

Contact point for this idea: Alessandro Morri – University of Bologna – [alessandro.morri4@unibo.it](mailto:alessandro.morri4@unibo.it)

Task partner: Emanuela Cerri – University of Parma – [emanuela.cerri@unipr.it](mailto:emanuela.cerri@unipr.it)

## Energy-saving innovative technologies for metals processing and recycling

- **Metal scraps and chip recycling and processing:**  
Intrinsic frictional heating and intensive plastic deformation introduced by FSE (friction stir extrusion) are able to convert aluminium and magnesium scraps to high quality, defect free wires. To obtain high quality products, process parameters should be carefully set.
- **Expected synergies and complementarities:**  
Synergies between the research unit of University of Bologna, with expertise in data analysis and interpretation of mechanical properties, the task partner unit of University of Parma with expertise in process parameters simulation and microstructure analysis, software companies providing services for design of tools and manufacturing companies providing metal scraps and chips.
- **Outcomes:**  
The new approach provides an opportunity to efficiently produce highly engineered structural and functional materials. Friction extrusion can be developed into metal recycling process of steels, aluminium alloys, magnesium alloys and other recyclable metals.
- **Market & Business opportunities:**  
Many different stakeholders (industries and customers) are operative in Europe in Al and Mg and can have significant interests in the economic gains of FSE (30-40% of estimated cost savings when compared to conventional re-melting and extrusion). FSE is a near-zero CO<sub>2</sub> emission process, which does not require fumes or metal oxide particulates to be dispersed in atmosphere, because melting is eliminated.
- **Partners already identified:**  
task partner: University of Parma, [emanuela.cerri@unipr.it](mailto:emanuela.cerri@unipr.it)
- **Wanted additional partners:**  
Industrial partners involved in metal scraps and chips recycling in Europe and research/academic.  
Partner able to scale up the process into industrial environment.

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