भारत सरकार Government Of India
रेल मंत्रालय Ministry Of Railways
(रेलवे बोर्ड) (Railway Board)

Record Notes of Discussion During 3rd Meeting of
Advisory Group of Experts
on
Upgradation of Technology and Leveraging 'Make in India' on Railways
Held on 14th September, 2015 at RDSO, Lucknow

1. In terms of letter no. 2015/CE-I/Innov./6, dated 31.08.2015; third meeting of the Advisory Group of Experts on "Upgradation of Technology and Leveraging 'Make in India' in the Railways" was held on 14.09.2015 at RDSO, Lucknow.

2. Following were present :

A. Advisory Group of Experts :

1. Dr. V. K. Saraswat
   Chairman Designate and Member/NITI Aayog
2. Shri P. K. Srivastava
   Director General, RDSO
3. Prof. N. S. Vyas
   Chairman, Technology Mission for IR
4. Shri Jeet Sondhi
   Former World Bank and Rail Expert
5. Dr. S. K. Salwan
   Chairman, Armament Research Board
6. Shri Nalin Jain
   Representative of FICCI
7. Shri Alok Kumar
   ***Convenor** and EDCE(G), Railway Board*
8. Shri C.P. Sharma
   Representative of FICCI
9. Dr. Madhukar Sinha
   ***Co-Convener** and ED(Innov.), Railway Board*

B. Other Participants :

10. Shri Nand Kishore
    Addl. D.G, RDSO
11. Dr. Manoj Singh
    Advisor/Transport, NITI Aayog
12. Dr. Anirudh Gautam
    GM (RS), RITES
13. All Sr.EDs and EDs
    RDSO, Lucknow

3. Director General, RDSO welcomed all the attendees to the 3rd meeting of the Advisory Group on Upgradation of Technology and Leveraging 'Make in India' on Railways.

4. During welcome address, DG mentioned that Indian Railway is on growth path on freight side as well as on passenger side with main emphasis on high speed passenger trains and heavy haul operations. RDSO had a major role to play in successfully handling this growth.

5. Presentation was given by Executive Director/Research/RDSO, covering following areas :

- ❖ An Overview of RDSO
- ❖ Important Labs and Facilities
- ❖ Important Achievements and Projects undertaken and completed
- ❖ Research Collaboration
- ❖ CAMTECH - towards Skillset Enhancement

During discussion on the presentation, following salient points emerged :

5.1 First Innorail Conference was organized by RDSO in December 2014. Chairman asked RDSO to provide list of participating firms in this Conference.

5.2 Train Collision Avoidance System (TCAS) –

5.2.1 Project was started in 2012 on South Central Railway in collaboration with three Indian firms with inter-operability; and the trials are likely to be completed by December 2015.

5.2.2 Benefits of TCAS system over ETCS (Level 1)/TPWS were also highlighted. Prof. N.S. Vyas mentioned that TCAS would be a major milestone for Indian Railways.

5.3 Radio Based Advance Warning System for Un-manned Level Crossings

5.4 Vehicle Borne Ultrasonic Flaw Detection System –

5.4.1 Chairman mentioned that all devices need to be thoroughly tested for sensitivity and insensitivity alongwith addressal to issues of false alarms.

5.4.2 Prof. N.S. Vyas mentioned that indigenization of sensors should now be possible with a strong sensors and instrumentation programme that is available in the country. Chairman stated that development of sensors is also being done by specialized institutions like ECIL, Bharat Electronics etc.

5.5 Fog Vision Technology –

5.5.1 Chairman stressed the need to work on Passive Millimeter Wave Imaging Technology for this purpose, by involving various academic / research institutions, organization and industries, as it was a very important area of safety for Indian Railways and which also hampered train operations during foggy conditions.

5.6 Communication system between Station Master and Gateman

5.7 Development of Bi-level Auto Car Wagon

5.8 AC Double Decker Coaches

5.9 Development of new BOXN25 Wagon with Pay to Tare ratio of 4.21

5.10 Distributed Power Control System –

5.10.1 Chairman mentioned that interoperability issue could be solved easily by experts in academic institutions providing both wireless and wired systems for communication between the locomotives.

5.11 Predictive Maintenance –

5.11.1 Chairman pointed out that all locos, coaches and wagons should become 'Smart', with their own communication and sensor network for monitoring and transmitting their condition for planning maintenance resources. A project in this regard should be taken up under TMIR.

5.11.2 Sensor based maintenance is also required for monitoring health of railway bridges. Such monitoring sensors should be embedded at the time of construction of bridges.

5.12 Development of Hotel Load Converter in diesel and electric locos

5.13 Enhancing access to high technology –

5.13.1 Chairman mentioned that Indian Railways should consider taking over technically competent sick PSUs like NGEF for getting a specialized agency with requisite skilled manpower.

5.13.2 It was mentioned that unless high proportion of indigenization was achieved, Railways would remain stuck at the lower end of technological cycle where the local value addition would be limited to 7-8%, even when the product was Made in India.

5.14 Swachchh Bharat Mission –

5.14.1 Chairman advised Railways to have proper system of garbage collection near tracks and have waste to energy power plants, near the stations, say at every 100 to 200 kms.

6. Presentation was given by Executive Director/UTHS/RDSO on 'Work done for Functioning of Metros' with following outlines :

- ❖ Metro certification
- ❖ Benchmarking of Indian Metro Railways
- ❖ Make in India
- ❖ Way forward
- ❖ Inputs form Metros

6.1 Choice of Grade –

6.1.1 Chairman mentioned that in view of the severe constraint of Road Space in the Country like India, underground metros should be preferred over the elevated ones, even if the cost was more. If seen in entirety, the costs even

out. So, it was the actual real cost which was there in terms of decongestion and in terms of passenger comfort that should be taken into account.

6.1.2 He gave the example of Russia, which had widest roads and was still operating three levels of underground Metros since long. He suggested that it should be taken care of at the DPR stage.

6.2 Traction –

6.2.1 Chairman advised RDSO to generate a paper on pros and cons of AC and DC traction for Metros and have a technical debate on this aspect.

6.3 Standardisation of technical specifications –

6.3.1 ED/UTHS mentioned that there was no standardization in different metros.

6.3.2 Chairman suggested that the standardization should be mandatory. Deviations can be sought by Individual operators based on adequate justification.

6.4 Indigenisation –

6.4.1 Chairman mentioned that ICF and RCF should have tie up with manufacturers of electrical systems for competing in tenders for Metro Coaches. In this regard DG mentioned that ICF has already done this for supply of MRVC coaches.

6.4.2 Chairman advised RDSO to ensure development of indigenous capability to produce head hardened rails.

7. Other issues :

7.1 DG briefed Chairman about the interaction of RDSO with Board, Governing Council Meeting (GCM), Centre Board for Railway Research (CBRR) and almost continual interaction of RDSO officers with their respective counterparts in Board. Chairman suggested that the research budget needed major enhancement and it should be kept separate from manpower cost.

7.2 Dr. Madhukar Sinha mentioned that RDSO needed to promptly issue an IPR policy of its own. Besides, RDSO should start looking seriously at recently off-patent technologies which were still ahead of the current technological level of Indian Railways and yet could be used in India legally with little or no royalty costs.

8. The Group visited the following laboratories and testing facilities at RDSO :

- ❖ Engine Testing Lab.
- ❖ Oscillograph Car Lab.
- ❖ Fatigue Testing Lab.
- ❖ Signal Lab.
- ❖ Traction Installation Lab.
- ❖ Air Brake Testing Lab.

❖ Geo-Tech. Engineering Lab.

8.1 Discussions during field visit –

8.1.1 A National Engine Development Mission should be launched by Railways.

8.1.2 Chairman mentioned that there were compact devices available which had accelerometers, GPS and other sensors and which could be fitted conveniently below the coaches for recording. This could be used for real time monitoring as well.

8.1.3 Also, there was a facility available for real time FFT of acquired data. It was informed that it was going to be used in the project of 'On Board Diagnostics' of Rolling Stock by Indian Railways.

8.1.4 Development and use of computer simulation package was advised by the Members for air brake testing before full scale testing in air brake lab, to reduce the overall time for according approval / development.

8.2 Issue of failure of international rolling stock in stability test on IR track was raised by one of the Members. In this regard it was informed that a project on adopting UIC standards for testing of Rolling Stock was under consideration and the issue would be taken up under TMIR.

9. **Concluding Discussions** :

9.1 Remarks by Chairman –

9.1.1 He appreciated the good work done by the labs shown to the Advisory Group and the knowledge of the lab staff that he had interacted with. He opined that good foundation was available for doing the R&D work.

9.1.2 He reminded the Group of the projected growth in suburban and passenger traffic alongwith the anticipated economic growth of close to 10% in the coming years for which Railways were expected to play a major multiplier role. He also stated the possibility of foreign technological invasion in the transport sector for which Indian Railways had to gear up with an appropriate vision and mission road map for both HR and technological progress. Equal emphasis was desirable on present maintenance challenges as well as perspective planning for future technology. Time was of great essence, as things could not wait for development of technology.

9.1.3 The "Digital India" and "Make in India" concepts alongwith High Speed and Dedicated Freight Corridor should be dovetailed with the research plan of Indian Railways. Chairman felt that the RDSO needed to give more emphasis on design and development. The need was to make an institution focused on research at the levels 4 to 6; viz. the domains of applied research, design development and testing, leaving levels 1 to 3 of basic research to the academic institutions.

9.1.4 Necessary eco-system already existed in Railways in form of Production Units and design facilities in RDSO. In this regard, RDSO's core

competence in design development and modeling needed upgradation alongwith its association with Production Units and development of field testing facilities like Test Track of international standard for conducting all types of testing and generate a comprehensive data bank for decision making, reducing outside dependence.

9.1.5 A good interaction with academic institutions involved in basic research should be part of this Eco System. For this, separate institutions across the country should be identified having proven capabilities in different fields (Mechanical Systems, Electrical and Electronic Systems, Materials, ICT, etc.) which were of interest to Railways. RDSO should also have identified persons for interaction with respective institutions for meaningful research.

9.1.6 Prototyping for designs could be done at Railway PUs and from smaller units in the MSME space, as had already been done by RDSO for development of TCAS. The larger established industries might not have sufficient interest in the prototyping work. An induction / roll out plan needed to be identified even before the prototype testing commenced.

9.1.7 Good design capability was available in RDSO as was shown for engine testing during his field visit. Some good modifications had been carried out in the imported design of locomotives. However, Indian Railways should start a "National Engine Development and Production Mission", utilizing its available design skills at RDSO, design capabilities of academic/research institutions and private sector like M/s Kirloskar, Ashok Leyland etc. This could be used for developing a suitable railway engine for future as development and proving out of engines normally took 7 to 10 years, even in Mission mode.

9.1.8 With instrumentation making major technological strides. Railways should plan to use it for upgrading their testing capabilities like Oscillograph Cars, Real Time Health Monitoring of Rolling Stock, etc.

9.1.9 Equal emphasis was also required on safety of the trains. The challenges like unmanned level crossings, collision avoidance, Fog Vision had already been identified and focused effort was required to face these challenges.

9.1.10 High value projects like High Speed and Dedicated Freight Corridor (DFC) were currently underway and 15% of total outlay of these projects should be earmarked for research and development related to these fields. This money could be utilized over a specified period of time.

9.2 Remarks by Prof. N.S. Vyas –

9.2.1 Engine design technology was quite complex and design of a new locomotive from scratch remained a far cry today for both Railway design engineers and academic institutes. In fact, IR continued to remain dependent on foreign affiliations even for high speed bogie design.

9.2.2 In this regard Chairman pointed out that Indian engineering institutions lay greater emphasis on theoretical concepts as opposed to teaching Design

and Application Engineering. The focus of technology transfer must, therefore, shift from obtaining know-how to know-why, so that the learning could provide future design development, which should be a comprehensive system design, not restricted to just the component level improvements.

9.3 Remarks of DG/RDSO –

9.3.1 R&D needs should be identified as major component to Railway System with necessary fund allocation. Short term solutions were taking overriding priority over basic design. Secondly, decision makers must have patience with regard to development of certain expertise as R&D required time and often produced negative results which were otherwise equally useful in the technological progress, as valuable learning.

9.4 Research Ethos –

9.4.1 A query was raised as to which enabling provisions existed in other Government or PSU entities or other nations like China and Korea, possibly lacking in RDSO, that were necessary for the development of research ethos and lead to prompt response to technological challenges.

9.4.2 Chairman stated in response that the concentration of power at the top tended to reduce the efficiency of any research organization. Some of the successful R&D organizations had sufficient delegation of powers right up to the lowest level which appeared to be lacking in Railways. An advance system of accountability and responsibility with a monitoring mechanism also needed to be set up alongwith delegation of powers. In this connection, the delegation structure used in Deptt. of Space Research and DRDO were discussed. Chairman also mentioned that the decision makers had to be sensitized towards negative outcome of experimentation as learning steps towards eventual research goal.

9.5 Personnel Requirements –

9.5.1 Chairman mentioned that continuance of the key personnel was necessary right upto the culmination of project for successful completion of R&D goals. However, such a rule was open to abuse by people preferring a particular posting location for personal reasons.

9.5.2 He also pointed out that in some cases; the change of guard brought forth fresh ideas and perspective which were extremely useful to the final project outcome. Chairman expressed opinion that RDSO might need to have two different sets of HR policies; one for pure research personnel and another for floating manpower moving in & out RDSO and Zonal Railways.

9.6 Focus of Research –

9.6.1 Chairman mentioned that publishing papers should not be the goal of an R&D organization. This should be left to the academic institutions.

9.6.2 DG mentioned that in RDSO, papers published were application based and mainly highlight the work done in a particular area which also served as Knowledge Bank for the future.

10. The meeting ended with a vote of thanks to the Chair and all the participants.

(No. 2015/CE-I/Innov./6, New Delhi, Dated 28.09.2015)

(आलोक कुमार) 28/9/15

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Distribution for information and necessary action :

1. The Chairman and all the Members of the Advisory Group of Experts.
2. The General Managers, All Zonal Railways.
3. Director Generals – RDSO/Lucknow and NAIR/Vadodara.

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- Dr. Madhukar Sinha, ED/Innovation, MoSR and Co-Convenor of 'Advisory Group'.