# Innovation in **Rail Engineering**, the intelligent railway

**Dr Christopher Johnson** discusses the future of rail research at Manchester Metropolitan University

The Centre for Sensing and Imaging (CSI) at MMU have been focused on delivering innovative research applications for the rail industry.

The initial research developed solutions for innovative track inspection technologies for light rail urban transport. A desire to increase the operational time window and the frequency of service continues to erode the time available for manual track inspection and maintenance.

A cost effective system of track inspection for rail and metro system networks has been developed. A novel application of several technologies, when combined together, provide an objective measure of the continued integrity of the track.

The inspection technologies are capable of monitoring the rate of degradation of the track asset and thereby provide guidance on predictive maintenance and future renewal requirements.

Developments by CSI integrate high speed automated vision systems with 3D profiling technology to provide a clear overview of the state of the key rail asset. In addition the application of MEMs sensors and novel algorithms considerably improve the accuracy of vehicle dynamic response measurements allowing a further characterisation of the rail asset.

**Research Growth**

The increased demand on railways by passenger and freight services has resulted in many train operating companies and routes running at full capacity. With the lessons learned from automated inspection the concept of an automated self-diagnostic and prognostic bogie has been proposed, allowing for the implementation of a predictive maintenance plan and improved life-cycle management of key components.

The focus of CSIs future research looks into applying innovative sensing technologies with a scalable, modular monitoring infrastructure to the bogie. With the prospect of automating the vehicle and integrating intelligence into the fabric of the vehicle assets, this modular approach will set the foundations for novel data analysis and machine learning for the rail industry.