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# Career Profile



**Teaching Experience in  
Manipal Institute of  
Technology**

**Indian Innovation Award  
from Dr. A.P. J. Abdul Kalam  
and other awards**

**PhD From IIT Madras in  
Machine Design**

**Career Profile  
Highlights**

**Setting up World class  
Mahindra Research Centre**

**25 years R&D  
experience in  
Mahindra & Mahindra**

**Experience in Innovation  
& New Product Development  
in Mahindra**

# Summary of Research Work : Rolling Contact Fatigue of Bearing Steels

- ❑ **Rolling Contact Fatigue (RCF)** is the principal mode of failure of rolling bearings. It occurs even in properly designed & well-maintained conditions and thereby leads to heavy losses.
- ❑ Detailed research work was carried out for better understanding of RCF failure of **Ingot cast and Continuous cast AISI 52100 bearing steels** and factors controlling it. From the knowledge gained thereby, remedial measures were suggested to prevent premature failure of roller bearings
- ❑ RCF tests were conducted on Ingot cast and Continuous cast AISI 52100 bearing steels and results were compared with theoretical estimations. Tests were also conducted on En 31 steels and it was observed that **Sulfa B.T. treatment increases RCF strength by 13%**
- ❑ Finally it can be said that the information generated in the evaluation of indigenous bearings steels will help the Indian industry in taking the right steps to produce improved quality bearings required for current application.

# Publications In National / International Forums

1. **'Tractor evaluation through Three Poster Test system'** Paper presented in International conference SIAT ( Symposium on International Automotive Technology ) held at ARAI, Pune, during 19<sup>th</sup>-22<sup>nd</sup> January 2005
2. **'Bringing Field to Lab in Tractor Evaluation Through Three Poster System & Statistical Tool'** paper presented in SAE Commercial Vehicle Engineering Congress, during Nov 1<sup>st</sup> –3<sup>rd</sup> ,2005 held at Illinois, USA
3. **'Bringing Lab to CAE in Tractor Evaluation Through Field Load Data Acquisition'** Paper presented in International conference SIAT ( Symposium on International Automotive Technology ) held at ARAI, Pune, January 2007
4. **'Development of Test Facility for Accelerated Evaluation of Tractor Brake System'** paper published in SAE International Conference
5. **'Quality control & damage detection of rolling bearings through NDT Techniques'** Paper presented in national seminar on Non destructive Examination- NDE-93 organised by Indian Society for Non destructive Testing ( ISNT), Madras Chapter, Chennai
6. **' Contribution of NDT techniques in RCF testing'** Paper presented in national seminar on Non destructive Examination- NDE-93 organised by Indian Society for Non destructive Testing ( ISNT), Madras Chapter, Dec 2-4, 1993 held at Chennai
7. **'Design of RCF test rig '** Paper presented at National seminar on Industrial problems in design Engineering , June 25, 1994 held at IIT Madras, Chennai
8. **'Wear Monitoring in RCF testing'** Paper presented in XI National conference on Industrial Tribology, Jan 22-25, 1995 , New Delhi
9. **'Vibration & Noise to monitor failure in RCF testing'** Paper published in proceedings of IX World congress on the theory of machines & mechanisms ( IFToMM) held at Plitecnico of Milano, Italy Aug 30-31, Sept 1-2, 1995
10. **'Recent trends in Design and manufacturing of Gears & Bearings'** Paper presented in 17<sup>th</sup> National conference of Production Engineers , Aug 31<sup>st</sup> ,Sept1-2,2002, held at IIT Madras, Chennai

## ❑ Innovation Projects

- ❖ Bringing Field to Lab ( Simulating Field application in lab)
- ❖ Bringing Lab to CAE ( Simulating Lab testing in CAE)
- ❖ Reducing Time to Market ( By Reducing Field testing & focus on lab & CAE)

## ❑ New Product Development Projects

- ❖ Tractor Business
- ❖ Automotive Business
- ❖ Trucks & Busses, Construction Equipments, Genset Businesses

## ❑ Establishment of world class Mahindra Research Centre

- ❖ Fatigue Test Centre
- ❖ Engine Development Centre
- ❖ Transmission , Hydraulic , Track & Vehicle Validation

## ❑ Won **Indian Innovation Award** from Dr. A.P. J. Abdul Kalam and several other awards

# Innovation Projects



A red tractor with a sprayer attachment is operating in a large green field. The tractor is moving from left to right, leaving a trail of white mist behind it. The field is lush green and extends to the horizon. In the background, there are trees and a small white building under a clear blue sky.

# Bringing Field To Lab

**In Tractor Evaluation Through  
Three Poster Test System and Statistical Tools**

**Dr. Prakash Kamath, Somasundar Menon  
Shiladitya Sircar and Sanjay Deshpande**





**International SAE Conference 2005 – Best Paper Award**



SYMPOSIUM ON INTERNATIONAL AUTOMOTIVE TECHNOLOGY  
BEST PAPER AWARD

**ARAI**



**SAEINDIA** The Engineering Academy  
For Advancing Safety  
Land, Sea, Air and Space

**FIRST PRIZE**

Sponsored by **MAHINDRA & MAHINDRA LTD.**

January 2005, ARAI, Pune (India)



# Bringing Lab to CAE



**Authored by:**

**Dr. Prakash Kamath**

**Somasundar Menon**

**In Tractor Evaluation with  
Field Load Data Acquisition**





**International SAE Conference 2007 – Best Presentation Award**





**International SAE Conference Chicago– 2010**



# Reducing Time To Market



**IN NEW PRODUCT DEVELOPMENT BY  
BRINGING FIELD TO LAB**

**Deepak Thakur,  
Dr. Prakash Kamath and Somasundar Menon**





**Indian Innovation Award 2010**



# **Summary of Innovation in Product Development of Tractor**

# Tractor Used in Various Applications



Agriculture - Puddling



Agriculture-Combined Harvester



Construction



Family Transport

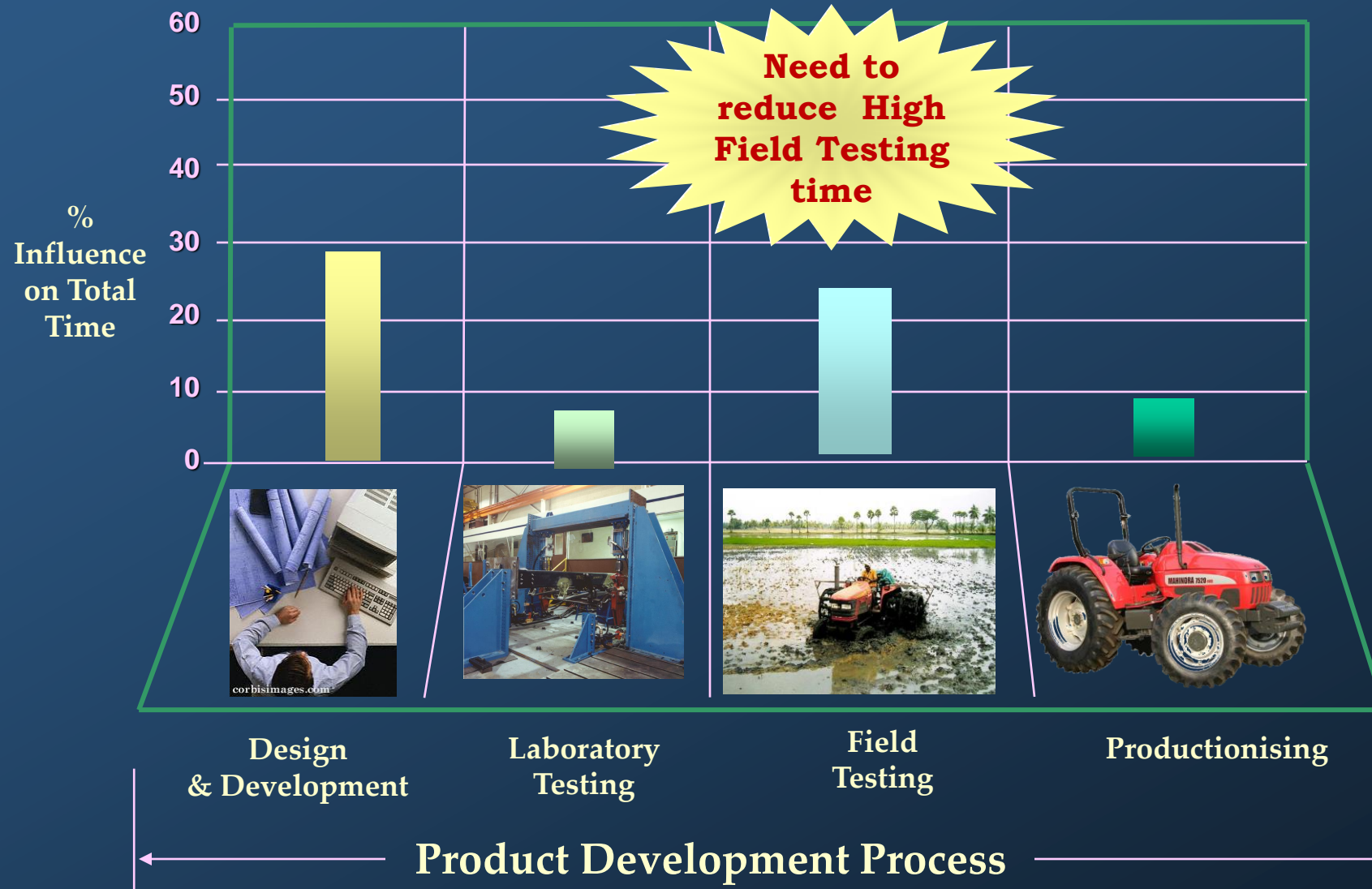


Haulage



PTO applications

# Product Development Process of Tractor



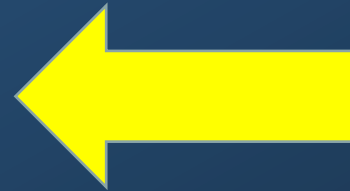


# Bringing Field to Lab Project Taken Up

## LAB TEST



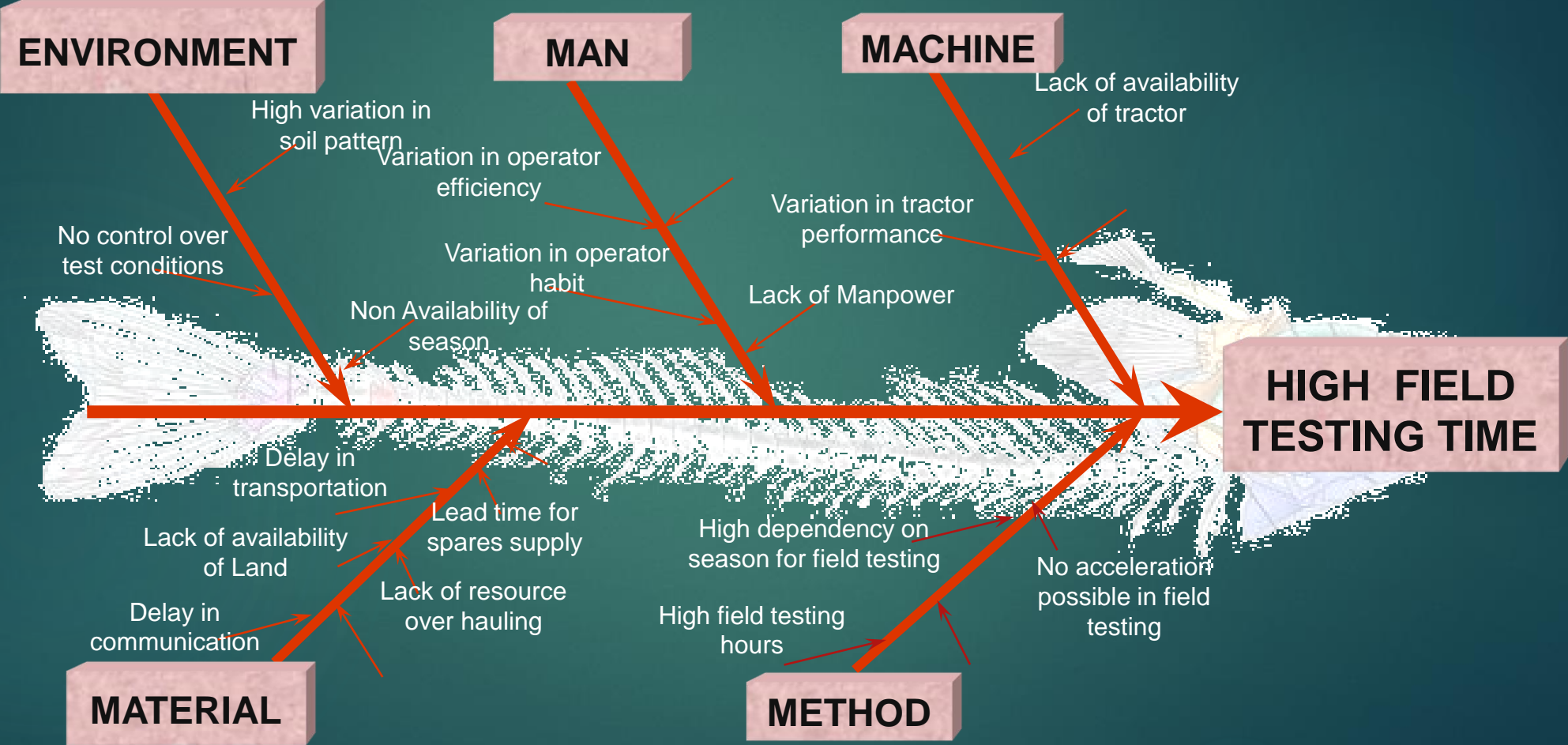
## FIELD TEST



**Simulating All Field Applications in Laboratory**

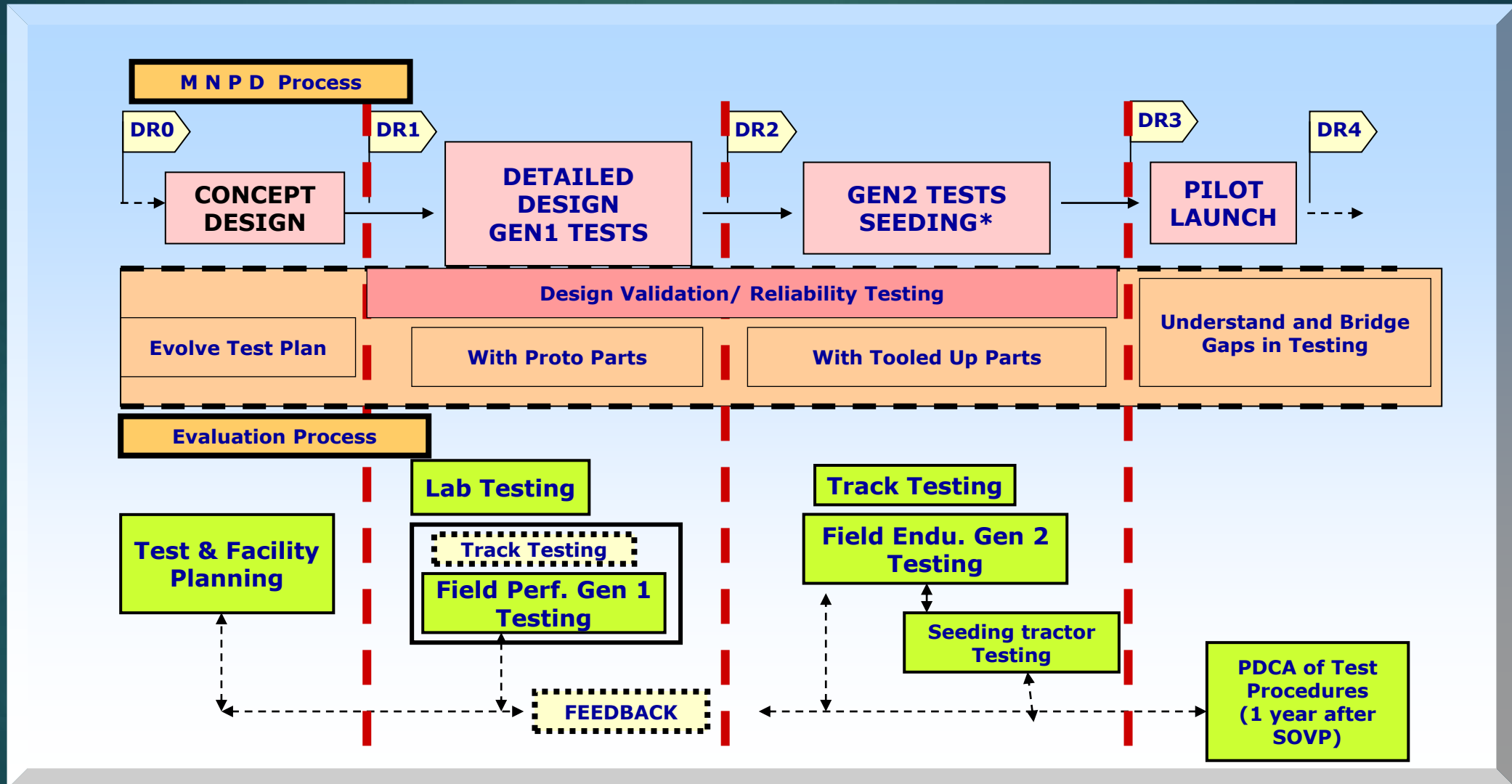
**Replacing Time consuming Field Testing with Accelerated Lab Testing**

# Analysis Done For High Field Testing Time





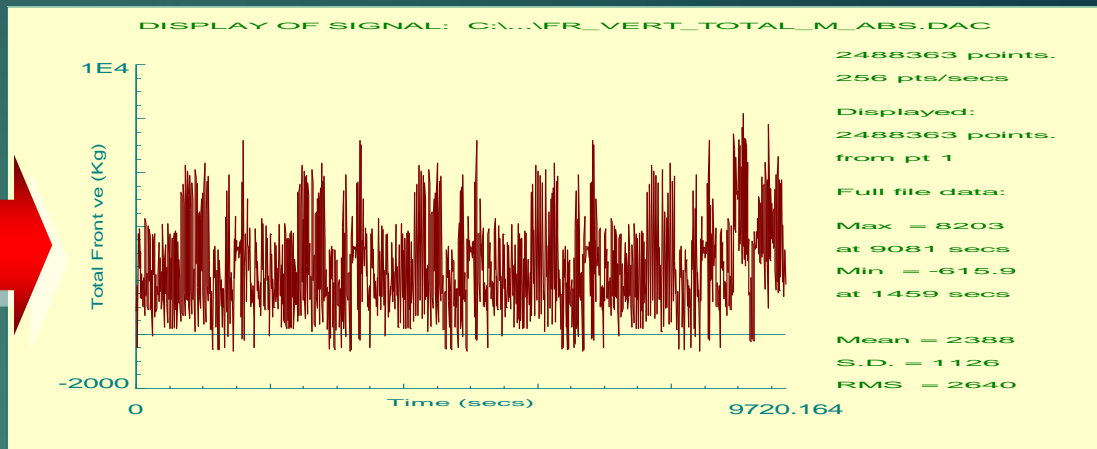
# Action 1 : New Evaluation Process Model Established



# Action 2 : Actual Load Data Acquired during Field Applications



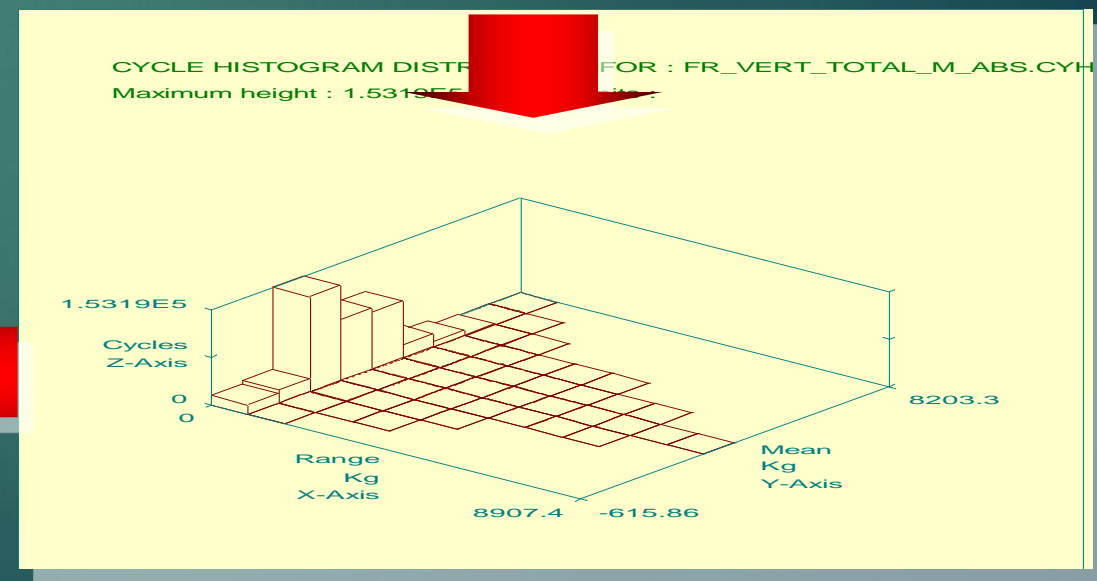
Field Events



Load Signals



Lab Testing



Load Analysis



# Action 3 : Test Facilities Developed to Simulate Field Applications in lab



DCP Test



SG Test



4WD Test



BLE Test



HR Test



RAE Test



RAC BA Test



B&CE Test



RIM BA Test



Pud Simu.



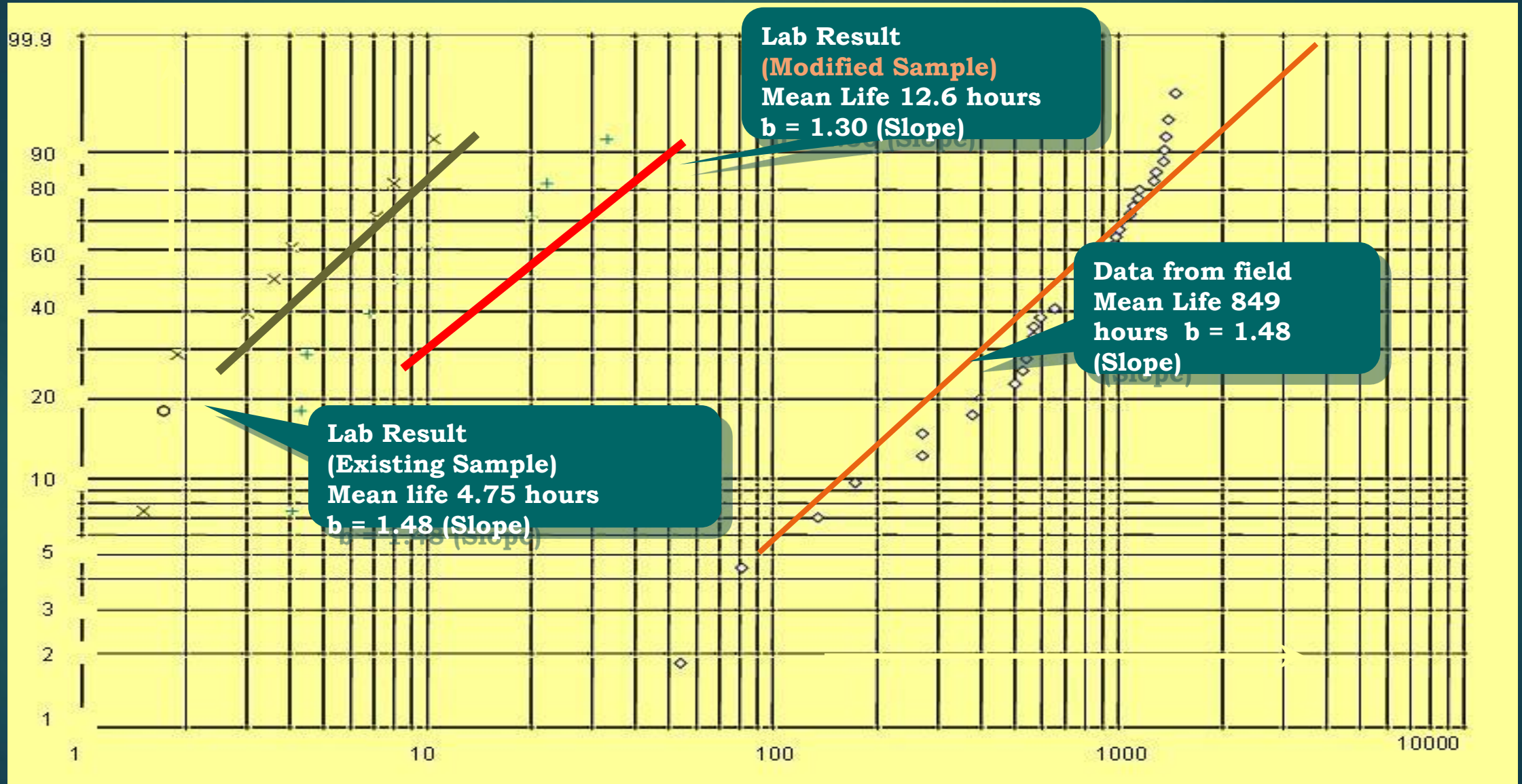
TS Test



BE Test

# Action 4 :Statistical Correlation Established between Field & Lab testing

Probability of failure (%)



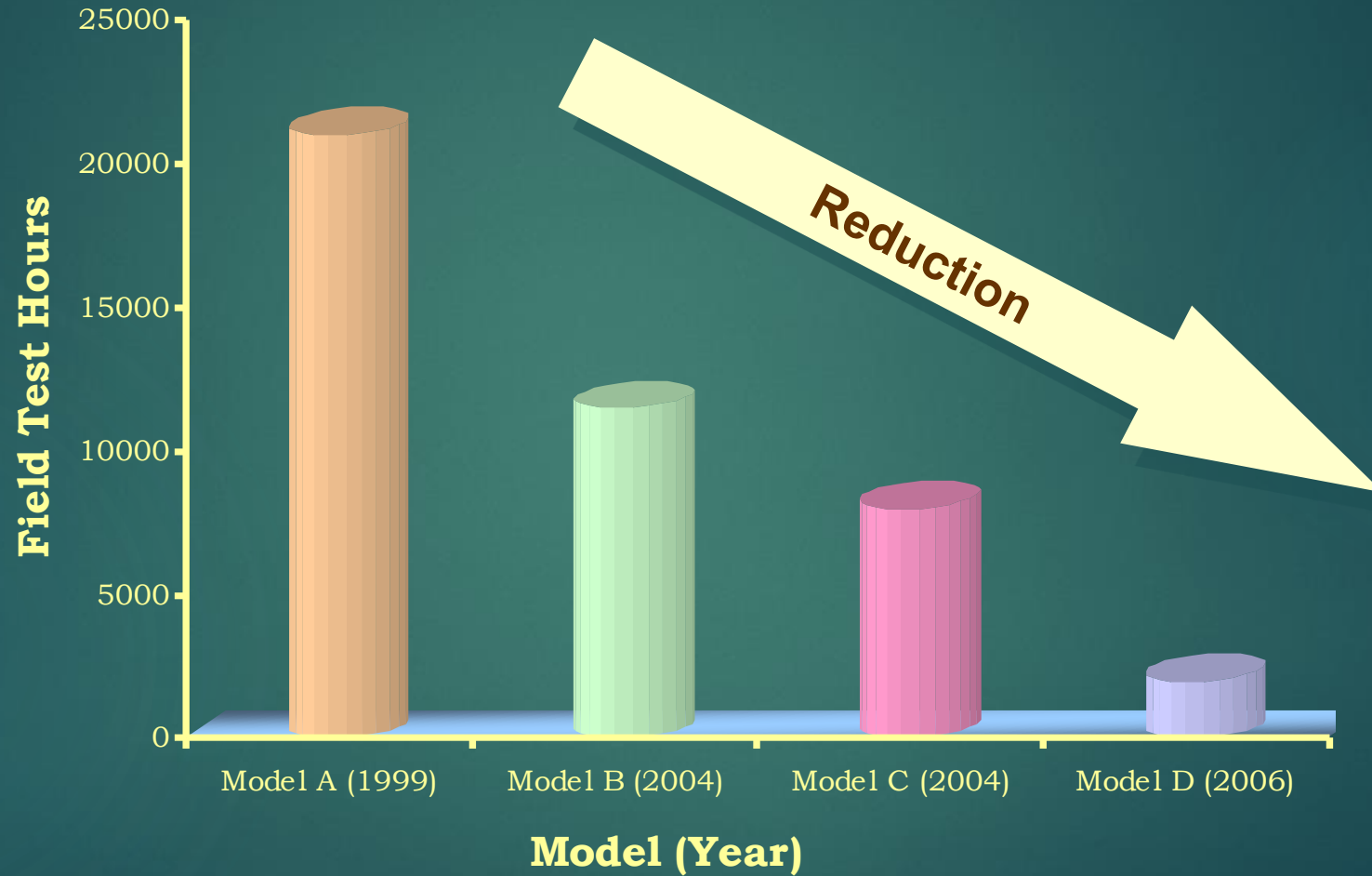
Life (Hours)



# Action 5 : Training & Development of Team

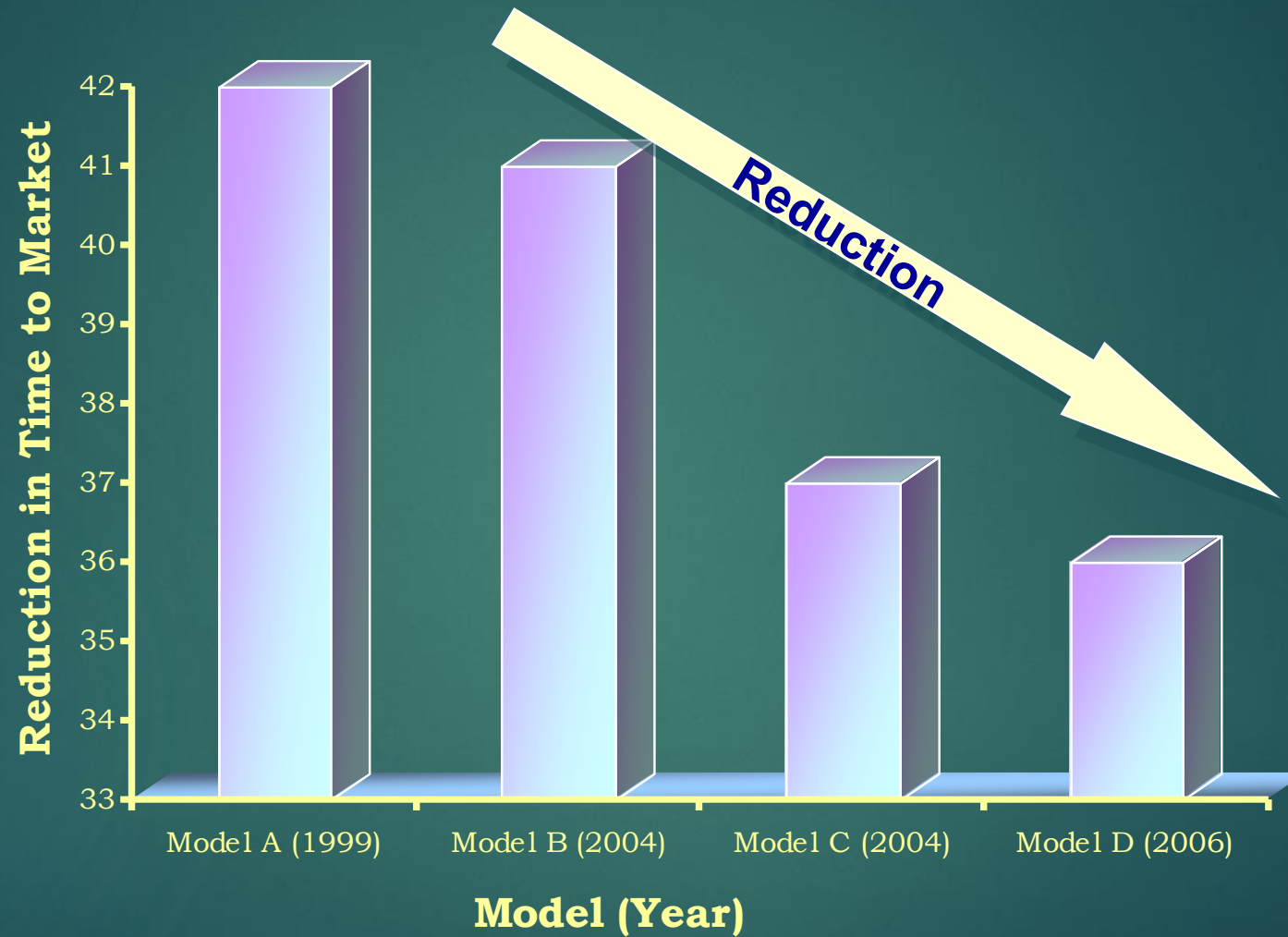


# Results : Reduction in Testing Time





# Results : Reduction In Time to Market





**Indian Innovation Award 2010**



**Support New Product Development**

# New Product Developments in Automotive, Tractor, Trucks , Busses





# Setting Up Mahindra Research Centre

- ❑ Engine Development Centre
- ❑ Fatigue Test Centre

# Engine Development Centre





Inauguration by Dr. A.P.J. Abdul Kalam



# Engine Development Centre







**“Delighted to visit EDC....I have a dream ...  
Mahindra to make it a reality...  
That is fossil fuel free automotive systems”**

**Dr. A.P.J. Abdul Kalam**

**Message from Dr. A.P.J. Abdul Kalam**

Delighted to visit EDC  
of MARV

Seen number of initiatives

I have a dream

Mahindra can make it a  
reality.

That is fossil fuel free  
Automotive Systems

A.P.J. Abdul Kalam



# Facilities in Engine Development Centre



Engine Components Storage Facility



Engine Components Protocol Facility



Engine Assembly Facility



Engine Trolley & Instrumentation Facility



Engine Performance Test Facility



Engine Teardown Facility



Inhouse Certification Facility



Vehicle Performance Test Facility



Tractor Performance Test Facility



# Fatigue Test Centre





# Facilities in Fatigue Test Lab



Four Poster Vehicle Test Facility



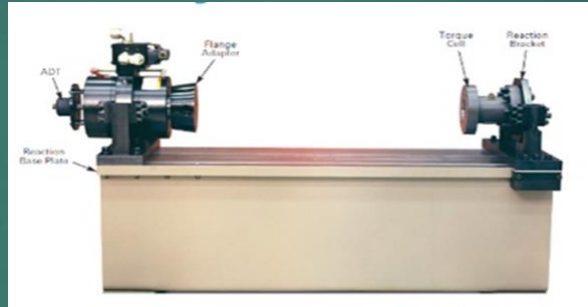
Three Poster Tractor Test Facility



Tractor ROPS Test Facility



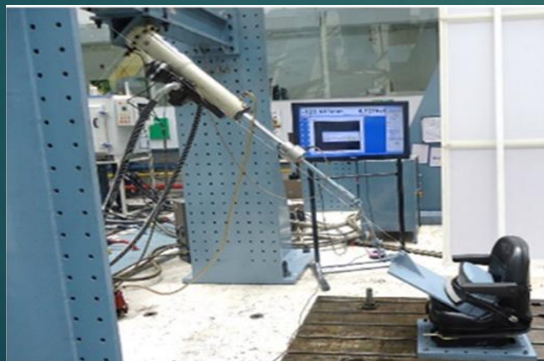
Multi Axis Shaker Test Facility



Rotary Actuator Test Facility



Vibration Test Facility



Seat Belt Test Facility



Hose Test Facility



Climatic Chamber Test Facility





**Visit of Mr. Anand Mahindra & Board Members**

# **Awards & Accolades**





**Best Paper award in International SAE Conference, ARAI Pune 2005**



First Prize in National Quality competition held in Mumbai on 15<sup>th</sup> September , 2006 at Mumbai



First Prize in National Quality competition held in Mumbai, 2006





**First prize in Quality competition held at Mumbai, 2006**



**Best Presentation Award - International SAE Conference, ARAI , Pune 2007**





**Knowledge Management Award – 2009**





**Golden Peacock award Award – 2009**





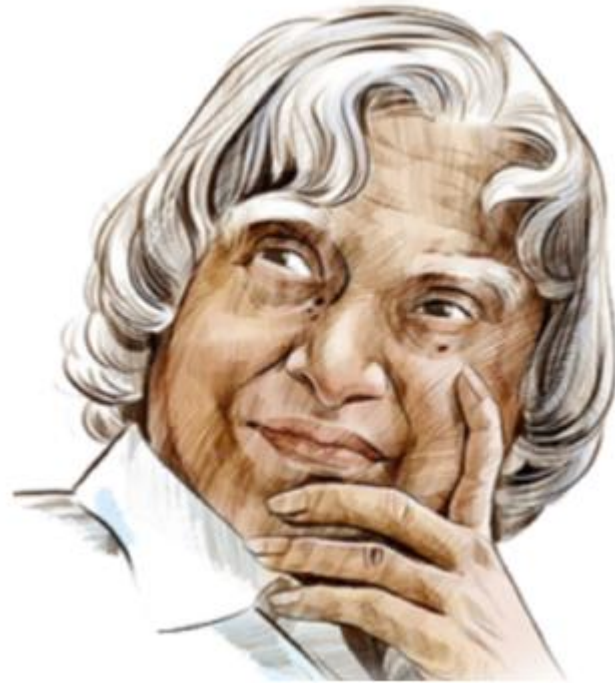
**Indian Innovation Award 2010**





**Awards won In Various Platforms**





Dream is not what you see in sleep....

Dream is something which does not let you sleep....

Dr. A.P.J. Abdul Kalam