

The Lean Engineering Research Group

Providing operational effectiveness and resilience to industrial and service organisations.

The **Lean Engineering Research Group (LERG)** continues to develop long-term commercial partnerships with manufacturing and service enterprises that apply lean design and operations practices for improving cost, quality, environmental, delivery and lead time competitive advantage.

Mission

We aim to supply high quality R&D deliverables, educational programmes and commercial services that provide our partners with strategic impact through design and operations performance improvement. In achieving this mission the group has, since 2008, leveraged over £4 million in government R&D and knowledge transfer funding to develop innovative technology solutions for its partners.

Background

The LERG have been providing lean operations management services since its formation in 2000. It was established by David Stockton, Professor of Manufacturing Systems Engineering with the aim of developing innovative approaches for introducing lean operations to the high product variety, low production volume manufacturing sector. With the increasing use of lean practices by a wider range of organisations it has expanded its activities to address the operations-based improvement needs of the service sector. In response to the increasing levels of global competition we continue to develop novel operations management approaches. These include using biological gene regulatory control principles to develop autonomous and intelligent operations planning processes that provide self-optimising, adaptive, flexible and resilient responses within complex supply chains.

Expertise

The Lean Engineering Research Group can offer practical expertise, knowledge and skills in the areas of:

- Designing, planning and controlling high product variety, low demand volume manufacturing and service work environments
- Application of lean and 6-sigma process and operations improvement practices within batch and flow-based manufacturing and service environments
- Bespoke work-based training in lean operations management, discrete event simulation modelling and improving process capability development
- Modelling and improving cost, resource efficiency and delivery performance at both process and operations levels using discrete event simulation and advanced modelling techniques
- Quality improvement using a range of techniques that include undertaking process capability studies



Leyland Trucks' production line was enhanced by workcell optimisation and operator training (courtesy Virtalis Ltd)



Facilities

LERG offer access to a range of decision-support tools that include (i) discrete event simulation modelling for improving facilities layout, scheduling rules, resource utilisations, buffer sizes and locations and inventory levels within both industrial and service organisations, (ii) creative problem solving for developing, implementing and sustaining lean interventions, (ii) artificial intelligence modelling and optimisation for schedule optimisation and enabling drum-buffer-rope control, and (iii) cost modelling and carbon emissions estimating for enabling improved energy management. Also available are virtual reality environments for training personnel in lean 5S, standard operations development and synchronous flow.

Key Collaborations

The LERG have and continue to successfully undertaken joint research, development, training and consultancy projects with:

- **Industrial and commercial organisations:** Rolls Royce PLC, Airbus (UK) Ltd, BAE Systems, Caterpillar PLC, Perkins Engines Ltd, LDV Ltd, The Unipart Group of Companies, Trelleborg Group and Magna Group. In addition we continue to provide our services to a large range of SMEs including Wrights Brothers Ltd, Canard Design, Big Stuff Ltd and Virtalis Ltd.

– Universities:

Loughborough, Hertfordshire, Cranfield, Coventry, Bath, Durham, Teeside and Warwick.

Research and Development Projects

Examples of the project areas include:

- Integrated discrete-event simulation and genetic algorithm optimisation tools for automatically maximising throughput levels whilst optimising inventory and schedules
- Improved model development processes for cost and process time estimating
- Improved inventory planning systems for increasing supply chain delivery reliability
- Methods and processes for implementing lean pull and flow systems within high variety, low volume manufacturing and service environments
- Reducing empty running of road freight vehicles
- Improving the ability of finite capacity resource planning to react to high levels of schedule disruptions using autonomous decision-making processes
- Reducing theatre production costs and lead times
- Providing adaptive project management tools for the creative product design sector

Contact details

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