VENTURI NOZZLE, used for a Venturi Oxygen mask

A 3d printed VENTURI NOZZLE was used first in an Italian hospital as of a local supply shortage. Mr. Cristian Fracassi supported the fight against Covid-19 by providing this urgently needed part made on his 3d printer.

Covid-19 is a global humanitarian challenge. It is spreading, causing many local emergency situations in hospitals. Rapid Shape provides information for its dental & hearing aid 3d printing community to #fightcorona #wereinthistogether

Note:

- This should be seen as a last resort VENTURI NOZZLE and is by no means a replacement for commercial original venturi nozzles. The need should be clarified with local hospitals, e.g. if a local supply shortage is given.
- Various VENTURI NOZZLES are available for various medical ventilators. The history of this part can be seen here: https://www.3dprintingmedia.network/covid-19-3d-printed-valve-for-reanimation-device/
- The production of the VENTURI NOZZLE with a Rapid Shape 3d printer is not certified according regulatory standards. It is not a medical product. It may be used only in full legal responsibility of the physician in charge, based on an emergency situation.
- Rapid Shape assumes no liability for the VENTURI NOZZLE nor for this document. This document is ex gratia.

Call to Action from CECIMO (European Association of the Machine Tool Industries and related Manufacturing Technologies)
for manufacturing companies to help hospitals in need due to severe shortages of critical medical equipment in hospitals or limited access to essential pieces, in particular valves or ventilators.
Source: https://www.cecimo.eu/news/cecimo-press-release-call-to-action-to-additive-manufacturing-companies-to-help-hospitals-in-need/

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What is a Venturi Mask?

Venturi Masks are low-flow masks that use the Bernoulli principle to entrain room air when pure oxygen is delivered through a small orifice, resulting in a large total flow at predictable FIO2. Source: https://www.sciencedirect.com/topics/medicine-and-dentistry/venturi-mask
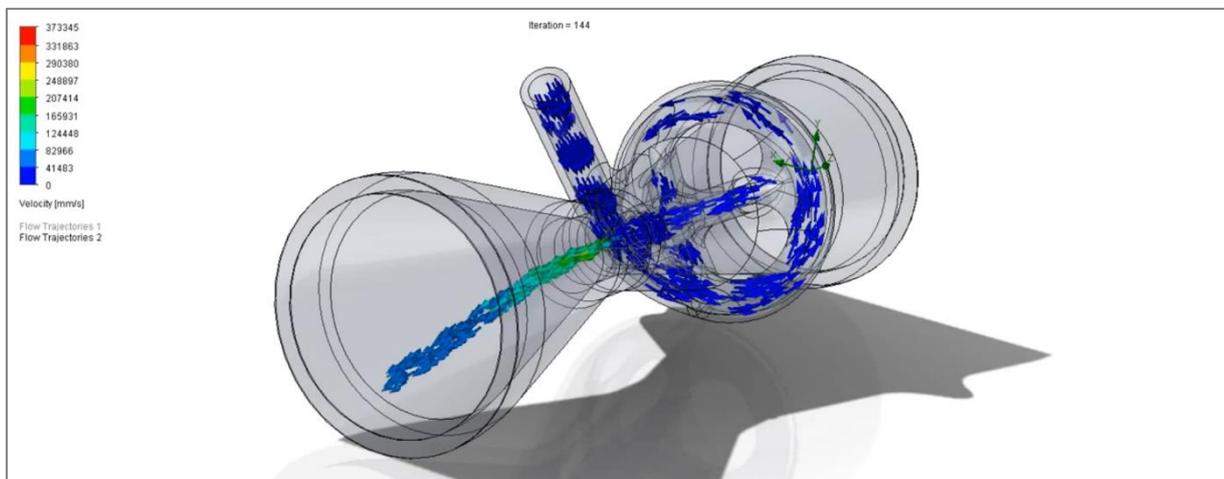
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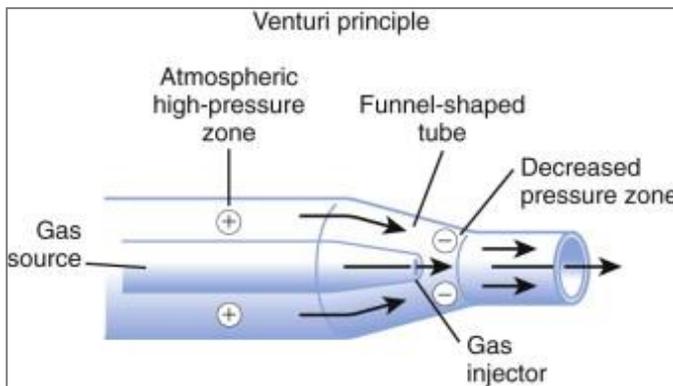
What does a Venturi Mask look like?

There are many versions of a Venturi Masks, please find one here:

https://www.youtube.com/watch?v=UAEWFgHqWx8&feature=emb_rel_end

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What physically happens inside a Nozzle?

A video of physics simulation of a nozzle for respirator you can find here: https://youtu.be/e-sKJf74xuw

MATERIAL REQUIRED:

3D PRINTER:

D20 series

☐ D20+, DMG 3Demax, SHERAprint 20+, P20+, DW D20+

☐ D20 II, SHERAprint 20, P20, DW D20

D30 series

☐ D30+, SHERAprint 30+, P30+, DW D30+

☐ D30 II, SHERAprint 30, P30, DW D30

D40 series

☐ D40 II, SHERAprint 40, P40, DW D40

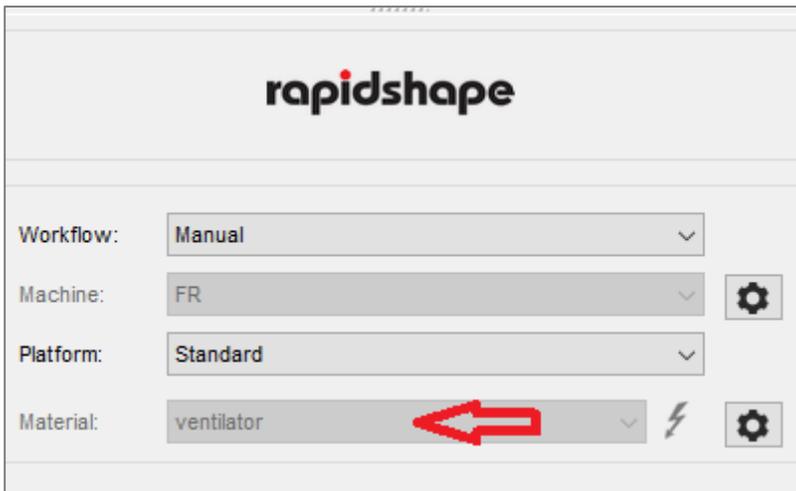## CAM SOFTWARE:

☐ Autodesk Netfabb

3D PRINTING MATERIAL:

☐ Rapid Shape Surgical Guide

☐ Straumann P pro Guide

☐ Shera SHERAprint SG
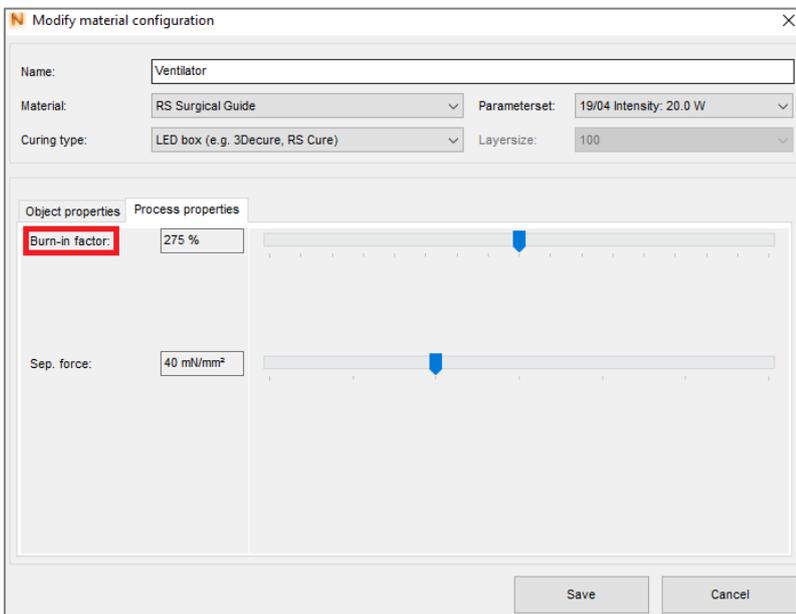
How to prepare the VENTURI NOZZLE print job:

Step 1: Please download the suitable and ready-made fabbproject files for your printer and open it in Autodesk Netfabb.

Step 2: Change the material configurations as follows:

Please select the chosen material in the material library. For all authorized resins, please modify the **Burn-in factor**. Increase the parameter **up by 50%.**
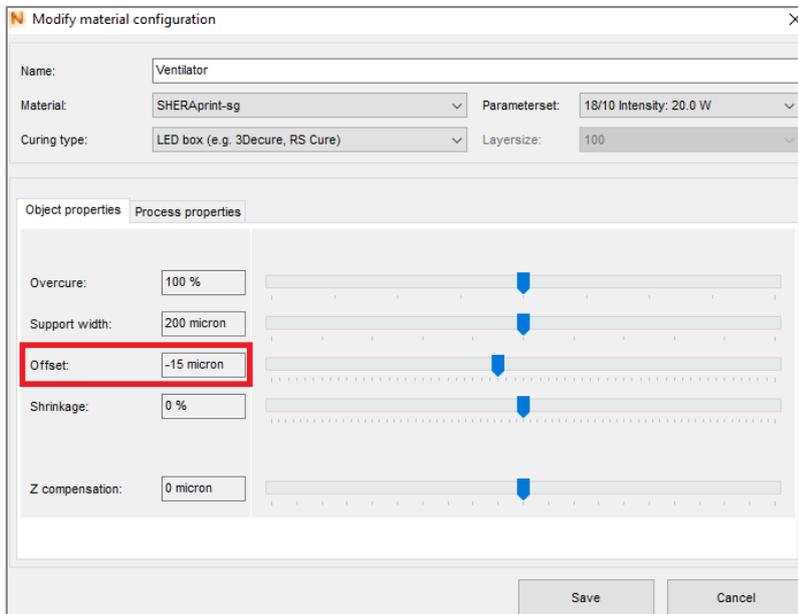
![rapidshape]
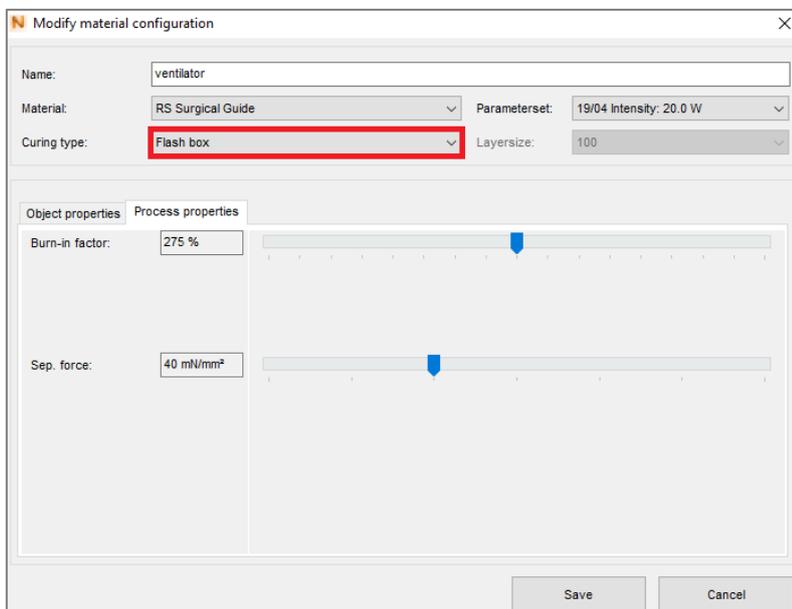
Select your available **curing type.**

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POST-PROCESSING
How to wash the VENTURI NOZZLE:

VERY IMPORTANT: Clean the VENTURI NOZZLE very carefully and accurately.

Step 1: After finishing the print job, please remove the VENTURI NOZZLE carefully from the build platform.

Step 2A washing with RS wash, Step 2B washing with an Ultrasonic Device:
Step 2A: Clean the VENTURI NOZZLE in the RS wash.

• Position the VENTURI NOZZLE horizontally.
• Cleaning program/time depends on the material. Please follow the resin manufacturer's instructions for use.

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Alternative to Step 2A

Step 2B: **Clean** the VENTURI NOZZLE in an Ultrasonic Device.

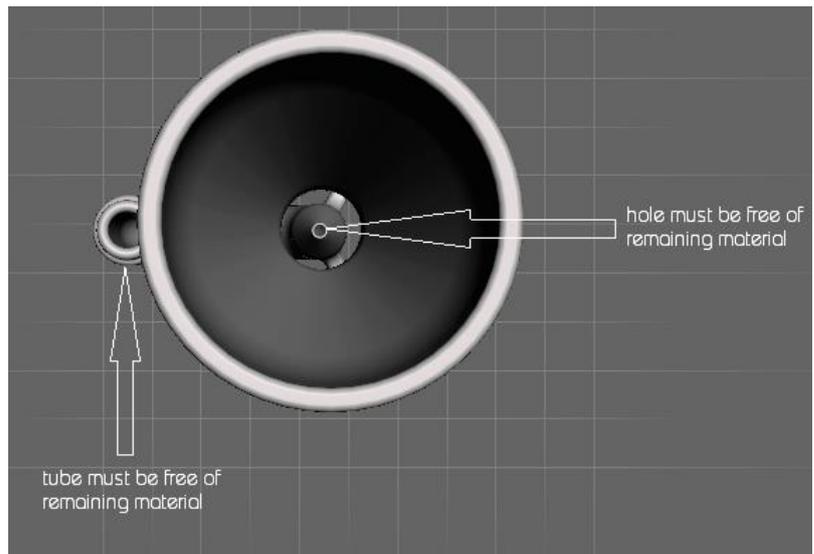• Position the VENTURI NOZZLE vertically.
• Cleaning program/time depends on the material. Please follow the resin manufacturer's instructions for use. <mark>Important: Use unused isopropanol for cleaning!</mark>

Step 3: Clean the VENTURI NOZZLE with **compressed air** (especially in the critical thin parts). If you detect residual resin, please use a **manual instrument** (e.g. interdental brushes) for cleaning.

Step 4: **Check** the VENTURI NOZZLE for residual resin (especially in the critical thin parts). Very important: After cleaning, there must be no residual material on the object!

hole must be free of remaining material

tube must be free of remaining material

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POST PROCESSING

How to post cure the VENTURI NOZZLE:

Step 1: After cleaning, you have to **post cure** the VENTURI NOZZLE. Please follow the resin manufacturer's instructions for usage.
For example, in the RS cure or Dentamid PCU LED N2:

Step 2: **Check** the VENTURI NOZZLE again for residual resin and defects (especially in the critical thin parts).

Step 3: **Pack** the VENTURI NOZZLE in a sealable bag or box for shipping. Make sure that the VENTURI NOZZLE arrives safely.

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Add notice for
transport
(see below)

TRANSPORT

Please add a notice to the physician in charge as follows:

The VENTURI NOZZLE must be steam sterilized before use in the hospital.

DESCRIPTION	LAST RESORT, VENTURI NOZZLE ventilation device (in case of local supply shortages).
ATTENTION	No medical device! Not original!
MANUFACTURING METHOD	3D printed with Class 1a material with intended use for Surgical Guides in mouth dental use. Material is certified for steam sterilization.
USE	May be used only in full legal responsibility of the physician in charge, based on an emergency situation such as a local supply shortage.
LIABILITY	No liability assumed from the producer, no liability assumed from the equipment in use manufacturer, no liability assumed from the material manufacturer
ATTENTION	Check if ventilator nozzle is free / open. The ventilator must be steam sterilized in the hospital before use.

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