

Modernization of nasal prosthesis fabrication through the use of the Blender API, 3D scanning and printing.

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Objective: To improve the efficiency, functionality and cost of nasal prosthesis production by replacing the physical workshop with a semi-automatic digital workflow.

Methods:

1. A high resolution (0.1 mm) surface of the face is acquired using an industrial handheld 3D scanner (Artec Spider, Luxembourg).
2. Pre-surgical photos are used as a visual aid in numerical sculpting of the prosthesis.
3. An in-house script using the Blender API automates the creation a custom mold model and designs the interior insert to create nostrils and a synthetic septum.
4. Molds are 3D printed and smoothed using alcohol vapour.
5. The prosthesis is cast with dye-colored silicone and cured.
6. Finishing asthetic flourishes such as synthetic hair and additional skin tone is applied.

Results: The new workflow resulted in a 40% reduction in production time and hence cost. A digital method of production almost entirely eliminated the need for a physical workshop.



Step	Time- Analogue (hrs)	Time digital (hrs)	Cost Analogue (CAD)	Cost digital (CAD)
Impression + master mold	2	1	200	135
Sculpting	6	3	600	300
Mold creation	3	0.5	250	70
Silicon casting	3	3	300	300
Total (CAD)			1350	805
			Savings (%)	40,4

Conclusion: The incorporation of 3D scanning/printing and the Blender API have allowed the semi-automatization of facial prosthesis production, reducing the time and cost while maintaining if not improving the quality of the prosthesis.

Future Development: Improvements in the robustness of the workflow to work with a variety of nose and cavity shapes in addition to cases of partial resection is being investigated. Additional automation using AI generated nose models based on a-priori images of the patient is under development.