Closing the Loop “The circular economy” Recycling and Re-Use of Valve and Hydrant Access Covers back into new products

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ABSTRACT

Daemco Australia manufactures and supplies a range of non-trafficable Valve and Hydrant Covers & Lids to the Water Infrastructure Network for new sub-divisions and renewal programs across Australia. These products are manufactured from Sheet Mould Compound (SMC), a glass-fibre reinforced polyester. As a certified company to ISO14001 Environmental Management, we undertook an internal review of our environmental impact and identified an opportunity to close the loop in the circular economy for this range by developing and implementing a recycling and reuse program. It was identified that it may be possible to recycle the SMC material and once processed, be added into a concrete aggregate mix that could be used to make new products. The challenge was to achieve a minimum Mpa structural strength in order for the concrete mix to be suitable to manufacture new products. Extensive research was done by experimenting with different mix combinations. I will explain the process and steps undertaken as to how this program now prevents the Daemco range of Valve and Hydrant non-trafficable products from being disposed into landfill, be recycled, re-used made into new products and extending the life and maximising the value to the Water Infrastructure Network

1.0 INTRODUCTION

Daemco Australia manufactures and supplies a range of non-trafficable Access Covers & Lids to the Water Infrastructure Network for new sub-divisions and renewal programs across Australia. These products are manufactured from Sheet Mould Compound (SMC), a glass-fibre reinforced polyester. As a company certified to ISO14001 Environmental Management, Daemco undertook an internal review of our environmental impact and identified an opportunity to close the loop in the circular economy for this product range through recycling and reuse as an aggregate material in concrete products.

2.0 WHAT WAS THE OPPORTUNITY

There is currently no recycle program in place for the disposal and reuse of SMC non-trafficable Access Covers at their end of life.

The article "A foundational Resource for a Circular Economy" with a presentation by Lisa McLean the CEO of Circular Australia at "Connected by Water" and summarised by Justin Matters, states that the circular economy is based on three principles[1];

1. Design out waste and pollution at every stage of production, use and end of life
2. Keeps products and materials in use at their highest possible value
3. Regenerate natural systems

Water is a foundation resource in the circular economy. The first principle is to design out waste and pollution at every stage of production, use and end-of-life. The opportunity existed to explore how this range of SMC non-trafficable access covers could close the loop in the circular economy with a recycle and reuse plan at their end of life. The second principle is to keep products and materials in use at their highest possible value. The challenge was to prevent these products ending up in landfill and to recycle and reuse them into new products. This extending their value and furthermore to develop a process, and procedure which was integrated into our ISO14001 Environmental Management System allowing us to measure the outcomes.

3.0 PARTNERING WITH A LEADER IN THE FIELD

Daemco Australia investigated many suitable partners for our recycle and reuse program. M. Tucker & Sons were identified as a leader in their field with an existing foothold in sustainable practices and already utilising reclaimed material and would be an ideal partner for this program.

M. Tucker & Sons, a leading Civil and Trenchless Drainage Specialist, manufacture sustainable concrete, made up of over 70% reclaimed material. The have an EPA Licenced waste treatment facility where they reclaim sand and rock from stormwater, NDD and drill muds where it is diverted from going directly into landfill, and iscast into concrete products.

4.0 HOW WAS THE PROBLEM ADDRESSED

M. Tucker & Son's were enthusiastic to be a part of the program and collaborated to develop a solution to utilise the SMC material as an aggregate suitable for use in concrete applications. The objective was to develop products that would be suitable for use in the Water Infrastructure Network such as thrust blocks, manholes, footpath re-instatement and roadside barriers. The first step of the process was to granulate the SMC material into aggregate sized material. This was processed at Corex's Recycling Facility. M. Tucker &

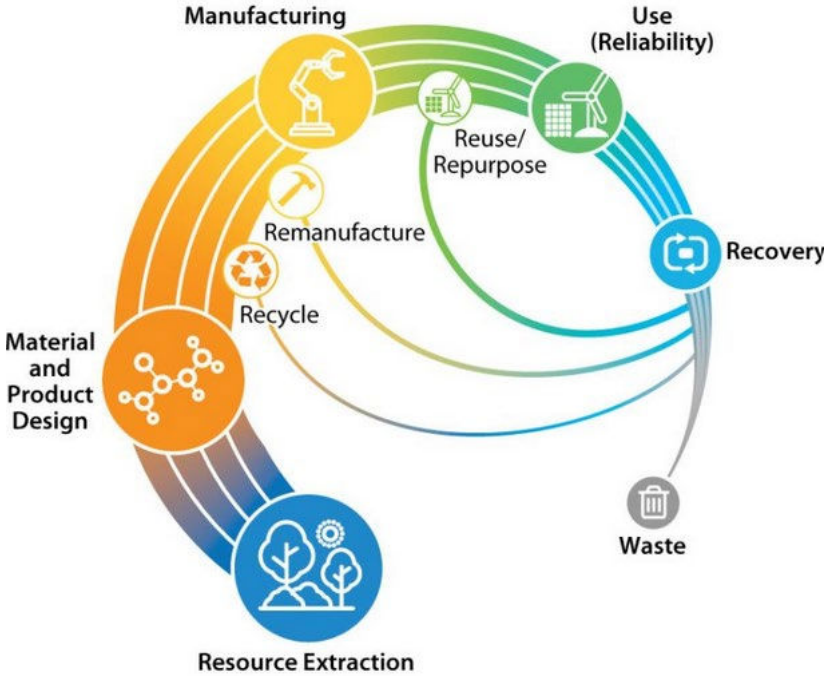
Son's would develop the formulations for the concrete mix, increasing the SMC aggregate and reducing the natural aggregate to find the right blend.

Various iterations of the formulations were developed and tested to maximise the use of SMC material and reduce the natural aggregate, whilst achieving the target concrete strength of 25mpa. Each formulation sample was cured, with strength testing analysis completed after 7, 28 and 56 days.

5.0 INNOVATING A SOLUTION

A final formulation was developed, which met the aggregate yield strength requirement of 25mpa. We have established a collection centre at our Tullamarine Facility for the return of end of life SMC non-trafficable access covers and integrated this new process into our ISO14001 Environmental Management System.

The outcome of this program is a solution to reuse SMC non-trafficable access covers at their end of life into new concrete products suitable for use in the Water Infrastructure Network. These include the re-instatement of footpaths, manholes, thrust blocking, roadside barriers. This now closes the circular economy loop, reducing landfill and maximising our natural resources through extended life and value.



6.0 FINAL COMMENTS

Daemco is the only company in Australia who has their product range of non-trafficable valve and hydrant covers certified to AS3996 Access Covers and Grates, a published WSAA Product Appraisal and partnering with a leader in their field, M. Tucker and Sons. To implement a recycling and reuse program to turn these products into new products that closes the loop in the circular economy.