LEVERAGING DEVELOPMENTS IN MONITORING TECHNOLOGY HELP TO ACHIEVE SOUND AND HEALTHY RAIL-TRACKS FOR A MODERN “WORLD-CLASS” RAIL-SERVICE

By Dr. F. A. Wingler, Germany, February 2018

This article is a continuation and update of the earlier published technical Railway Papers:

<> LEVERAGING STATUS-REPORT/AUDIT ON TRACK-CONDITION OF THE WHOLE NETWORK OF INDIAN RAILWAYS – A TOOL FOR LONG-TERM CAPITAL INVESTMENT-SHEMES AND MAINTENANCE-STRATEGIES

<> LEVERAGING DEVELOPMENTS IN MONITORING TECHNOLOGY FOR OPTIMISING TRACK MAINTENANCE – Switch Monitoring and Diagnostic Systems

<> THE ULTIMATE GOAL TO PREVENT FATAL TRAIN-ACCIDENTS IN INDIA – VISION: “CLOSE-TO ZERO” –

See: http://www.drwingler.com
LEVERAGING DEVELOPMENTS IN MONITORING TECHNOLOGY HELP TO ACHIEVE SOUND AND HEALTHY RAIL-TRACKS FOR A MODERN “WORLD-CLASS” RAIL-SERVICE

The envisaged “WORLD-CLASS” Rail-Service in India needs modern sound and healthy, high quality Rail-Tracks of “WORLD-CLASS STANDARDS”.

The spate of train derailments in India is an index for the actual poor track-condition and quality of the network and an index of how un-healthy many tracks are.

Modern Monitoring Technologies help to make predictions on the Longevity of Rail Tracks, to determine the Threshold for Intervention and to evolve a **Network-Status Report** on the Health of all Rail-Routes as a tool for long-term Investment Planning and Strategy and as a basis for the leadership in making decisions. A Network-Status Report encompassing all routes will help the leadership to understand what ails Indian Railways, what the back-logs to deal with are and what the back-logs to be caught up are.

Modern Monitoring Technology helps to visualize the track to understand, when and where Maintenance and Renewal are required.

Modern Monitoring Technology helps to gather Track Quality Indexes for Predictive Maintenance.

**RILA** track laser 3D video measurement and mapping system mounted on scheduled running passenger trains gather regularly GPS-positioned accurate, up-to-date rail-track, infrastructure and analysis data, without disrupting the service; see [www.fugro.com/rail](http://www.fugro.com/rail).

Drone surveying and post data processing techniques help to capture location data for planning and intervention.

Sensors making use of Newton’s Law Mechanism, installed onboard of scheduled running trains, have become a tool for Monitoring Track-Conditions to develop Strategies and Plans for Predictive Maintenance- and Renewal-Intervention.

The modern leveraging Rail-Network Condition Monitoring Technologies produce “**Big Data**”.

“**Big Data**” is data, whose volume, scale, diversity and complexity require new architectures, techniques, algorithms and analytics to manage
it, and to extract hidden values, information and knowledges from it in making decisions and in evolving planning and strategies in order to come to right actions to be taken.

“Big Data Crunching” should not be a problem in the “High IT Country” India in order to convert the gathered large volume of data efficiently in information for rail-track engineering as well for track and infrastructure maintenance/renewal strategies, planning and organization. Accurate up-to-date information help to make informed decisions related to investments and operations. Data services help to deliver improved efficiencies in asset management and engineering. They bring the railway onto the engineer’s desktop enabling to analyse and extract leveraging and actionable information quickly and efficiently for actions to be taken.

“Big Data is the new oil. But just like crude oil it is valuable, and unrefined it cannot be really used”.

“How America's top Railroad learns to fly”, Surveillance by Drone; Pict. from Union Pacific INSIDE TRACK, INNOVATION, 12.05.2017

Supervision and geographical Data Acquisition Services with Drones by SIGMA RAIL, Spain see: https://www.uc3m.es/ss/Satellite/.../New_system_uses_drones_to_monitor_railroads
Mining Data retrieved from TELVIC RAIL Sensors installed onboard Bogies of scheduled running Belgium Passenger Coaches with the Objective of developing a predictive Maintenance Tool; see: Research aims to develop predictive maintenance tool - Railway Age https://www.railwayage.com/analytics/research-aims-develop-predicti...

“BIG DATA CRUNCHING”
OUTLOOK

Let’s hope that in consequence of the deployment of “Leveraging Developments in Monitoring Technology for optimizing Track, Bridge and Tunnel Maintenance” there will be in future “Close-To-Zero” train-derailments on account of unsound and un-healthy rail-tracks.

“LEVERAGING”
Reviewing the technical papers presented on the 2018 Guwahati IPWE International Technical Seminar leaves the impression that the Indian Engineers "know their onions", how, by which methodology/technology and what to monitor. And nobody has to teach them, what modern global developments in monitoring are.

The great challenge is to come to relevant consequences with the result in bringing more quality on the rail-roads for fewer derailments. But this will need a high amount of money and vast restructurings in the organization with a paradigm shift. Let`s hope that the new leadership will be aware of the LESSONS TO BE LEARNED FROM MONITORING.

Monitoring alone is not enough. Actions for track improvement have to follow.

Leadership must ensure that the necessary long-term funds are made available and that the necessary structural reforms are carried out, with the aim of eliminating the backwardness and back-logs in track quality as soon as possible.

3769 Rail Fractures in the past one year on IR speak their own language about the poor condition of IR tracks (Paper No. 13 of P. Mittal and A.V. Mittal, page 116-125).

IR must get rid of its 13 m rails, often of poor steel quality and AT welded to LWR/CWR-tracks, which are in need to be bandaged with joggle fish-plates. If the LWR/CWR-tracks are composed with factory delivered 240 m rails of high steel quality and with robotic flash-butt welds, there will be nearly zero rail fractures, and hence, nearly no monitoring of rail fractures will be needed.

The decissions of the leadership are in favour of glossy and prestiguous programmes aiming to transform IR to a World-Class Railway with "World-Class Standards" and to take IR to the "World-Class League." However, the decissions are not in favour of allocating sufficient funds for SOUND AND HEALTHY RAIL TRACKS on all routes according world-class standards. One has to look only on the plight of the tracks in the sub-urban Division of CR at Mumbai; see the message of the Paper No. 39, page 338-345, presented by R.K. Goel and P.K. Naga, about maintaining the sub-urban section of the Mumbai CR Division, full of muck, mud and garbage, which cannot be removed to make place for a well drained un-fouled and clean ballast bed for a stable rail-road. This plight is really heart-breaking and depicts the acute dilemma, that IR are presently facing. A "WORLD-CLASS RAILWAY" needs also World Class High Quality Rail-Tracks; and in this respect India is lagging far behind:
There should not only be LEVERAGING DEVELOPMENTS IN MONITORING, there should also be LEVERAGING ACTIONS TO BE TAKEN RESULTING IN HIGH TRACK QUALITY ON ALL ROUTES FOR CLOSE-TO-ZERO TRAIN-DERAILMENTS.

**In Conclusion:**

The higher the Track-Quality the less Monitoring is necessary. High Track-Quality on IR can be achieved with long milled and flash-but welded Rails of high Steel Alloy Quality and by comprehensive Sub-Grade/Formation/Drainage Rehabilitation and Strengthening.