RDCR

Recycling.
Disassembly.
Circular materials.
Reuse.

Recycling

GRP Recycling

Investigate glass fibre polymer composite recycling technologies able to reclaim greater value fibres from waste than is currently commercially available

Description

- This project will look to investigate fibre reclamation technologies that are applicable to glass
- This could also include reprocessing technologies such as alignment, weaving or resizing
- The primary focus will be recovering valuable fibres using an economically viable route

Background

- Currently only approximately 2% of GRP is recycled
- Commercial recycling routes are limited to grinding or co-processing in a cement kiln
- These routes significantly reduce the value of the reclaimed glass
- Other routes (e.g. pyrolysis) degrade glass fibres to the point that they are no longer of use

Objectives

- Identify the GRP recycling landscape
- Develop a proof of concept for a new technique
- Test and validate the recyclate produces, and assess the associated business case

Benefits

- Development of economically viable GRP recycling route reclaiming valuable recyclate
- Supply chain for end of life GRP
- Applications for end of life GRP
- Validated properties for the recyclate

Recycling of Consumables & Tooling

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Understand the needs and limitations associated with effective end of life solutions for composite manufacturing consumables and tooling

Description

- This project will look to identify the range of materials in need of processing, and the cost implications associated with sending them to landfill
- It will seek and assess a range of potential solutions for minimising or eliminating this
- This could include new, less impactful alternatives, or the development of methods for effective reuse/recycling

Background

- There are numerous well-established manufacturing processes for composites, each with consumables
- Selection of these is based on process parameters, volumes, costs etc.
- End of life is rarely taken into consideration
- These materials effect the overall impact of composite part production

Objectives

- Identify currently used materials and volumes
- Research and develop effective, lower impact alternatives to current strategies
- Realise the associated business cases

Benefits

- Development of low impact, low cost consumables and tooling
- End of life strategies – reduced landfill costs
- Lower impact composite production (both environmental and cost)

Matrix Reclamation

Develop cost effective recycling technologies that focus on reclaiming the matrix of a composite part, enabling recycling of the entire composite (fibres and resin)

Description

- This project will look to develop methods for effective reclamation/recycling of the polymeric matrix
- This could look into thermal, chemical, or biological recycling methods amongst others
- It will look to draw on the experience of other industries, such as waste processing, or commodity plastics

Background

- The global use of composites is expected to reach $95bn by 2020
- At current, the predominant focus of composites recycling is on the higher value fibres
- As a result, the value of the matrix is lost during recycling
- There is increasing dive (both from legislation & consumers) for a process capable of recovering value from both

Objectives

- Review current technologies for reclaiming polymeric material (composites and wider)
- Develop, optimise, and scale up a cost effective process
- Realise the associated business case

Benefits

- Develop UK supply chain
- Direct learning from and into commodity plastics recycling
- Gaining value from the matrix
- Help to meet future legislative targets

Applications for Recyclate

Investigate and identify future applications, end users, and potential supply chains for recycled composite materials

Description

- This project will look to identify valuable uses for composites recyclate
- It could look at parts or components that need recycling, and applications for the recyclate produced
- Alternatively it could to identify solutions needed in industry, and identify potential products that could be recycled into that solution

Background

- Current carbon composite recyclate is predominantly short and discontinuous
- Recycled glass is often grind and only usable as filler
- Regardless of material, applications are often limited due to format and/or reduced mechanical performance
- Limited applications result in limited demand, reducing value and cost

Objectives

- Identify applications for recyclate families or individual parts and determine feasibility
- Identify customer-supplier relationships to create a recyclate supply chain
- Identify the variance that occurs in recyclate

Benefits

- Monetisation of waste could result in less waste to landfill by giving it value
- Pairing waste companies with end users could result in a new circular supply chain
- Lower volumes of virgin materials required

Innovative Reclamation Technologies

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Develop, scale up, and commercialise new and innovative composite reclamation technologies with clear advantages versus current commercially available alternatives

Description

- This project will look to identify and develop innovative composite reclamation technologies
- This could include reclamation technologies for different fibres and/or resin systems
- It could also look into novel methods or technologies with a distinct unique selling point. E.g. lower energy, in a box, enzymatic etc.

Background

- Current commercial composite recycling methods are limited
- Carbon composites are usually recycled via pyrolysis
- Glass composites are largely recycled by grinding, or co-processing in a cement kiln
- The recyclate reclaimed in both instances in sub optimal, both in terms of mechanical performance, and in value
- New techniques are needed

Objectives

- Evaluate the current academic and commercial landscape
- Downselect a method against a relevant set of requirements
- Develop, scale up, and demonstrate method

Benefits

- Reclaim fibres with higher value than currently commercially possible
- Develop new recycling technologies that are lower impact
- Help stakeholders meet future legislation

Reprocessing of Reclaimed Fibres

Identify and develop possible and economically favourable reprocessing routes for composite recyclate

Description

- This project will look to develop reprocessing methods that give added value to reclaimed composite recyclate
- This could include alignment technologies, fabric making techniques, and methods for handling reinforcement, amongst others
- It could also look into resizing capability and how this can enhance recyclate usability

Background

- To recycle fibres into a usable format, two steps – reclamation and reprocessing – are required
- A good reprocessing phase can increase the performance of the recyclate produced
- Current existing reprocessing technologies for the creation of high value, high performance recyclate are primarily small scale/academic

Objectives

- Evaluate current reprocessing technologies
- Identify, scale up, and implement a fibre reprocessing technology
- Develop the associated business case
- Determine mechanical performance

Benefits

- Develop UK supply chain
- Direct learning from and into commodity plastics recycling
- Gaining value from the matrix
- Help to meet future legislative targets