Master Thesis

Track Quality Degradation of Light Rail Ballasted Tracks: Models and Methods

Abstract

In Railways, including Light Rail systems, track quality plays a crucial role in the safe and efficient operation and maintenance of the system. Today, many studies on track quality and its deterioration process are carried out in order to determine the behavior of tracks at various conditions. This is essential to determine the decisions that seek to minimize the life cycle cost (LCC) of an asset while at the same time considering the system's maintainability, reliability, accessibility and safety (RAMS).

This thesis determines the track quality of a Light rail transit (LRT) system by using statistic methods such as the J synthetic coefficient; track geometry index (TGI); and European Standard EN 13848-5. Once the track quality over time is known, the values obtained are used to determine the track's deterioration rate, which allows the prediction of the future track quality and thus, the definition of cost efficient maintenance and operation plans

Although there is a lack of standards for the determination of track quality for LRT system, many of the existing railway standards in some countries are gathered and integrated in this thesis for the evaluation limits of track quality. Furthermore, in this study pros and cons of different methods are mentioned, and a combination of statistic methods and mechanistic methods is also presented in order to have a more comprehensive of the degradation of the track quality for LRT systems.
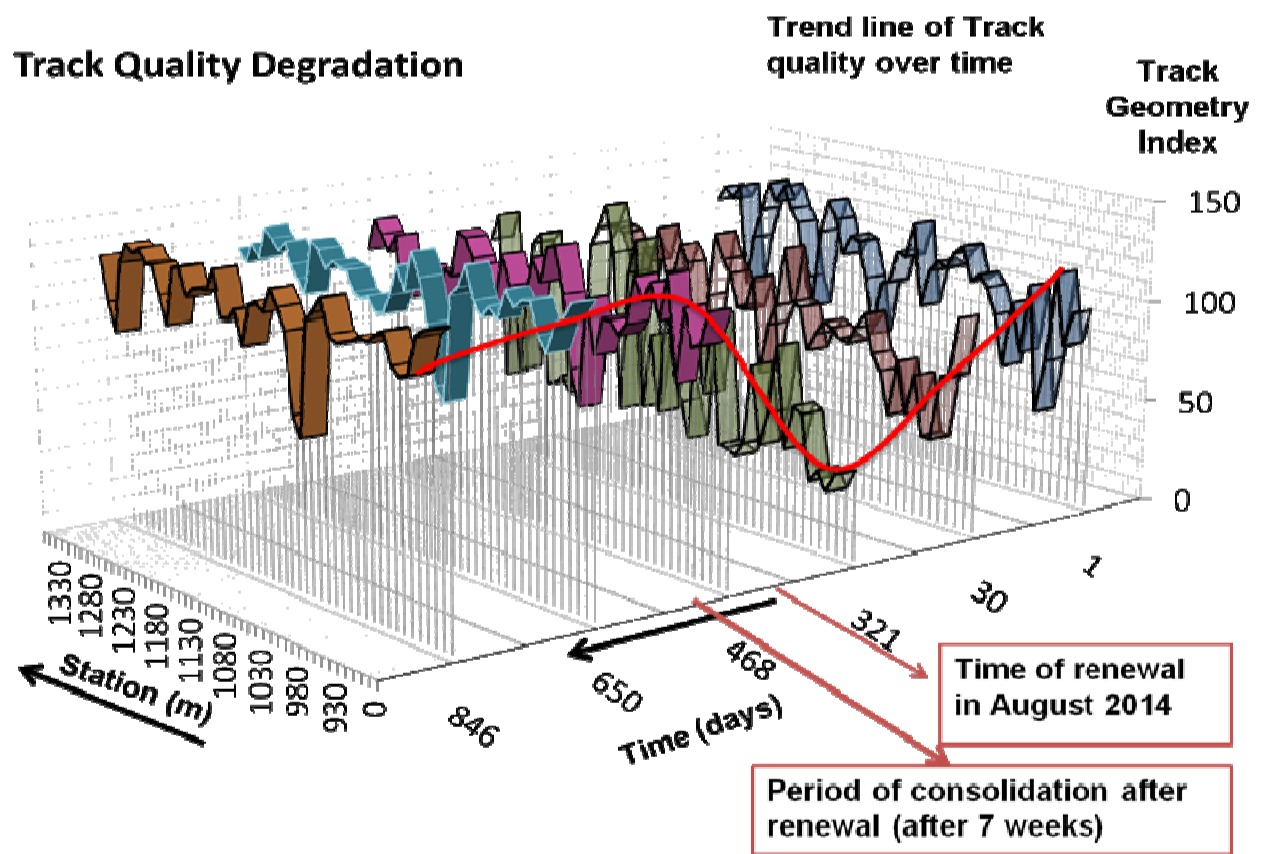
HOANG TIEN LE

Evolution of Track Geometry Index of The Track Section From May 2013 to October 2015
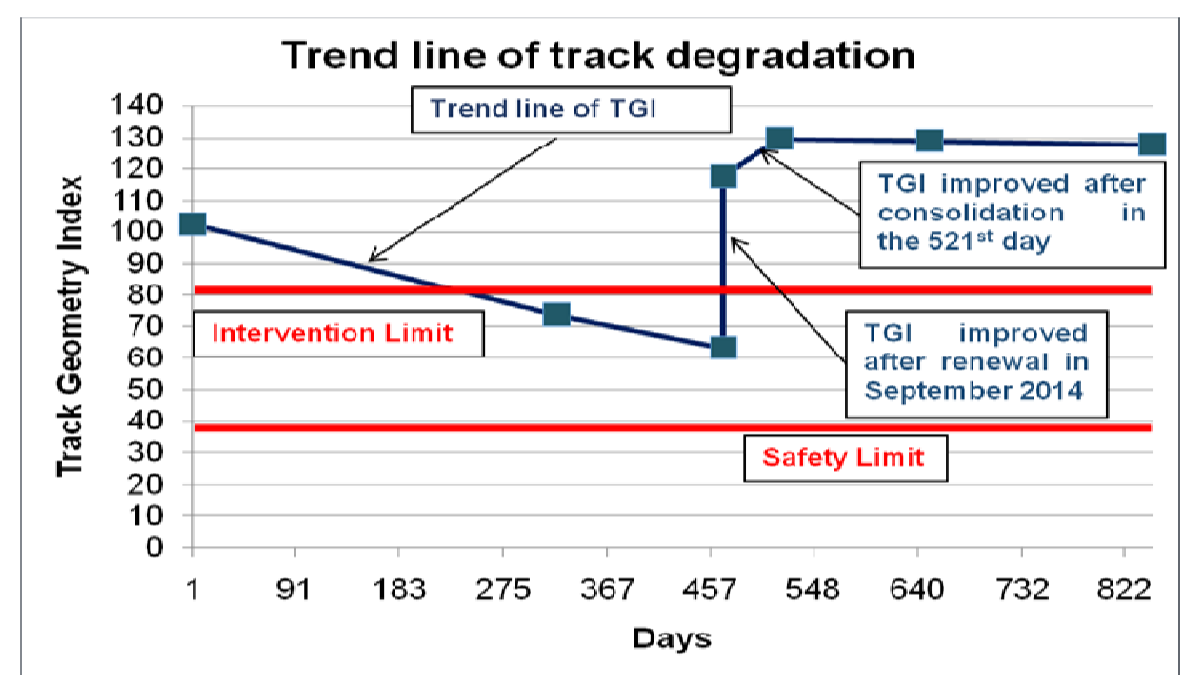
Evolution of Track Quality of The Track Segments From May 2013 to October 2015 (3D Graph)

Schematic Diagram of Research Methodology

Comparison of the degradation rate b before and after renewal in methods

Methods		Before renewal	After renewal
J Synthetic coefficient		0.00041	0.00036
Track Geometry Index		(-)0.00103	(-)4.6x10^{-5}
European Standard	SD of Longitudinal Level	0.000456	0.000765
	SD of Alignment	0.00269	7.3x10^{-5}
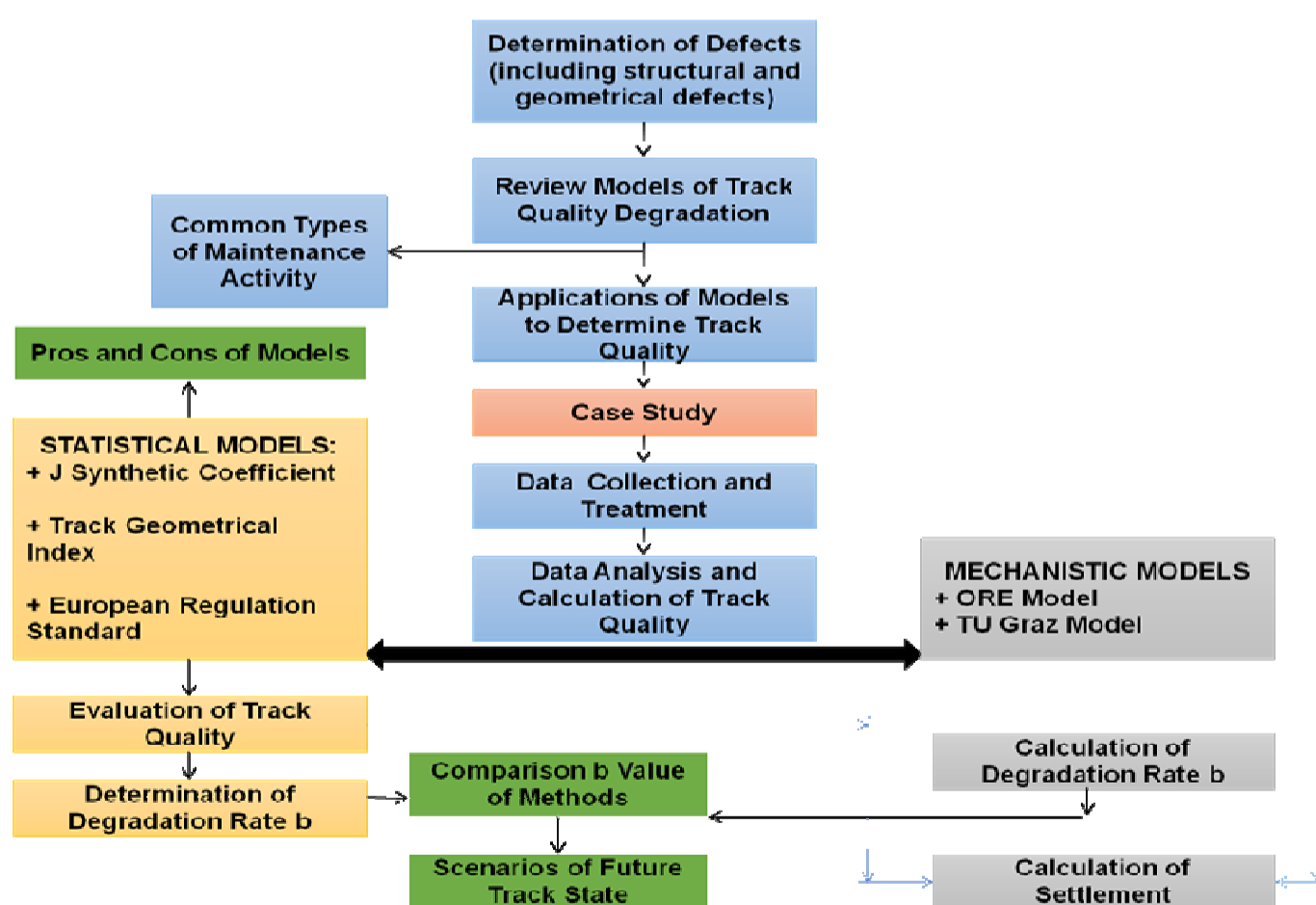
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