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**A STUDY ON
DIESELISATION OF SIBI
KHOST SECTION WITH
GEU-15 & GMU-15 GROUP-
IV DIESEL LOCOMOTIVES**

MIAN GHAS-UD-DIN

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By

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Pakistan Railways provides the only transport link for passengers and goods between Sibi and Khost through a 133 Km long railway track section. Transportation operations have suffered because of deteriorated condition of XA class locomotives group V leading to loss of revenue. A study has been undertaken to see if dependable heavier axle load diesel locomotive with lesser rail bending moments can replace existing XA class locomotives which produce greater rail bending moments with low axle loads. The appropriate choice would be to consider the GEU-15 and GMU-15 diesel locomotives under Group IV which are already touching Sibi shed. This would require an increase of permissible section speed from 40 to 60 KMH to achieve the optimum operation speed.

The German Railway design practice has been adopted to find the rail bending moments under static axle loads of the locomotives. The track section material is taken as 100 lbs rail with mono block prestressed concrete sleepers of Pakistan Railway design. From the analysis it was found that under static axle load XA class steam locomotive produces a maximum rail bending moment of 2.0064 ton cm as compared to rail bending moments of 1.7577 & 1.7787 ton-cm produced by GEU-15 & GMU-15 diesel locomotives respectively in the worst case. By the commissioning of diesel locomotives, increased speed will have dynamic effect which can be analysed through the application of impact factor and speed coefficients to the static axle load. The practices of Indian, Belgium and West German Railways along with

Pakistan railways has been evaluated and compared to find out the permissible speed factor. From the experience of Indian Railways on test/trial of Rajdhani express a speed factor of 28.6% was adopted for a locomotive speed of 60 KMH. A rather small rise of 7% in the speed factor has been estimated when the speed increased from 40 KMH to 60 KMH. Therefore a section speed of 60 Km per hour would be permissible provided the track is well maintained to specified track geometry parameters.

Under the prevailing financial crisis, the objective of introducing the diesel locomotives by Pakistan Railways could be achieved by intensification of maintenance efforts rather than the alternative of replacements of existing infrastructural elements involving major investments. In the first stage of first phase, induction of GEU-15 and GMU-15 diesel engine would be made for transportation along sibi-Khost section. The increased maintenance effort would include increasing maintenance funds and equipment by 20% initially subject to further review, ultrasonic testing of rails to replace defective rails, replacement of excessively worn out rails along sharp curves exceeding wear limits as prescribed in Way and Works Manual, and intensified monitoring of bridges by Bridge Branch. The existing speed restrictions of bridges would continue. Maintenance efforts for embankment and protection works would also be intensified by improving the current revenue budgetary allocations.

In the second stage action plan would be initiated to undertake improvements in track structural works. Track on all major bridges would be welded by providing suitably designed expansion joints accompanied by the provision of fittings and fasteners in accordance with International Standards to cater for expansion. Check railing would be provided on sharp curves. Joint leveling and dehogging operations would be introduced throughout the section and their measurements would be made by "Funicular Rule". Rail joints would be maintained by special efforts along the entire section.

In phase II of the programme, maximum sectional speed would be raised from 40 to 60 KMH by the realignment and redesign of sensitive track curves considering super-elevation, deficiency of cant and transition. Special efforts would be made to clear the obstructed view and to prevent boulders falling on the track by removing overhanging

boulders and rocks. Execution of pending protection works and clearance of catch water drains would be undertaken.

The technical evaluation and recommendations made in this paper have been accepted and approved by the Railway Board. They have further been implemented with full achievement of targets.