Thinking Scrap from Scratch

When people talk of scrap metal, they are usually referring to old scrap from vehicles, construction material, electronics, electrical equipment and large machinery.

However, scrap can be divided into three types;

- new scrap (rejects generated in production),
- old scrap (products at end of useful life) and
- prompt scrap (leftovers from the production of final goods).

The scrap metal industry is a multi-billion-dollar industry globally and was birthed by the emergence of technological possibilities. An overview of the scrap metal industry provides an excellent vantage point from which to observe various aspects of a circular economy, particularly at the feedstock (entry) and end of life (exit) stage, encapsulating a necessary paradigm shift in how product design is viewed and implemented.

As part of the broader Recycling Industry, the Scrap Metal Industry is driven by the value of the recovered metals and materials. Recycling industry activities involve; the collection, separation, sorting, shredding/sizing, final melting and processing of materials for manufacture into raw materials or new product. The presence of scrap essentially represents marginal inefficiencies and the recycling process represents the winnowing down of these inefficiencies to the point of zero margin.

The modern feedstock for scrap metal production has become highly complex consisting of multiple metals, plastics, fillers and paints assembled in such a way as to make modern recycling a challenging activity. One can compare the technological and economic challenge of recycling modern products to attempting to reproduce pure water, sugar, milk and coffee beans from a ready-made cup of coffee.

Improved scrap metal production efficiency would require a product-centric approach to manufacturing where products are designed with recycling in mind and made more amenable to the recycling process.

A product-centric approach requires a good knowledge of separation physics, thermodynamics and metallurgy. The industry has started to leverage off of technological developments with the introduction of modelling software that defines design parameters for products from the onset in such a way as to optimize resource and recycling efficiency. In addition, a product-centric approach should also be integrated with concepts of eco-design to further optimize resource efficiency and incorporate a sustainability approach throughout.

From a sustainability perspective, scrapping as an activity generates less mining waste, uses 40% less water and substantially less energy, not to mention the mitigation of metals in landfills which reduces the amounts of toxic chemicals leached into the soil and water. From a Macro-economic perspective, it is estimated that a 10% increase in the recycling activity of a nation can decrease the import dependence on raw materials by 2%, considering the relative size of imports in comparison to recycling, this is a significant effect that could aid in reducing import dependency – which itself comes with a lot of socio-economic and socio-political benefits.

A product-centric approach re-enforces the inescapable link between classical minerals processing, the urban mine, recycling and landfills, underpinning how integrated and multidisciplinary approaches are the best way to find solutions for modern challenges. Recycling has always been an activity driven by technology and will continue to be so as techniques and tools evolve to enable improved efficiencies. However, urban mining and recycling can still learn a lot from the wealth of knowledge and insight that can be gleaned from traditional minerals processing.

The answer, to the pursuit of higher resource efficiency and resource security, may well lie in the adoption of an eco-designed, product-centric approach where stakeholders adopt a more integrated view and **re-thinking scrap from scratch.**

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