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van Straten, Bart; van den Dobbelsteen, John; Horeman, Tim

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Steam sterilization of used disposable face masks with respect to COVID-19 shortages

B. van Straten[1,2], J. van den Dobbelsteen[1], T. Horeman[1]

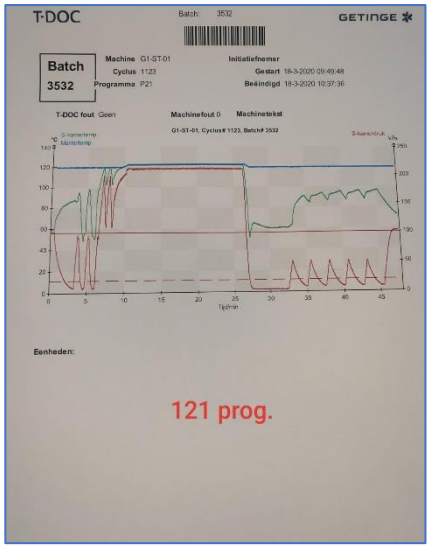
1. Delft University of Technology, Department of BioMechanical Engineering, Delft, The Netherlands
2. Van Straten Medical, De Meern, The Netherlands

Background
Due to Covid-19, shortages may arise in hospitals regarding personal protection equipment. With respect to this threating deficit, hospitals and other healthcare institutions may want to become independent of their suppliers and pursue circular re-use of mouth masks and other personal protection products. During a study, several masks were sterilized and examined upon permeability using particle counters.

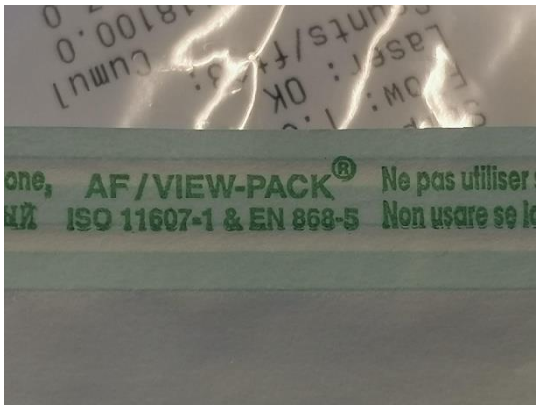
Aim
A steam sterilization method is evaluated, measured on an acceptable outcome giving repeating satisfactory results of sterilized the mouth masks.
The permeability of mouth masks are examined using a Solair 3100 particle counter from Lighthouse Benelux (www.lighthousetest.com).

Methods and procedure
A batch of nine mouth masks were sterilized at Van Straten Medical / CSA Services in De Meern-Utrecht. Upon receipt the masks are checked and packed in laminated bags. A separate routing was made - outside the standard routing for sterilization of surgical instruments - for collecting, processing and returning the mouth masks. The masks are discarded if they showed visual shortcomings such as loose straps, damage or other deformations.

The batches were individually packed in laminate bags and sterilized with steam sterilization by means at 121 ^{o}C in Getinge autoclaves and in combination with permeable laminate bags, Halyard type CLFP150X300WI-S20. The autoclaves were activated on a 121 ^{o}C program and validated accordingly.



After each sterilization batch, a free floating airborne counting was performed of particles of sizes 0.3, 0.5 and 5.0 µm



The results of indicate that the mentioned sterilization process did not seem to influence the functionality with regard to permeability of the FFP2 masks (type 1862+ 3M) tested. The sterilization process of available standard autoclaves in all hospitals could to be adjusted in order to use this sterilization method.

The initial 'positive' experimental results were shared with other hospitals in the Netherlands. Further analysis as a result of sterilization in our autoclaves demonstrated that 134 ^{o}C steam sterilization resulted, as well as tested Gamma sterilized mouth masks, in deformation of the masks and deteriorating outcomes from the particle counting.
These results were furthermore, shared with the National Institute for Public Health and the Environment (RIVM), Ministry of Health, who are also preparing for the outbreak.