

Title:

HIF – Harsh Intelligent Fabricator

Concept Proposal & Prior Art Claim – 2025

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Public Disclosure for Prior Art Protection

1. Abstract

HIF (Harsh Intelligent Fabricator) is a proposed intelligent manufacturing system that uses a flexible, carpet-like robotic surface capable of bending, wrapping, and conforming to irregular 3D geometries.

Once placed over a surface, it receives a digital design input and carves, engraves, or shapes the underlying material from top to bottom with micron-level precision.

The objective is to create a tool that combines CNC machining with soft robotics and adaptive gripping behaviour, enabling carving of structures that are impossible for rigid mechanical arms.

2. Core Idea

Instead of a stationary cutting tool moving around a fixed object, the tool itself becomes a flexible fabric that can wrap the object and precision-carve it from all angles simultaneously.

The carpet can change shape, tighten, and reposition like an intelligent skin.

This removes the biggest limitation of today's CNC machines:

they cannot reach corners, deep cavities, curved interiors, or multi-axis negative spaces without expensive multi-arm setups.

HIF acts as:

A full-surface machining layer

A distributed tool network instead of a single cutting head

Software-directed carving with zero repositioning

3. Functional Principle (High-Level)

1. The surface (fabric/carpet) contains a grid of micro-actuators or cutting elements.
2. Software feeds design data.
3. The carpet tightens/positions itself over the target surface.
4. Cutting/engraving begins from outermost to innermost layers.
5. The system adapts dynamically to complex curvature that rigid CNC tools cannot handle.

4. Why This is Novel

There is no currently mainstream or patented consumer/industrial system that:

uses a soft robotic carpet as the cutting surface

conforms to any shape

and performs distributed carving directly from contact

All existing machines are rigid arm-based or gantry-based.

HIF shifts fabrication to contact-based carving through a flexible medium.

This creates a new engineering category:

“Soft-surface autonomous fabrication.”

5. Potential Impact

If developed, HIF could:

Replace large industrial CNC rigs

Make on-site architectural carving possible

Enable temple/stone/heritage restoration

Reduce need for multi-axis robotics

Manufacture parts with extreme curvature

Create new ultra-adaptive 3D printing + subtractive hybrid methods

6. Prior Art Claim Statement

This document serves as public proof of conceptual authorship by

Harsh Sharma (HIF originator), 2025.

Any future patent based on this mechanism must acknowledge this concept or demonstrate a substantive technical deviation