



Beyond Trams - Very Light Rail

WMG's expertise

- Established in 1980 to help strengthen UK manufacturing through collaborative applied research with industry
- Academic Department of the University of Warwick, a top 6 UK university
- Focused on applied research
- 500 staff working in 6 buildings
- 400+ technical staff from Tata Steel Automotive, Jaguar Land Rover and Tata Motors are accommodated within our facilities



Professor Lord Bhattacharyya
Founder and
Chairman of WMG

Part of the High Value Manufacturing Catapult Focused on Low Carbon Mobility:

Our research covers four key technologies:

- **Energy Storage and Propulsion**
- **Lightweight Vehicle and Powertrain Structures**
- **Electric Machines and Power Electronics**
- **Intelligent Vehicles**

These were all identified by the Automotive Council as key technologies for the UK based automotive industry to be globally competitive

We are transferring knowledge and technology from automotive to other sectors



Why Very Light Rail?

Our vision is to establish rail services that are focused on community needs and will provide low-cost frequent interconnections in urban/suburban and rural environments

Very Light Rail will have applications on existing lines and newly built segregated lines

- Less than half the weight of a tram or similar light rail vehicle
- Reduced infrastructure and maintenance costs
- Self propelled – no need for expensive overhead electric supplies
- Target selling price of less than half that of a conventional light rail vehicle

This is not 'Rocket Science' - the technologies already exist and can be transferred from the road transport sector

Very Light Rail Vehicles will be available to purchase within the next 2 years



£350k



£1m+



£500k

Turkish Railcar

From customer requirement to concept through detailed design and manufacture in 12 months



The concept of Very Light/Ultra Light Rail has been around a long time and has negative connotations for many people

- There have been a lot of proposed schemes which have not come to fruition
- Lack of supply chain to support the initiatives
- Impression that such technology is unproven and risky

Notable successes are few but include the Stourbridge Shuttle



Photograph courtesy of Parry People Movers

WMG centre HVM Catapult is seeking to use its reputation, expertise and resources to bring critical mass to this area of opportunity

Very Light Rail is:

Affordable

- Pricing similar to that of a 60 seat bus (*around £500k compared to a £1-1.5m for an imported tram*)
- Reduced infrastructure and maintenance costs
- Operating costs lower due to reduced fuel consumption
- Capable of running without the use of overhead electric cables (costing around £600k per route km to electrify a double track route with tram-style electrification)
- Appropriate use of modern materials will benefit track systems and station facilities

Go-Anywhere

- With just 40% of Britain's rail network being electrified, Community Rail will not be restricted to where it can run

Designed for Communities

- The vehicles will be modular in design and therefore constructed to suit local need
- Pollution free stations

Have Happy Passengers in Mind

- Comfortable seating with adequate leg room
- Power to charge phones/laptops
- Low noise/vibration levels
- Climate control
- Solar reflective glazing
- Customisable compartments for luggage and cycles (where there is heavy usage)

Current WMG Research in Rail - The Radical Train

Network Rail and RSSB are encouraging new thinking in very lightweight rail vehicles including future interoperability with “mainline traffic”

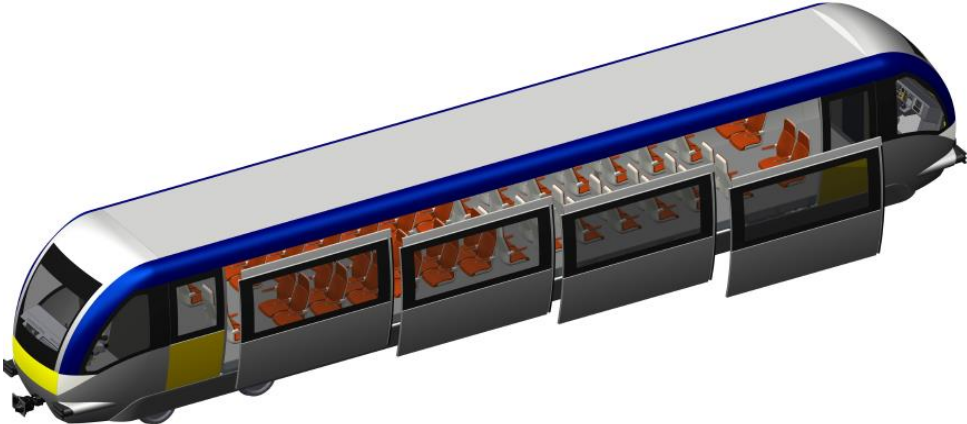
In 2014 the Revolution VLR Consortium won £1.6m from Future Railway towards a £4.2m project to develop a **radical train demonstrator**



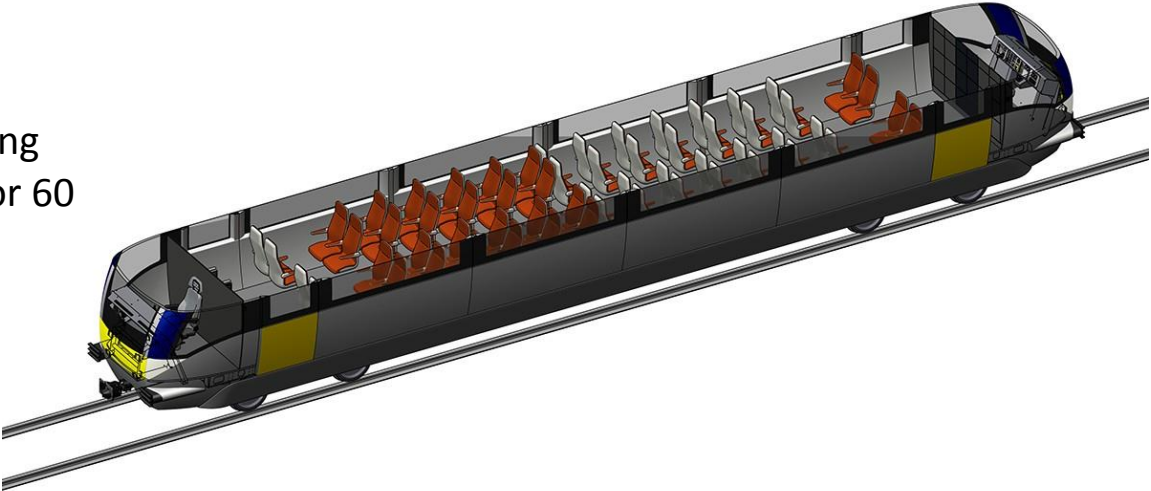
- Overall objectives: un-laden vehicle weight less than 18 tonnes for a 18m car and a £500k target price
- a modular lightweight segmented body structure to minimise manufacturing costs
- lightweight self-propelled bogies, incorporating diesel-electric hybrid propulsion plus battery energy storage for regenerative braking and zero-emission launches from stations

Revolution VLR

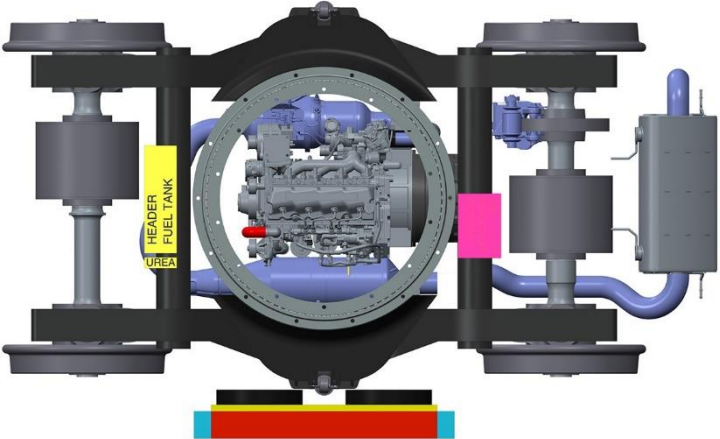
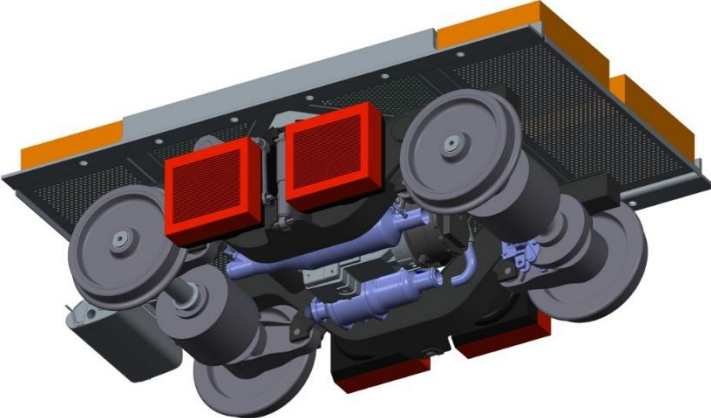
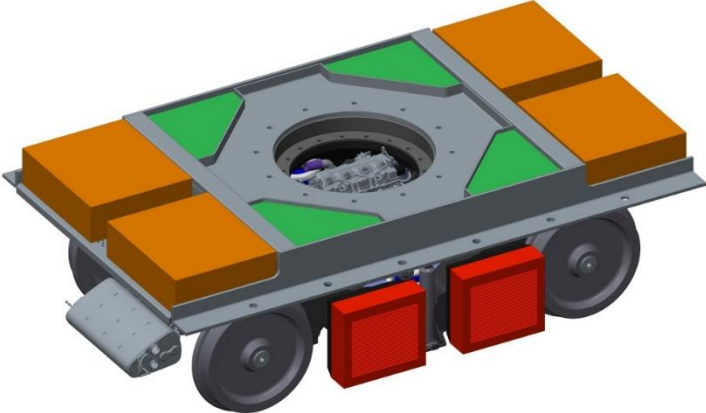
Modular assembly to reduce manufacturing costs



Vehicle provides seating for 60 plus standing for 60



Self-Powered Bogie Concept – Incorporating Full Powertrain



Very Light Rail Innovation Centre



The UK has the necessary design talent and manufacturing capacity to create next generation very light weight rail vehicles for domestic and export markets. WMG centre HVM Catapult is interested in nurturing this new transport manufacturing sector

An innovation hub is needed to support the fledgling industry

- providing a neutral space for pre-competitive research
- lobbying regulatory bodies, funding sources, national and local Government
- coordinating strategic initiatives & managing collaborative projects
- facilities for the building of demonstrators and prototypes
- **open access test facilities including a test track for vehicle, systems and infrastructure trials**
- supporting the education of the next generation of very light rail engineers, apprentices, etc.
- SME incubator units
- hosting conferences and exhibitions

Current Status

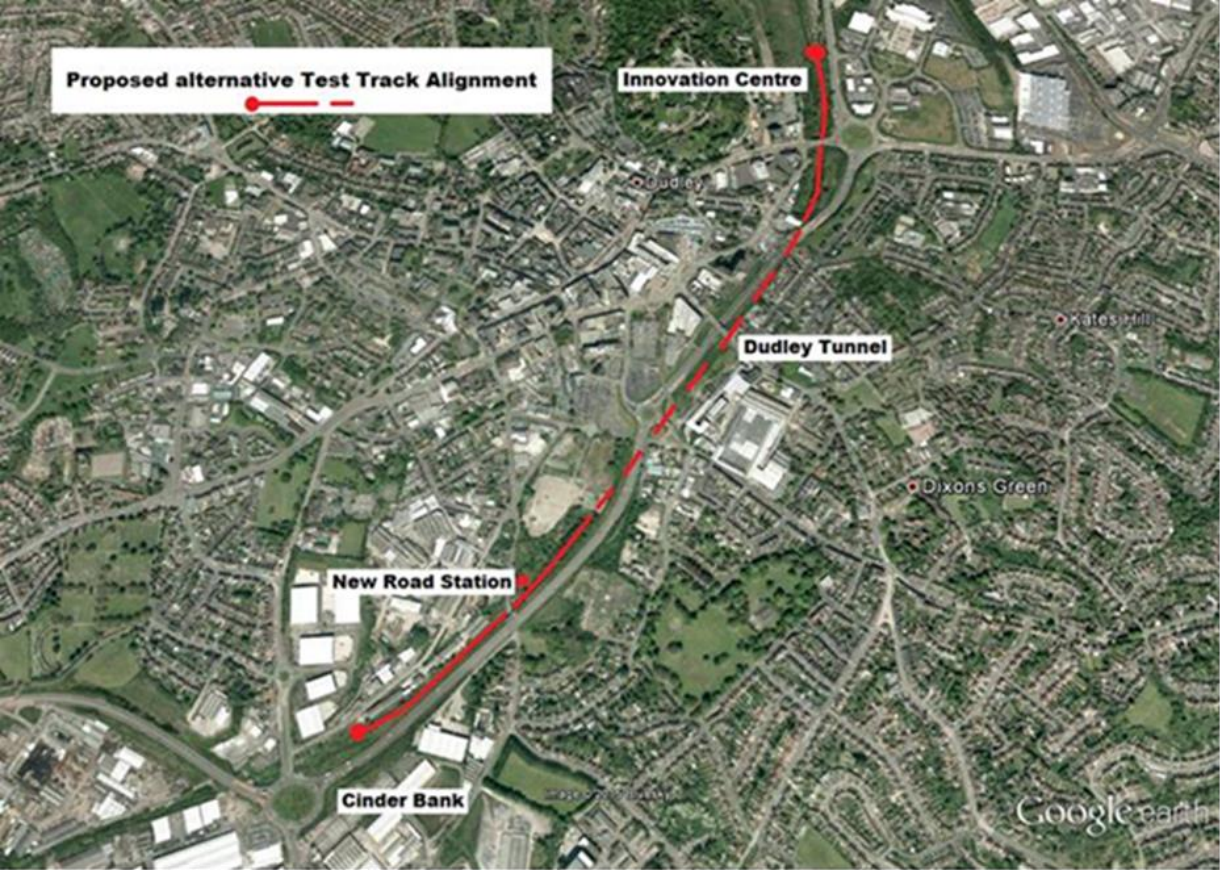
- The initiative is a joint venture between University of Warwick and Dudley Metropolitan Borough Council
- Centre to be owned and managed by a Community Investment Company
- Dudley College (apprentice training) and the University of Southampton (civil engineering) have joined the consortium
- Universities of Huddersfield (dynamics) and Birmingham (command and control) have expressed an interest – further meetings have been arranged
- Work over the past 2 years has identified a site, created architects concepts, produced cost estimates for the centre (£20m) and test track (£8m) and economic impact statements, generated a detailed project plan and appointed project consultants
- £9.5m of Black Country LEP funding has been applied for (£4.5m already allocated)
- ESIF bid for £13.5m submitted in May 2015 – *the application was positively rated by ESIF but blocked by the local ESIF committee who are based on LEP geography and review the application. DMBC are in talks with members of the committee to resolve issues – we would like help from APPLRG and MPs to help unblock this funding*
- Balance of funding to come from industrial contributions and possibly crowd funding. *Could the APPLRG help us to lobby for these additional funds?*
- Innovation Centre to open in April 2018

The Proposed Site (Previously Occupied by Dudley Station)



Situated on the mothballed South Staffordshire line running from Stourbridge to Walsall

Proposed Test Track Route



National Innovation Centre for Very Light Rail



Future Challenges

Lightweight Vehicles

- Achieving Tram-train crashworthiness with Very Light Rail Vehicles - allowing mixed traffic operation

Self Propelled Vehicles

- Replacing diesel engines with ultra-high capacity batteries and/or fuel cells



Any Questions?

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