Making surgical instruments from medical waste

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New steerable instruments for ‘advanced laparoscopic surgery’ partly made of stainless steel and blue polypropylene covers being used for the first time in Malta. Credit: Delft University of Technology

In Dutch hospitals, over a million kilos of blue 'wrapping paper' is used each year to keep medical instruments sterile. After they have been used, they create an enormous mountain of waste. TU Delft researchers Tim Horeman and Bart van Straten, in collaboration with the Maasstad

Hospital in Rotterdam among others, devised a method to melt down this blue polypropylene wrapping paper and turn it into a new medical device. A growing number of Dutch hospitals are adopting this approach. An article about the method was published in the *Journal for Cleaner Production*.

Waste leads to new reusable and steerable medical instruments

Horeman and Van Straten worked with waste management company Renewi to collect the blue wrapping paper from operating rooms at several hospitals. They then conducted research into the relationship between the material properties, the effects of heating at various temperatures and the processed waste. This led to the development of what are called instrument openers: tools to keep medical instruments that contain a hinge open during the cleaning process. In addition, the researchers designed handles for a new line of reusable and steerable instruments for advanced keyhole surgery.

Hospital care contributes 7 percent to the total CO_2 emissions in the Netherlands. The rapidly growing mountain of waste produced by hospitals is not only caused by a growing patient population but also by the increased use of disposable products. Melting down medical waste into a new raw material is one of the ways we can tackle the global hospital waste problem.

Credit: Delft University of Technology

Horeman explains that "with this method, our research team has created a circular chain that fully coordinates the technical, medical and logistical processes. This is the only way to process waste into high-quality new medical instruments, for example, without having to use additives. And this is just the beginning as far as we are concerned."

Credit: Delft University of Technology

More information: B. van Straten et al, Surgical waste reprocessing: Injection molding using recycled blue wrapping paper from the operating room, *Journal of Cleaner Production* (2021). DOI: 10.1016/j.jclepro.2021.129121

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