

Technology Development in Rail Industry – COVID-19 Mitigation

1. Introduction to the Rail Cluster Builder

The Rail Cluster Builder project awarded to Scottish Engineering in August of this year is an 18-month programme funded by Scottish Enterprise and supported by Transport Scotland. The purpose of the project is to facilitate connections for SMEs in the engineering and manufacturing sectors in Scotland seeking to diversify into the rail market. The project is jointly funded by Scottish Enterprise and the 2014–2020 European Structural and Investment Fund through SPRITE (Scottish Programme for Research, Innovation and Technology Ecosystem). This is a programme which aims to improve the innovation performance of Scotland’s Small and Medium-sized Enterprises (SMEs) and stimulate greater coordination between stakeholders and partner organisations to help businesses capitalise on new economic and public-sector innovation opportunities.

The roots of the project lie in the recently issued Rail Services Decarbonisation Plan in which the Scottish Government aims to decarbonise passenger rail services in Scotland by 2035, ahead of the UK’s target of 2040. By moving away from diesel and using green sources such as electricity, battery or hydrogen, opportunities will arise for innovation in train manufacturing as well as wider supply chains, supporting the creation of skilled, sustainable employment in Scotland.

The Rail Cluster Builder will be key in helping to develop Scotland as a leader in the innovation and manufacture of net zero rail products and services.

76% of all Scottish rail passenger and 45% of freight journeys are currently undertaken on electric services and there are plans to electrify more of the network. Almost 295k passengers travel on



Scotland's railway every weekday with some 107m annual passenger journeys each year. 13,000 people work on Scotland's railway contributing £1.3bn to the Scottish economy. These figures have been significantly impacted by the recent Coronavirus pandemic which is the rationale behind this report - recent figures at the end of August 2020 show a 65% drop in the use in passenger services across the country which has a far reaching impact on a key sector of the economy that connects people, places, communities and businesses.



Following the outbreak of the COVID-19 Pandemic and national lockdown, utilisation of public transport networks has decreased dramatically. Even with face coverings becoming mandatory on trains from 22nd July, social distancing on trains dropping from 2m to 1m as of 27th July, a public awareness campaign around ScotRail's five rules for safer travel and train operators running 90% of services since 3rd August, rail journeys have dropped by 75% compared with this time in 2019 [1].



2. Technology

The National Manufacturing Institute Scotland (NMIS) have been conducting analysis into solutions being deployed in other countries, specifically throughout Europe and Asia, to develop an understanding of potential opportunities for deployment into the Scottish public transport sector. Countries include China, South Korea, Austria, France, Germany, Italy, Spain and Sweden.

As expected, most countries are augmenting their digital offering to incorporate data that can facilitate safer travel on trains. These include;

- Vision systems and AI to monitor people flow through termini, crowding and mask wearing in carriages.
- Fully contactless travel options.
- Congestion notifications to passengers to alert busy routes.
- View occupancy levels on trains.
- Use of Bluetooth to interface consumer rail apps with on-board data gathering systems to enable conductors to quickly and easily check tickets without the requirement of face-to-face contact and eliminate bottlenecks and queues.
- Monitor passenger behaviour on platforms for social distancing and health monitoring whereby passengers need to prove they are fit to travel in collaboration with health tracking applications.

Capita recently published an article outlining COVID-19 as a means to accelerate the digital transformation across the sector to support the safe return of passengers to the rail network [2].

Continuing from the digital offering, companies are engaging in cleaning strategies that involve;

- Autonomous systems incorporating UV cleaning strategies which enables the breakdown of the cellular walls of the Virus.



- Electrolysed water.
- Self-cleaning ticket machines,
- Retrofitting of advanced air conditioning systems into legacy carriages.
- Research into in-built self-cleaning handrails and barriers using UV light is also being explored to reduce transmission in high contact areas.

Other opportunities that are being explored are the redesign of seating arrangements to provide safer separation of passengers and widespread availability of PPE at train stations.

In the UK, First Rail and Siemens are investigating advanced filtration and air conditioning systems such as HEPA (High Efficiency Particulate Air) to clean aerosol spread of COVID-19.

3 - Opportunities

These serious challenges have created real opportunities for innovation from the SME sector in Scotland, for example:

- Development of integrated digital platforms and passenger management solutions for the rail sector and other modes of public transport. (See Note A below for a case study in the application of digital technology).
- The deployment of safe cleaning practices with methods such as; automated self-cleaning, UV cleaning applications, self-cleaning surfaces.

The Rail Cluster project team would be delighted to hear from SME business with ideas that can help make for safer and more convenient rail transport. Please contact Project Leader, Shona Clive, at shonaclive@scottishengineering.org.uk



NOTES

A - Case Study (Zipabout – Digital Technology)

Through data innovation, British technology start-up Zipabout, provides governments, local authorities and transport providers with practical answers to the world's most pressing transport issues: safety, accessibility, sustainability and demand.

During the height of the COVID-19 outbreak, Zipabout's technology platform indicated an average 25% increase in the number of rail passengers, including key workers, unable to find services to match their travel needs. This increase was due to the introduction of reduced timetables (largely based on Saturday services), as well as delayed/cancelled services brought on by staff shortages.

With the power to forecast demand for each route, service and station, Zipabout released a free dashboard to all train operators (running reduced timetables) so they could see which services were in demand. In May, Zipabout was appointed by the Department for Transport to provide its plug-in personalised information service to all users of National Rail Enquiries to help rail passengers avoid busier times, maintain social distancing and make informed decisions about their journey.

To find out more - <https://www.zipabout.com/>



B - About the National Manufacturing Institute Scotland (NMIS)

The National Manufacturing Institute Scotland (NMIS) is the future of manufacturing.

It is a group of industry-led manufacturing research and development facilities where industry, academia and the public sector work together on ground-breaking manufacturing research to transform productivity levels, make companies more competitive and boost the skills of our current and future workforce.

It is operated by the University of Strathclyde and supported by Scottish Government, Scottish Enterprise, Highlands and Islands Enterprise, High Value Manufacturing Catapult, Skills Development Scotland, Scottish Funding Council and Renfrewshire Council.

The new NMIS facility, along with the NMIS specialist technology centres: Lightweight Manufacturing Centre and Strathclyde's Advanced Forming Research Centre; the only High Value Manufacturing Catapult centre in Scotland, are key facilities in the development of the Advanced Manufacturing Innovation District Scotland being developed by Renfrewshire Council in partnership with Scottish Government and Scottish Enterprise. The district is also home to the Medicines Manufacturing Innovation Centre.

NMIS will -

- Increase productivity by reducing barriers to innovation
- Stimulate investment and increase manufacturing competitiveness
- Catalyse job creation and strengthen supply chain links
- Inspire and attract talent and equip current and future workforces with the skills they and businesses need
- Work with manufacturing businesses of all sizes and multiple sectors, providing benefits across the whole of Scotland.



C - About Scottish Engineering

Scottish Engineering is the industry membership association for engineering and manufacturing in Scotland with a heritage dating back to 1865. It connects and supports over 350 member organisations across a diverse, modern and forward-looking sector. Membership accounts for around one third of all employment in engineering and manufacturing in Scotland, includes some of the largest international names in engineering through to medium sized and small businesses, and covers every region of Scotland.

For more information - scottishengineering.org.uk



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REFERENCES

[1] <https://www.transport.gov.scot/publication/covid-19-transport-trend-data-10-16-august-2020/> - COVID Transport trend data.

[2] <https://www.capita.com/our-thinking/all-change-rail-digital-and-covid-19> - Using COVID19 as an opportunity to modernise the Rail Sector.

