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Modified Full-Face Snorkel Masks as Reusable Personal Protective Equipment for Hospital Personnel[1] LAUREL KROO, Department of Mechanical Engineering, Stanford University, PNEUMASK CONSORTIUM COLLABORATION[2] — In the spring of 2020, an international coalition created a reusable PPE solution for healthcare workers, in response to the global supply chain collapse of N95 respirators triggered by the SARS-CoV-2 pandemic. The device, "Pneumask", consists of a modified full-face snorkel mask, adapted to interface with FDA or NIOSH-rated inline respiratory filters. This project involved the characterization of fluid flow through the device with industry-standard CFD tools (STAR-CCM+) to evaluate CO2 species transport, one-way valve performance, fit testing, filter characterization, and the clinical evaluation of the device. On each of these fronts, our conclusions on the performance of Pneumask were cautiously optimistic, for use as a stop-gap alternative to disposable N95 respirators. The design was distributed at scale, with thousands of units deployed domestically, and tens of thousands in use internationally. This deeply collaborative team project demonstrates an applied example of how our modern understanding of fluid mechanics can be used to save lives in times of human crisis.

[1]Prakash Lab and the Global Pneumask Coalition
[2]For a comprehensive list of members of the Pneumask consortium, contributing co-authors and funding agencies please reference our preprint: https://doi.org/10.1101/2020.04.24.20078907

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