

Improving Comfort & Patient Satisfaction in 3D-Printed Upper Limb Prosthetics with Vapor Smoothing



Industry

Healthcare – Prosthetics



Material

PA12, manufactured using HP MJF 580 (Multi Jet Fusion)

Advantages summarized

The Atlantic Clinic for Upper Limb Prosthetics uses additive manufacturing to produce custom upper limb prosthetic components tailored to individual patients. To enhance wearer comfort, ease of use, and cosmetic finish, the clinic integrates PostPro vapor smoothing into its production workflow. The process creates a smooth, sealed, low-friction surface that improves skin comfort, simplifies daily use, increases resistance to staining, and delivers a refined, highly customized visual appearance, supporting personalized designs such as tattoo-style graphics, color variations, and character-themed prosthetics for children.

About the Application

Upper limb prosthetics are worn in direct contact with the body and used throughout daily activities. Because of this, the surface finish is not only an aesthetic consideration, but a critical factor in comfort, hygiene, durability, and overall patient satisfaction.

The Atlantic Clinic manufactures custom prosthetic components using PA12 on the HP MJF 580 platform. These parts are designed to fit patients individually and must allow them to comfortably don and doff the prosthetic while interacting naturally with clothing during everyday movements.

Beyond functional fit, the clinic also leverages 3D printing to create personalized prosthetic designs like tattoo-style graphics, color variations, or child-friendly character themes. This level of personalization can help patients feel more confident and emotionally connected to their prosthesis.

Raw 3D-printed surfaces can introduce surface roughness that increases friction against the skin, causes clothing sleeves to catch or drag and makes parts more susceptible to staining. For devices worn for extended periods, even minor surface friction can significantly impact comfort.



Challenge & Solution

Upper limb prosthetics must provide:

- Comfort during prolonged skin contact
- Ease of donning and doffing
- Minimal friction against skin and clothing
- Resistance to staining and everyday wear
- A professional, patient-ready cosmetic finish
- Support for personalized, patient-specific design requirements

To address these requirements, the Atlantic Clinic applies PostPro vapor smoothing to its MJF-printed PA12 components. The automated finishing process creates a sealed, smooth surface without altering part geometry or fit.

The Difference Made by PostPro Vapor Smoothing

For upper limb prosthetics, vapor smoothing delivers several important benefits:

- **Improved comfort:** Reduced surface friction enhances skin comfort during extended wear.
- **Easier donning and doffing:** Smooth surfaces allow the prosthetic to slide more naturally against the skin.
- **Better interaction with clothing:** Sleeves are less likely to catch or drag during everyday activities.
- **Increased durability:** Surface sealing enhances the mechanical properties of the component, improving resistance to wear and daily handling.
- **Protection against staining:** Reduced porosity helps prevent absorption of oils, dirt, and everyday contaminants.
- **Improved hygiene:** Sealed surfaces are easier to clean and maintain.
- **Improved cosmetic finish:** Vapor smoothing enhances the surface uniformity and intensifies color vibrancy produced by the HP 580 platform.
- **Consistent surface quality:** Automated vapor smoothing ensures repeatable results suitable for ongoing clinical production.

This application involves direct skin contact, making surface quality a critical factor in overall device performance and patient experience.

Conclusion

The Atlantic Clinic for Upper Limb Prosthetics demonstrates how combining HP MJF printing with PostPro vapor smoothing improves the comfort, usability, and appearance of custom prosthetic devices.

By delivering smooth, sealed, prosthetic components, vapor smoothing supports both functional performance and long-term patient satisfaction in healthcare applications, while enabling the personalized designs that make prosthetics more tailored to the individual.



Benefits of AMT PostPro Vapor Smoothing for Prosthetic Applications:

- ✓ Reduced surface friction for improved skin comfort
- ✓ Easier donning & doffing of prosthetic devices
- ✓ Enhanced durability and resistance to staining
- ✓ Improved hygiene through sealed, low-porosity surfaces
- ✓ Improved interaction with clothing during daily use
- ✓ Enhanced appearance & color quality
- ✓ Consistent & repeatable surface quality for serial production in medical applications

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