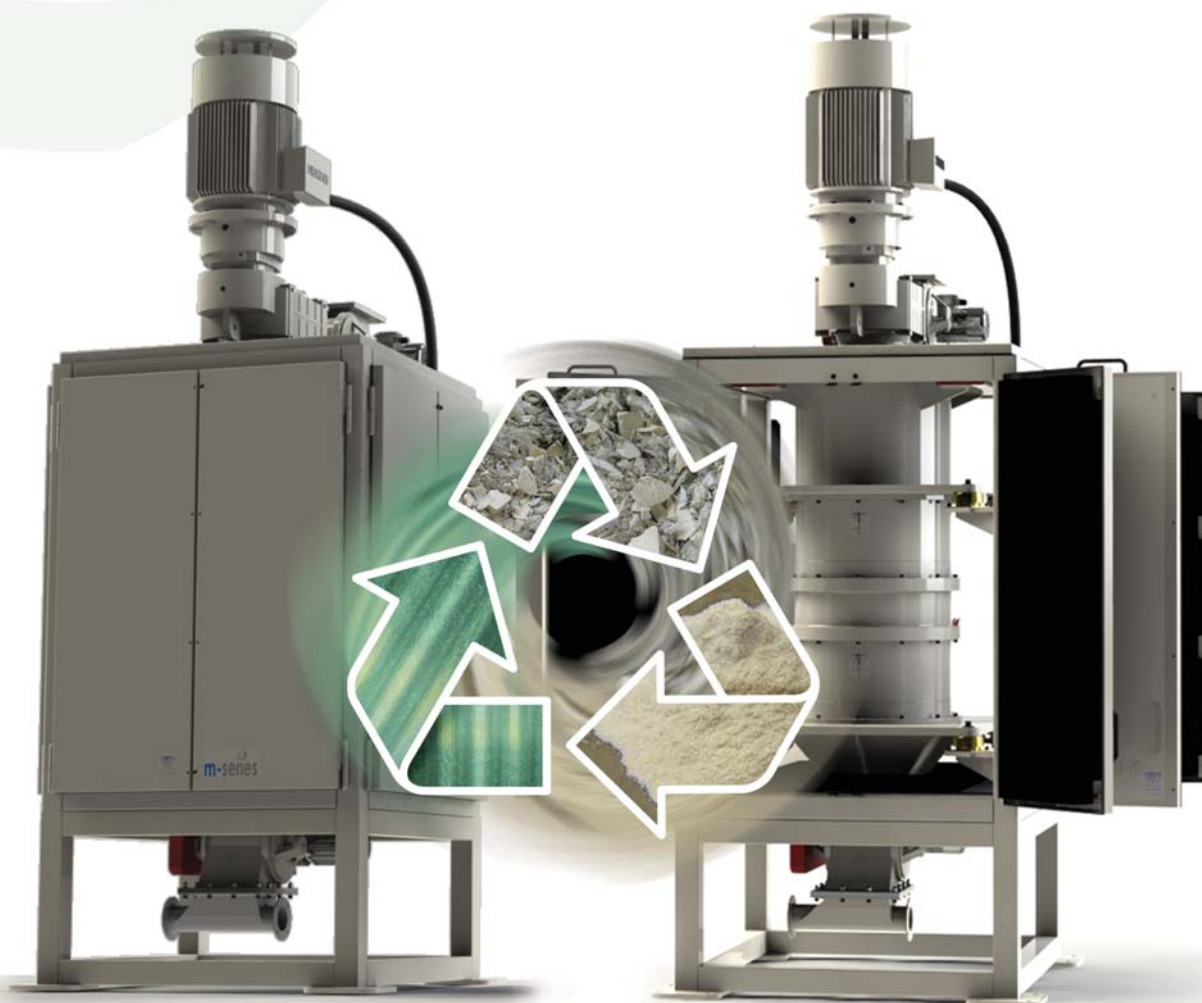


Easily convert GRP waste into re-usable  
powder products and batch feedstock



A new **force** in GRP recycling

Dynamic, low energy recycling with **m-series** milling technology



# Recycling GRP. Proven results for business and the environment

**Patented milling technology from International Innovative Technologies (IIT Ltd) meets the fine grinding requirements of waste glass reinforced plastic (GRP) and other minerals once regarded as too costly to recycle.**

The **m-series** milling system has outstanding recycling potential for converting a range of plastics, polymers, glass and GRP waste into re-usable powder products and batch feedstock.

Formerly, waste GRP went into landfill (150,000 tonnes p.a. in the UK alone). The **m-series** provides a cost effective GRP recycling solution that eliminates landfill and offers businesses genuine 'recyclable' credentials to enhance corporate reputation and product marketability.

Advantageous to the following manufacturing markets:

- Aircraft/Military
- Automotive/Transportation
- Marine
- Construction
- Consumer Products
- Corrosion Resistant Equipment
- Electrical Products

## How it's done

During production processes, waste GRP off-cuts are produced. These are first converted into flakes using shredding equipment before secondary reduction is carried out in an **m-series** mill which successfully converts the flakes into a fine powder of generally less than 100 microns.

Production runs have shown that the inclusion of a percentage of this powdered material back into the primary material for new GRP products has no detrimental effect on GRP in terms of strength, light transmission, light diffusion or durability.

## m-series benefits

- **Compact size** = small footprint, easily integrated into previously inaccessible processing locations
- **Low energy**, efficient grinding = volume powder milling economies
- **Low maintenance** modular design with heavy duty, hard-wearing components
- **ATEX compliant**
- **Impressive range:** Multi machine configuration for flexible output requirements



**ATEX compliant:** GRP milling falls within the scope of the ATEX Directive and should only be carried out using ATEX compliant equipment like the IIT **m-series** mills. Independently assessed and validated to be CE marked and categorised as ATEX compliant for materials up to ST2.

## Independent analysis proves m-series mills recycle GRP without degrading structure or performance.

### Strand integrity maintained - outstanding results

Specialist materials scientists have undertaken rigorous analysis of the particle characteristics of milled GRP powder and have confirmed that the particle size reduction process has no impact on material properties or performance.

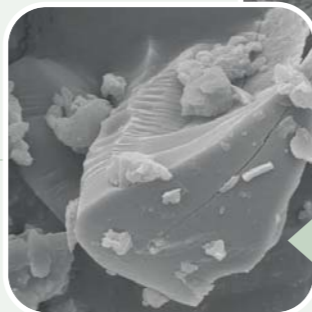
In addition, the process temperatures generated during the milling of GRP have no adverse implications for the material and there is no contamination from the grinding media used.

### Achieves desired 'fracturing' in grinding zone

Image to right shows the result of solid polymer fracturing caused by the impact between particle and mill and between particles in the grinding zone. The glass fibres also contribute to the fracturing process due to their hard, crystalline structure.



**Milled GRP:** 100 x magnification. Image shows strand integrity of GRP is retained after milling process



**Milled GRP:** 5000 x magnification. Hairline fracturing of GRP particle.

- 1 Waste GRP is recycled in two stages:
- 2 The GRP sheet is reduced to approx. 10mm<sup>2</sup> flakes.
- 3 The flaked GRP is milled to a fine powder which can be incorporated into new GRP products.



## Optimum results from maximum particle grinding power

*IIT Ltd's grinding technology combines low energy consumption with a compact size and powerful grinding force.*

**m-series mills utilise natural centrifugal and gravity to feed materials through the mill, into contact with the grinding media.**

All material contacts with the grinding module as it descends, being forced between the rollers and the outer grinding ring on the internal mill barrel, reducing it to a powdered form.

Grinding efficiency is maximised using very low electrical energy input relative to the fineness and volume of powder produced.

**The energy consumption associated with the m-series mill is typically between 3 and 10 times less than traditional milling processes.**

The rotational speed of the rollers controls the crushing force applied and the diameter of the mill housing determines the throughput volume. Typically, a standard 600mm mill barrel operating at 300 rpm produces a very fine powder output at up to 5 tonnes per hour and multi-mill configurations provide flexible output requirements.

Multi stage grinding is achieved through the incorporation of a number of grinding modules in series with particle size controlled both by the number of modules and rotational roller speed applied.

The mill is capable of grinding soft, medium and hard materials to 9.5 on the Mohs scale and with 90% passing 45 microns and below.



### Outstanding flexibility

The use of different materials for the grinding rollers – from tool steel through to tungsten carbide – can also be varied to meet the needs of different feedstocks.

**m-series** energy efficiency brings new opportunities for the fine grinding of materials once headed for landfill – and grades of materials previously uneconomic to recycle.

*IIT's low energy milling technology has a significant role to play in economically converting GRP that is currently regarded as waste into useable raw material. The technology has been used successfully for recycling GRP for over 2½ years by a major GRP producer. The GRP production waste is shredded and then milled ready for re-use in the original products.*



# A new force in GRP recycling

Global concerns over climate change and the crucial importance of energy efficient industrial processes means the **m-series** mill is attracting considerable worldwide attention.

## FAQs

### Q. Will investment in composite recycling pay for itself?

A. Investment in IIT Ltd's **m-series** technology will immediately begin saving you money by dramatically reducing waste management costs and landfill, while at the same time giving you valuable recycled product back into your manufacturing process ensuring a competitive edge. The more waste you produce, the faster your business will feel the benefit.

### Q. Is it easy to integrate and operate?

A. Very. The **m-series** compact size means you can integrate our system even if space is restricted. IIT boasts full Project Engineering capability so we can devise a bespoke solution that can be easily built into existing manufacturing.

### Q. What about recycling FRP and fibreglass?

A. There are substantial opportunities for the mill in recycling FRP and fibreglass waste depending on quantity produced. Manufacturers are also installing **m-series** mills as an efficient means of milling glass cullet for the manufacture of FRP.

## Versatile milling solutions

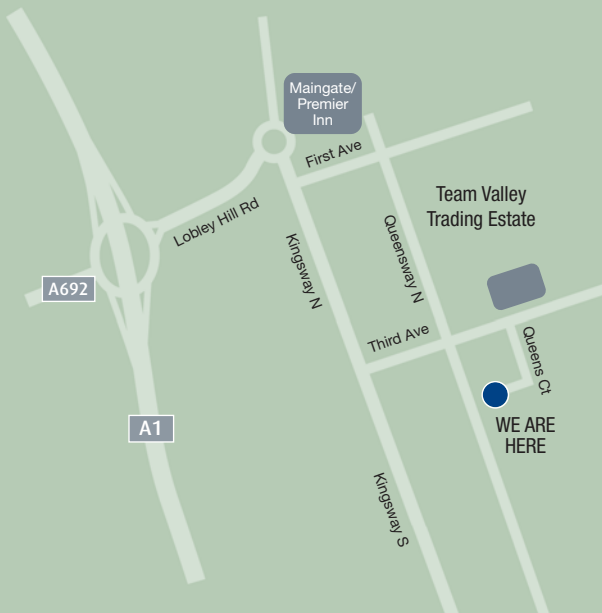
In traditional minerals processing and materials handling applications, the **m-series** mill is a highly economic solution for the fine grinding of a wide range of natural raw materials and other industrial products including:

- metal oxides
- bauxite
- calcium carbonate and limestone products
- silicon carbide
- coal
- fly ash
- blast furnace slag
- nickel slag
- steel slag

Product brochures for IIT Ltd's range of products are available by telephoning our sales team on + 44 (0)191 491 3136, via email: [enquiries@iituk.com](mailto:enquiries@iituk.com), or may be downloaded in pdf format from [www.IITUK.com](http://www.IITUK.com)



Classification systems brochure also available.



international  
**INNOVATIVE**  
technologies

Unit 5, Queens Court, Third Avenue,  
Team Valley Trading Estate,  
Gateshead, NE11 0BU UK  
T +44 (0)191 491 3136  
F +44 (0)191 487 4409  
E [enquiries@iituk.com](mailto:enquiries@iituk.com)  
[www.IITUK.com](http://www.IITUK.com)

