industrial sector requires an effective way to manage them in a structured way. Hence TCA provides an edge of advantage by serving both types of requirements what the pro-industry needs today

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This procedure is well explained using chronological order phases in this paper.

III. PROGRAM MANAGEMENT PROFILE

A standardized and an integrated program management process is implemented for exhaust system product development with robust program organization, scope management, program time plan, risk management, reporting and documentation and managing of engineering change requests. It is divided into phases with corresponding defined milestones. These milestones along with customer requirements are received with the RFQ package.

At each of the defined customer milestones, appropriate deliverables are given to customer based on their requirement. The exhaust system product development process begins from the requirement of customer along with the milestone defined by customer for the product to be developed and the deliverables mentioned. The product development process is divided into various phases from initial program screening, concept engineering, design engineering, flow/thermal analysis, structural analysis, proto manufacturing, testing validation & Implement / Launch the product

IV. INPUTS RFQ FROM CUSTOMER

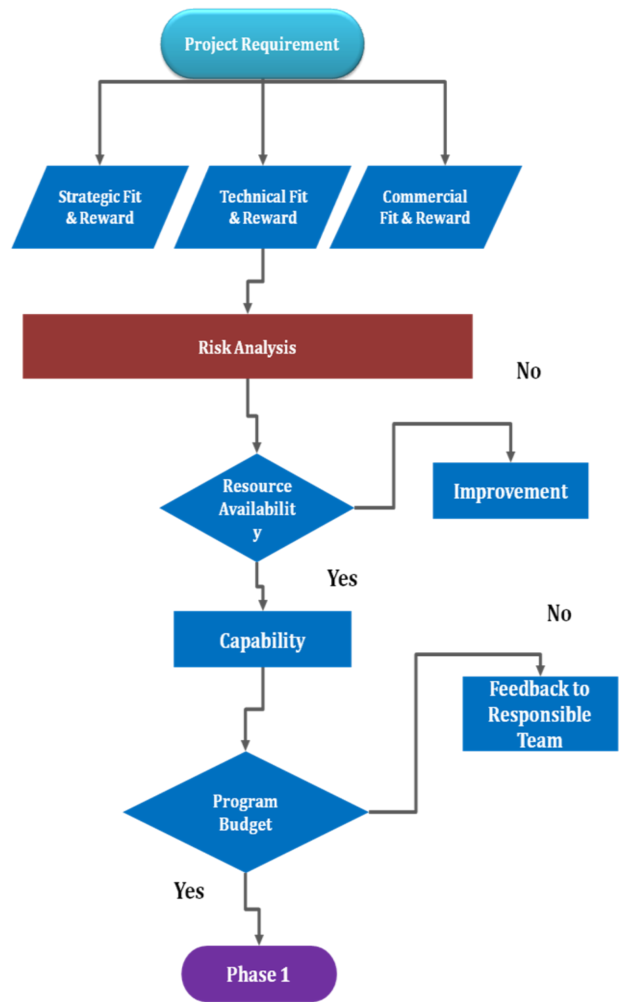
Customer requirement in terms of engineering, quality, timeline is clearly understood within the program team for the scope definition and quality delivery of products on time. Usually, the emission control RFQ provides the customer requirement that includes applicable statutory norms & emission control regulations as governed by the respective countries. After the RFQ is being received by the program management team, a preliminary RFQ study with the Cross Functional Team is carried out to find the product's design and manufacturing feasibility.

The statement of requirements from the customer along with the deliverables and their milestone events are studied to prepare our internal product development time schedule in conjunction with the customer milestones.

V. PROGRAM SCREENING

Project screening is a process that starts once the requirement from a customer is received. An initial screening of the program will be done within the cross functional team of the program in terms of risk analysis, resource, budget, strategic fit and reward, commercial fit and reward.

A detailed program screening will lead to proper planning & execution of the program till its conclusion.



The risk involved in the program in terms of technical aspects considering the technical gap of our capability, complexity of the product/program and skill base are analyzed. Whereas, the commercial risk considering the market presence for the similar product, market skills, regulatory issues, commercial need are evaluated by the business development team and ratings are being given to take the program forward. Similarly, the strategic fit and reward are also evaluated and suitable ratings were being awarded to evaluate the business case of the program. The program will be considered by the management if there is value included either technically or commercially to the organization.

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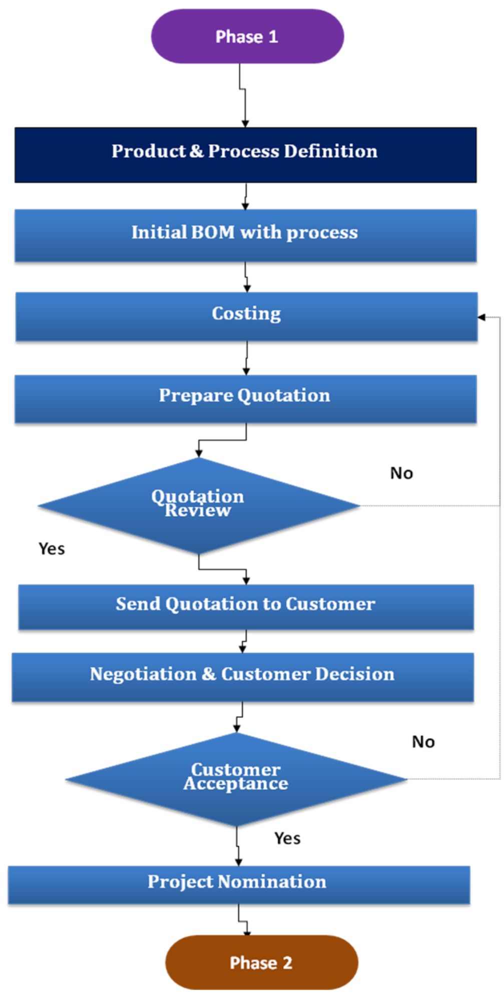
The program will be awarded by the customer, after settling the techno commercial proposal between customer and us.

VI. PROGRAM ACQUISITION

The phases and milestones described by the vehicle program by customer needs to be correlated with our internal product development time plan considering every elements included in the program with the plan and actual time plan.



Usually, the program time plan will be made per discussions with Cross Functional Team (CFT) and will be discussed with customer if there is any discrepancy in meeting the customer milestone and will be shared to them if there is not any problem meeting the target timeline.

VII. BENCHMARKING

Benchmarking is a technique to analyze and identify the optimum results which is existed in the market. This requires a detailed study in terms of Cost, Quality, Delivery, Manufacturing, Service and Technology criterion within the given context. Also this is used to understand the status of a product or process which is in practice and can be used to develop or improve the value of it. It is a management technique to improve business performance being humble enough to admit that someone else is better at something, and being wise enough to learn how to match them and even surpass them [2]. This technique is carried out on the existing product or process which can be performed by component level, white paper or reverse engineering.

Benchmarking can be (a) internal: Comparing performance between different groups or teams within an organization or (b) external: Comparing performance with companies in a specific industry or across industries, within these broader categories, there are various types of benchmarking as follows:

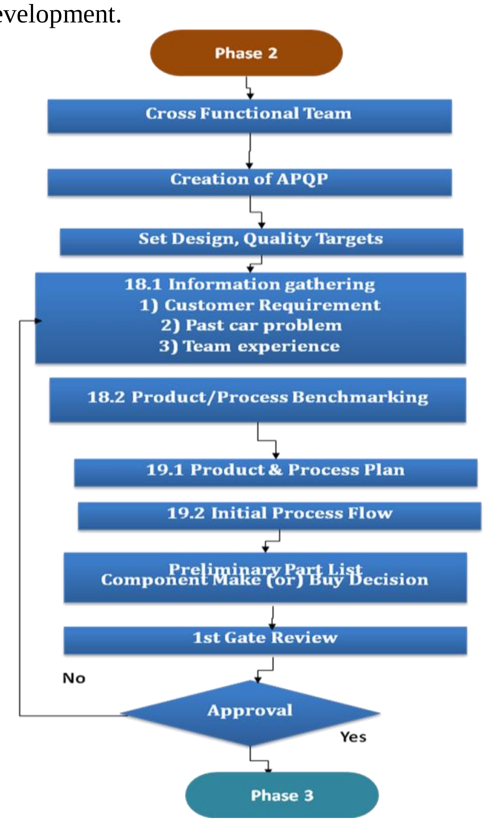
- Strategic benchmarking - Involves observing how others compete. This type is usually not industry specific, meaning it is best to look at other industries.
- Financial benchmarking- Performing financial analysis and comparing the results in an effort to assess the overall competitiveness and productivity.
- Product benchmarking - The process of designing new products or upgrades to current ones. This process can sometimes involve reverse engineering which is taking apart competitor's products to find strengths and weaknesses.
- Process benchmarking - The initiating firm focuses its observation and investigation of business processes with a goal of identifying and observing the best practices from one or more benchmark firms. Activity analysis will be required where the objective is to benchmark cost and efficiency; increasingly applied to back-office processes where outsourcing may be a consideration.

- Performance benchmarking - Allows the initiator firm to assess their competitive position by comparing products and services with those of target firms.

VIII. PRODUCT PLAN & DEFINITION

The requirement of the customer is studied in detail by the program manager of the program management team and the scope of the work and deliverables be identified by the program engineer. Once the scope is identified, the program manager will delegate the work to the respective departments on need basis.

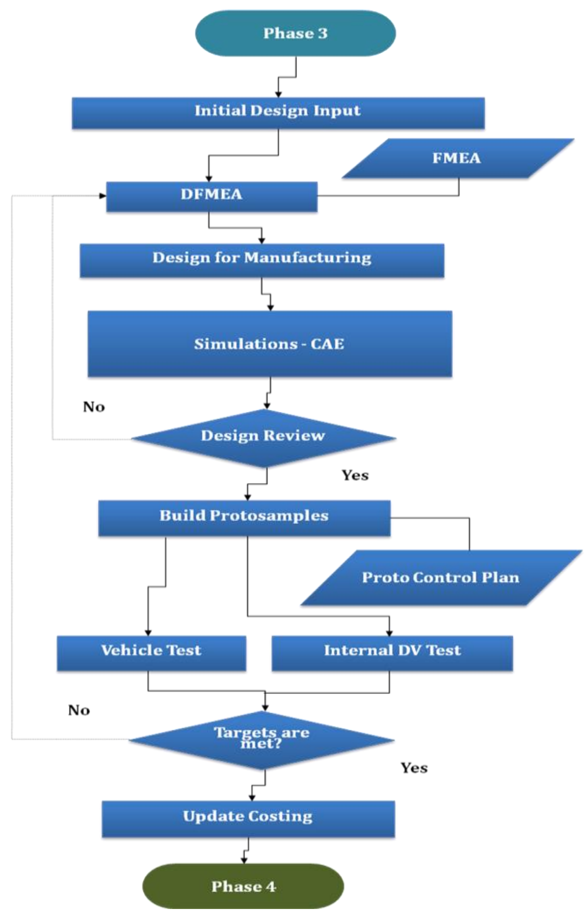
Generally, it starts from the concept engineering which is bifurcated within itself as hot end engineering and cold end engineering for exhaust emission reduction and exhaust noise reduction respectively. The requirement of the customer is understood and based on which the input data will be given to only hot end engineering if it is just exhaust after treatment system development, to only cold end engineering if it is just exhaust muffler system development or to both if it is a complete exhaust system development.



All the necessary input details and conditions are provided by the program manager to the engineer provided by the customer. In case of any paucity of input data, program manager with the consent of customer will request the engineer to make some basic calculations and assumptions to solve the analysis. The output from the concept engineering will be given to the design engineering department in the form of concept design hand sketch, Computer Aided Engineering report, etc.

IX. PRODUCT DESIGN & DEVELOPMENT

The design engineering team receives the input details from concept engineering to make the design considering the manufacturing and quality feasibility. The design engineering will have several design review meetings with other cross functional team like quality, purchase, production, etc to make the optimal and cost effective design to meet the customer requirements on design.



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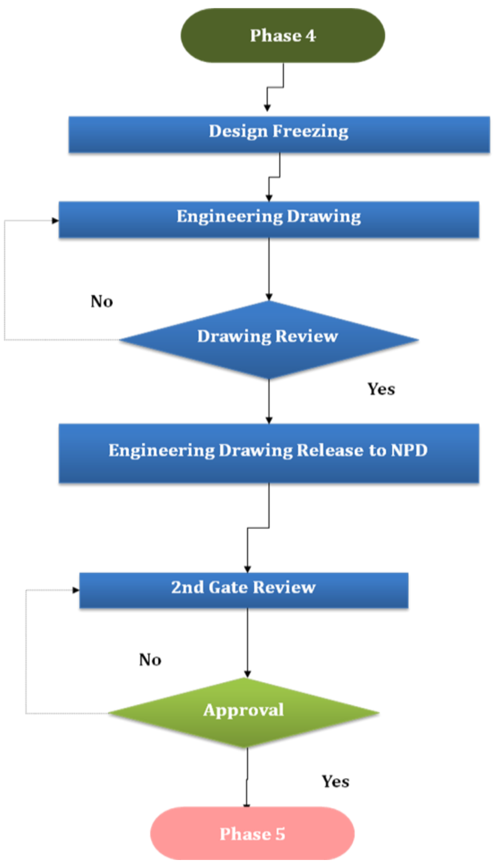
A sub category inside the design engineering department called the design for manufacturing will work closely with the NPD team of the manufacturing plant and also with the production team to have a robust design with good manufacturing feasibility.

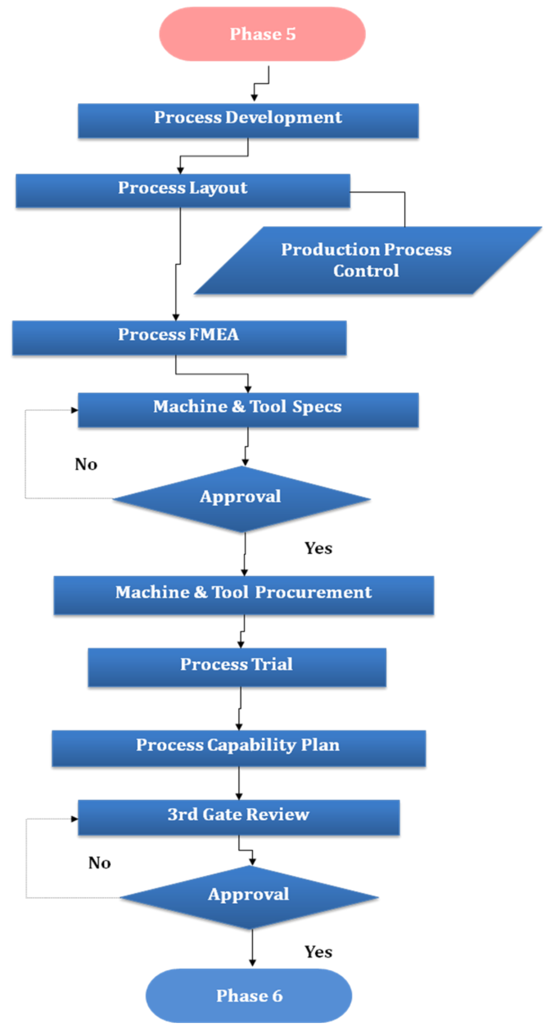
Like virtual analysis, simulation will also have input data and 3D model available for their analysis for design engineering department from program manager. The boundary conditions needs to be taken into consideration based on customer standard; in case of non availability of information program manager will discuss with customer and inform the analysis team to do some assumptions.



The output results or the reports from the structural analysis department will be given to the program manager and the same will be submitted to the customer. Also, the vehicle test data and bench test data will be shared with the CAE to have good correlation between the simulation and test results.

X. PROCESS DESIGN & DEVELOPMENT

Based on the requirement of customer and also for the internal design validation, the number of proto samples with no or minimal tool will be made. These proto samples are usually made for design validation and also for validation of the system at vehicles and laboratories at customer end.



Prototype samples are the representative of intended design, performance & functional deliverables. Hence all of them have to undergo respective verification & inspection. This has to be controlled by In-process control systems such as Process flow diagram, Working instructions, Control plan & Inspection check sheets before it was dispatched to customer.

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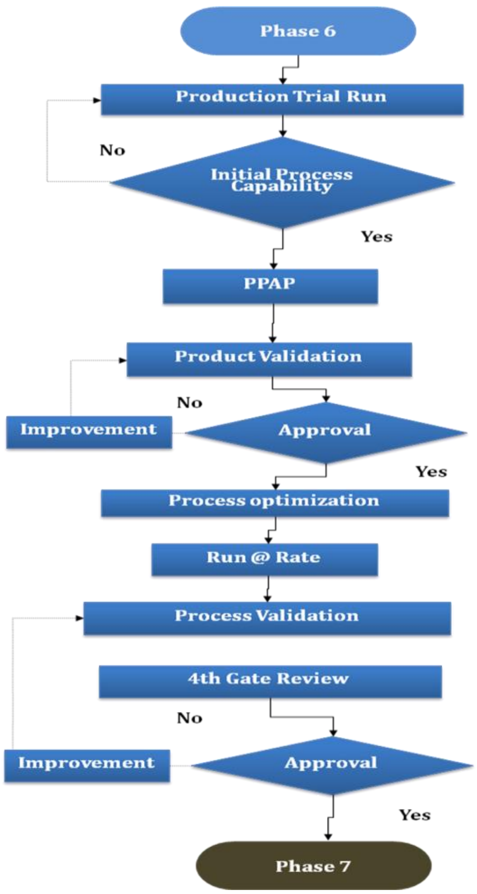
XI. PRODUCT & PROCESS VALIDATION

The testing is carried out in two phases, one with the samples made out from the proto or soft tools and the other with the samples made out from the serial production tools. The earlier is called the Design Validation test and the latter is called as the Product Validation test.

The tests which are done at laboratories using different equipments will be correlated both with the simulation result and also with the customer testing. All the testing specification and conditions will be provided by the program manager along with the test sample. The test fixture preparation should be prepared by the testing team and a final test fixture approval will be done by the customer to approve the test fixture and the set up.

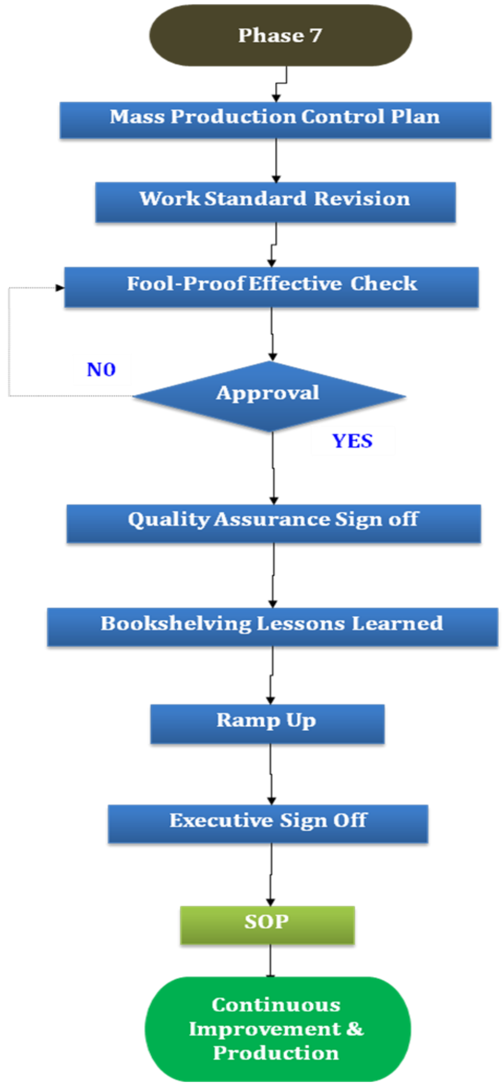
The final test reports from each test needs to be shared with the program manager and which will be shared to customer and regular follow up meetings will take place after submitting the test reports.



XII. START OF PRODUCTION

Upon the development process attains maturity, the regular production to start with adequate systems in place. Initial phase of production need to be monitored carefully to ensure the planned process are in place and expected quality is met by virtue of the same.

At times, the regular production set up may require some alterations based on mass production practices. After due validation of the same, required modifications can be performed/ implemented provided there is no compromise on product/process characteristics.



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XIII. CONCLUSION

In this paper it is explained how effectively the TCA can be applied in program management context to achieve the intended results. On systematic implementation, TCA is widely accredited as a valuable technique promises rich dividends and enable effective utilization of the available resources & can result in substantial economies on a national scale. This also provides special significance to developing countries which has adopted a program of rapid growth in the face of paucity of value integrated product development. Nevertheless on business prospect, it can achieve great economies and increased efficiency.

References:

[1] Bogan, C.E. and English, M.J. (1994). Benchmarking for Best Practices: Winning through Innovative. New York: Mc graw-Hill.

[2] Benchmarking Supply Chain Management: Finding Best Practices by Bjørn Andersen, Tom Fagerhaug, and Stine Randmæl SINTEF Industrial Management, Trondheim, Norway

[3] Del Giorgio Solfa, F. Benchmarking en el sector público: aportes y propuestas de implementaciónparalaprovincia de Buenos Aires (1a Ed.). Villa Elisa: Industry Consulting Argentina. 2012

[4] Integrating value methodologies into product development and program management processes at Pratt & Whitney Canada-Alain leblanc.

Biographies

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Dr. S Rajadurai, born in Mylaudy, Kanyakumari Dt, Tamil Nadu, India, received his Ph.D. in Chemistry from IIT Chennai in 1979. He has devoted nearly 37 years to scientific innovation, pioneering theory and application through the 20th century, and expanding strides of advancement into the 21st century. By authoring hundreds of published papers and reports and creating several patents, his research on solid oxide solutions, free radicals, catalyst structure sensitivity, and catalytic converter and exhaust system design has revolutionized the field of chemistry and automobile industry.

As a corporate executive in the United States and India for over three decades, Dr. Rajadurai managed strategy on power train development and emission control for low, ultra low, super ultra low and partial zero-emission systems. From 1990-1996, he was the Director of Research at Cummins Engine Company. He was the Director of Advanced Development at Tenneco Automotive between 1996 and 2002 and subsequently Emission Strategist and Director of Emissions at ArvinMeritor until 2004. From 2004-2009, he was Vice-President of ACS Industries and since 2009 as Head of R&D Sharda Motor Industries Ltd.

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Mr. Suresh Kumar B, a native of Ganapathi Agraharam, Thanjavur Dt, Tamil Nadu, India. Presently working as Senior Manager in R&D Program Management for Sharda Motor Industries Limited, MWC, Chennai. He has received his Bachelor graduation in Mechanical Engineering from Sathyabama University, Chennai & obtained his Masters in Business Administration in Technology Management from, MIT-Anna University, Chennai. Before joining SMIL in 2018, he has started career in 2002 from Ford Motor Company, Chennai then worked for German automotive giant ZF Friedrichshafen GmbH & continued to work for French automotive firm Faurecia Clean Mobility (Emission control technologies) till 2018. Throughout his career, he has served in various functions of automotive manufacturing and primarily responsible for New product Development & R&D assignments.