



## INTEGRATED ADDITIVE MANUFACTURING OF MULTI-REQUIREMENT PRODUCTS USING MULTIPLE MATERIALS

### IITM Technology Available for Licensing

#### Problem Statement

The present patent addresses two main problems:

- Traditional **3D printing struggles to create objects that meet multiple requirements**, like making lightweight yet strong components for electric vehicles.
- The current solution of blending different materials together in 3D printing has **limitations because it can mix up their properties and doesn't give precise control**.

The present patent proposes a system and method to solve these problems by allowing **3D printing with multiple materials to create objects that meet various requirements** and perform well.

#### Technology Category/ Market

**Categories:** Applied Mechanics & Mechanical Engineering, Electronics & Circuits

**Industry:** Manufacturing and Engineering; Cars and Transportation; Aerospace & Space; Medical & Health; Energy & Green Energy; Art & Design; Building & Architecture; Military; Electronics Manufacturing.

**Applications:** Customization, Material Optimization, Improved Performance, Efficient Manufacturing.

**Market:** The global additive manufacturing & material market size reached **US\$26.8B** in **2022**. It is set to reach **US\$183B** by **2032**, growing at **21.2% CAGR**.

#### Technology

The present patent invention discloses an **Integrated Additive Manufacturing** of Multi-requirement Products using **Multiple Materials**. It is a **method** to fabricate objects with different materials by adding material **layer by layer**.

#### Key Features / Value Proposition

##### ❖ User Perspective:

- Users can **customized** items tailored to their needs.
- **Enhanced & Personalized Performance**
- **Sustainability:** Reduces material and energy consumption for eco-friendliness.
- **Artistic Freedom:** Artists craft intricate designs.

##### ❖ Industrial Perspective:

- **Advanced Manufacturing**
- **Cost Efficiency**
- **Material & Application Versatility**
- **Intelligent Design & Additive Manufacturing**
- Emphasizes specific properties in material selection.

The method is all about customizing objects to have the exact properties needed, using multiple materials and precise planning. **The method disclosed is:**

• **Users provide Input** about what they want the object to do, like its specific qualities or functions.

• **Different materials** are identified to make the object meet desired qualities.

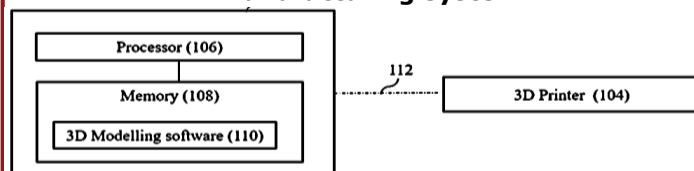
• **Material Pairing:** Two materials are chosen: one for main part of the object & another for a smaller part.

• **Location Planning** to find where to put the second material within first material to make it work well.

• First material is deposited in **layers**, second material is added in planned locations within first material.

• **Layer by layer**, the two materials are combined to create the final object with desired qualities.

**Fig. 1 shows a block diagram of an additive manufacturing system**



**Figs. 2 shows 3D models of a brake pad required to be developed through additive manufacturing**



#### Intellectual Property

**IITM IDF No: 2416;**  
**Patent Grant Number: 449088**

#### TRL (Technology Readiness Level)

**TRL - 4, Experimentally validated in lab.**

#### Research Lab

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