Thermoplay supports RP95-M Half Mask manufacturing

In April 2020 Thermoplay supported the half mask RP95-M project, designed to meet all the requirements for medical staff and first responders.

The original prototype of the half mask was developed and manufactured by 3D printing at the **CTU** in Prague, the **Czech Institute of Informatics, Robotics, and Cybernetics (CIIRC). TRIX Connections s.r.o.**, a CTU start-up, modified the original model of the RP95-M, to make it suitable for injection molding. R&D personnel at **CARDAM s.r.o.** a **BENEŠ a LÁT a.s.** took part in the design and development for massive production. The **Institute for Physics at the Czech Academy of Sciences** developed the testing apparatus for the quality control prior to shipping.

JAN SVOBODA s.r.o, **Thermoplay representative in Czech Rep.** partook in the manufacturing and delivery of the production tools. To ensure speeding up the manufacture of the molds and production launch, work was distributed among 6 different tool works companies that are working on 11 molds in parallel to ensure a production capacity of 120 000 masks weekly. To forefront the demand increase for this product, a simple and cost effective production module is easily possible. **Thermoplay** provided the new generation TF nozzles series, which were installed in 10 molds, with a very short delivery time of 3 weeks. The injection system was designed through online **Webcreator** configurator allowing very short delivery time design and manufacturing.

Fig. 1

Fig. 2

Fig. 1 - RP95-M half mask design
Fig. 2 -Design of RP95-M half mask and P3 R filter

The **RP95-M** mask is provided with a **P3 R combined particle filter** offering a maximum level of protection, better than the characteristics of FFP3 one. Filter efficiency is > 99,9999%. The product is intended for **all users in the so called front line**, such as doctors, nurses, paramedics, firefighters, police and military personnel, customs officials as well as shop assistants, line workers and similar. The protective mask is designed to **significantly reduce the financial costs** of all organizations that make use of these types of resources.

The **half mask RP95-M** is certified EN 140:1999 and made of very durable materials: PA12, TPE and VMQ silicone. The mask **filter** is certified: EN 143:2000 and provides highly efficient protection against carcinogenic and radioactive substances and pathogens such as viruses, bacteria and fungal spores. The half mask is disinfected in ethanol, sterilization is done in an autoclave at 120°C and a pressure of 2 bars for 20 minutes. Disinfection of the filter is possible using standard chemicals (e.g.: disinfection based on Peracetic acid), sterilization is done by plugging up the filter and subjecting it to 75°C.

Due to the shortage of FFP3 respirators, the comparison with the attainable FFP2 type which are currently being used by the health services is very competitive. **RP95-M half mask offer protection type FFP3 and lifespan of the filter is 5 days minimum**. Comparing the purchase cost of the **RP95-M half mask with regular respirators**, the RP95-M half mask (at FFP3 quality), brings substantial financial savings in the **first week of deployment**. The purchase costs are on average **5 times** lower in the **first week** of usage than with some types of FFP2 protection. After acquiring the half mask, the only other additional costs involved are with the actual filter changes, and therefore the weekly costs on protective equipment is roughly **13 times lower** in the **first week** of deployment when compared with the readily available FFP2 type respirator. This solution allows a far greater number of personnel to be equipped with quality protective tools and secures their protection for longer periods with a high standard of qual-

APPLICATION DESCRIPTION

Injection system:
Thermoplay TFH623046-1MD RT R=0
Injection polymer: PA12
Part weight: 35g
Wall thickness: 1.1 mm
Cycle time: 20 sec
Result from customer:
Perfect cavity filling without problems, no scraps. Manufacturing started on the first shot without any problems. Large process window allows low injection pressure. Perfect injection point aesthetics.

RP95-M half mask produced with injection molding

RP95-M half mask final assembly ready for use

ity and comfort.
The weight of the half mask is 160g including the filter. During testing it was proven that the mask can be comfortably used for long durations of time. The filter is mounted to the side due to safety reason during use. This solution widens the users field of view and avoid to be pushed out when manipulating objects. Thanks to the durable materials, the mask can be sterilized in an autoclave for multiple times. The polyamide used on the mask allows for a limitless amount of sterilizations. The sealing material, a thermoplastic elastomer, allows for a 100 sterilization cycles and an unlimited amount of disinfection cycles. The limiting factor on the life of the filter is the degree of mechanical fouling due to heavier breathing. In a dusty environment such as a building site, the filter can be clogged in two days. In a clean environment such a hospital, the filter may last at least one week of continuous usage. In practice, this time may prove longer. Clogging up does not influence the filters ability against viruses, however. The Czech front line (doctors, nurses, firefighters, police officers, etc.) thank the following companies for their support and commitment:

Development of the mask:

Production coordination:

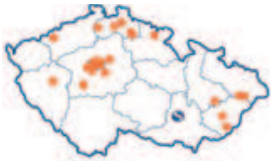
Hot runner system for filling of cavity:

Optimization of filling of a cavity:

Mold Makers:

Injection factory:

Network of involved companies in Czech republic



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