



Car shredding in Australia doesn't yet require the prior removal of plastics and other non-metals as it does in the UK and other parts of Europe. istockphoto

A rescue mission for a metal recycler

CSIRO Minerals Project Leader Warren Bruckard has been investigating simple and cheap new ways to reduce problematic sludge waste volumes from metal shredding processes and to increase the recovery of metals and other recyclable materials – something in which steel producer Smorgon Steel Recycling is interested.

In the age of environmental responsibility, old cars no longer rust away disgracefully, overgrown by weeds in remote country paddocks.

Today they disappear into the jaws of huge shredding machines in metal recycling plants in Australia's capital cities, along with expired washing machines, refrigerators and light metal wastes.

Powerful electromagnets draw out the larger steel fragments for re-melting in electric arc furnaces, while further separation steps remove larger fragments of non-ferromagnetic metals like brass and aluminium.

The separation processes result in large volumes of intractable sludge containing about 25 per cent water, as well as small particles of steel, copper wire, brass, solder (a lead-tin alloy) and aluminium, mixed with vinyl and other plastics, synthetic fibres, fabric, rubber, glass, quartz and wood.

Smorgon Steel Recycling Victorian General Manager, Mr Peter Morrison, says his company is committed to reducing waste volumes sent to landfill and is considering processes developed by CSIRO Minerals.

Typically, metal recyclers disposed of shredder sludge in landfill or toxic waste dumps. But rising disposal costs, tightening government regulations and social concerns are forcing the industry to address disposal options and consider methods to get more from their waste. As recent experience in Victoria attests, local communities strongly oppose any attempt to locate

new toxic waste dumps in their urban or rural municipalities.

Current techniques used by metal recyclers are not efficient in disaggregating the complex mix of materials in shredder sludge to recover recyclable materials, so Mr Bruckard turned to separation methods used in the minerals industry for potential solutions.

His research team initially applied sophisticated physical and chemical analysis techniques to characterise in detail the sludge from Smorgon Steel Recycling's plant. The preliminary characterisation step is critical not only for process development but also for the recyclers themselves – they need a clear understanding of the chemical and physical nature of the wastes they are producing and treating, if they are to comply with disposal regulations and reporting requirements.

The analysis showed the sludge contained about 3.1 kg of recoverable copper per tonne

of dry feed and about 33 kg per tonne of clean steel.

As these materials are of value, some metal-recycling plants could recover the cost of installing and operating an additional plant required to process shredder sludge.

However, comparatively speaking the recovered materials are relatively low in value. Therefore Mr Bruckard believes the most basic requirement is that any recovery process must not only be relatively simple, but also cheap to run.

The CSIRO team has proposed a process that would combine hydraulic classification to remove plastic, foam, rubber and other low-density, non-metallic materials, magnetic separation to concentrate clean steel, and gravity concentration in a jig to separate low-density materials like calcite and glass from the high-density metals like copper, lead and brass.

The process would be refined to optimise the grade and recovery of the valuable materials while making the residual waste stream more benign for disposal.

Mr Bruckard says further development work is now needed on a larger scale, and with a wider range of samples, to prove the economic benefits of the proposed treatment processes.

Mr Morrison says Smorgon is considering options, such as the CSIRO process, to treat shredder sludge and recover its valuable materials.

He welcomed CSIRO's initiatives in the general waste treatment area and says he looks forward to working further with CSIRO on Smorgon Steel's waste streams.

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