The group’s expertise is diverse and spans various fields including the following research areas:

- Particulate solids handling and pneumatic conveying
- Industrial maintenance modelling and energy assets management
- Process efficiency and optimisation
- Design and manufacturing optimisation
- Advanced engineering structures

Projects have included working with businesses and research partners in energy generation (conventional and renewable), automotive, pharmaceuticals, construction, food, bulk materials handling and plastics manufacture sectors. The group oversees several PhD students and researchers.

The Design, Process and Manufacturing Research Group is led by Professor Don McGlinchey, who graduated from Strathclyde University with a BSc (Hons) Physics before working as a project engineer at Babcock Energy Ltd. He returned to academia and gained an MSc in Bulk Solids Handling Technology and his Doctorate on a study of the effect of vibration on powder beds.

At Glasgow Caledonian University (GCU), Professor McGlinchey is the academic leader in teaching, research and consultancy in the area of Bulk Solids Handling. His research interests span gas/solids multi-phase flow experimentation and modelling and particulate solids’ characterisation.

GCU’s Centre for Industrial Bulk Solids Handling is a specialist research centre and education provider in the area of Particulate Solids Handling, delivering Masters-level programmes, educational short courses and consultancy to resolve particulate solids handling problems within industry. Clients have included Scottish Power, Lafarge Plasterboard, Stable Micro Systems and Doosan Babcock. GCU houses one of the few independent research facilities for pneumatic conveying and solids handling worldwide. Industrial scale pneumatic conveying systems are used for a wide range of consultancy and contract research and development.

Pneumatic transportation of bulk solids continues to be important in many industrial processes. There is a need for accurate, reliable, on-line, continuous and non-invasive measurement of solids’ mass flow rate where mass and energy balances are required in industrial, pharmaceutical and commodity transfer processes in order to achieve efficient utilisation of energy and raw materials.

Professor McGlinchey’s work to develop an instrument which can accurately measure the mass flow rate of solid particles has been supported by Scottish Enterprise Proof of
Concept programme. The patented Thermal Solids Mass Flow-meter invented and being developed at GCU can in principle provide direct mass flow measurement of solids-gas two-phase flow irrespective of the flow regime and velocity distribution in the conveying pipeline. The robustness of the measurements to particle properties and flow regimes is still under investigation. Other non-invasive in-line techniques do exist but they rely on indirect measurement methods. Such methods are vulnerable to interfering factors such as moisture content and flow patterns.

The Design, Process and Manufacturing Research Group’s manufacturing expertise spans unconventional machining processes including electrochemical machining and laser machining. The group has previously received EU funding under the Co-operative Research Projects (CRAFT) programme for work with SMEs. Research has also included improvements to spring tine frames in scallop dredges. Current projects include a Knowledge Transfer Partnership (KTP) with MAHLE Engine Systems UK, a leading global development partner for the automotive and engine industry, working on applications of surface characterisation and metallurgy knowledge to identify factors influencing integrity of bimetallic strip bond delamination.

GCU’s Centre for Creative industries has established research and knowledge transfer links with the creative industries. The Centre focuses on creativity applied to business and economic development and supports companies, which realise their growth potential through the exploitation of new technology and the adoption of best practice in product and packaging design.

Research has included European FP7 funding for MAXIMUS, a project to improve the design review process within automotive and architectural design through dramatically improved rendering and interaction technologies. The MAXIMUS (Maximum fidelity interactive multi-user display systems) project brought together GCU, Fraunhofer IGD of Germany, Barco of Belgium, Inesc-Id from Portugal, UK architects firm Page & Park Architects, Spheron-Vr of Germany and Italdesign Giugiaro from Italy, to develop the first system to fully support high dynamic range information throughout this process.

Innovative KTPs within the group have included work with large format print company Novograf, to introduce digital design and technologies; a project with Curious Group analysing business systems; and work with Rawplugs, the manufacturer and supplier of construction anchors, in the areas of product development and product performance testing. GCU’s KTP with charity Street League to develop a cohesive communications and digital branding strategy was awarded a Grade A (outstanding) assessment.

At Glasgow Caledonian University, we work with industry and public sector partners to ensure our expertise responds to the need for real-world innovation. GCU’s strategic business development and knowledge transfer teams work with academic experts in our Schools and Research Institutes to support businesses with a problem-solving approach.

Contact us to find out more about building a brighter future with GCU at www.gcu.ac.uk/business.