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ADVANCED TECHNOLOGY

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VANDAD SANAT is a leading company in the development of advanced hybrid manufacturing technologies, specializing in combining **metal 3D printing** and **traditional machining** into a single platform. By integrating these technologies, we provide innovative solutions for producing complex and highly precise components.

Our core expertise lies in the application of Directed Energy Deposition (DED) technology, enabling seamless and efficient design, production, and finishing of parts. This technology eliminates the limitations of traditional methods, offering greater design freedom and the ability to manufacture intricate geometries with exceptional quality.

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Introduction to Innovative Metal Additive Manufacturing Technology

Metal Additive Manufacturing technology, utilizing Directed Energy Deposition (DED), has revolutionized the manufacturing industry. This technology employs a focused energy source (such as a laser or plasma arc) and metallic materials in powder or wire form to produce complex metal parts with high precision and quality.

Key Features

- **High Precision and Quality: Equipped with advanced fiber lasers of varying power levels (2 to 6 kW) or electrical arcs and precise control systems to ensure exceptional accuracy and quality of manufactured parts.**
- **Flexibility in Consumable Materials: The ability to use various types of metallic wires makes this machine suitable for diverse industries.**
- **High Production Speed: A high deposition rate (2–8 kg/hour) reduces production time and boosts efficiency.**
- **Real-Time Monitoring: Advanced sensors and real-time feedback systems enable complete process control and enhance production quality.**
- **User-Friendly Design: A simple user interface and integrated CAD/CAM software make the machine easy to operate for users.**

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Commercial and Economic Benefits

- Cost Reduction: Reduced production time and optimal use of raw materials lower manufacturing costs.
- Increased Productivity: High production speed and minimized time for part manufacturing enhance production line efficiency.
- Customization and Flexibility: Ability to produce custom and complex parts without significant changes

Applications

- Aerospace Industry: Manufacturing complex, lightweight, and high-strength parts requiring exceptional precision and mechanical resistance.
- Automotive Industry: Production of precise, durable components, reducing weight, and improving performance.
- Medical Field: Custom implants and surgical tools manufactured with high precision and quality.
- Oil and Gas Industry: Fabricating corrosion-resistant and high-temperature parts, increasing durability, and reducing maintenance costs.
- Mining Industry: Manufacturing and repairing parts required for mining machinery and processing equipment.

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Standards and Certifications

- ISO 9001: Quality Management System Certification
- CE: Compliance with European Safety and Health Standards
- ASME: American Society of Mechanical Engineers
- ASTM: Standards for Testing and Materials

Product Introduction

The Metal 3D Printer based on Wire and Directed Energy Deposition (DED) offers an advanced solution for producing high-precision metal parts with outstanding mechanical properties. Utilizing the combination of DED technology and metal wire as the raw material, this printer enables the production of complex and durable components.

Build Dimensions	Build Volume: 500 x 500 x 500 mm Dimensional Accuracy: ±0.5 mm
Laser System	Laser Power: 2 kW fiber laser Wavelength: 1500 nm Operating Mode: Continuous/Pulsed
Consumable Materials	Material Types: Metal wires (stainless steel, titanium, aluminum,) Wire Diameter: 0.8–1.2 mm
Production Speed	Deposition Rate: 2–4 kg/hour

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Technology Used in Metal 3D Printers Based on Directed Energy Deposition (DED)

The Directed Energy Deposition (DED) technology is an advanced additive manufacturing method that enables the production of complex parts with high precision and superior mechanical properties by melting and depositing metal materials. Below are the key components and processes involved in this technology

1. Energy Source

In DED technology, a concentrated energy source is used to melt the metallic materials. The energy source can include:

- Laser: High-power laser beams, such as fiber, diode, or CO2 lasers, focus on the material surface to melt it.
- Electron Beam: Uses an electron beam to melt materials in a vacuum environment.
- Plasma Arc: Employs an electric arc to generate the heat required to melt the metallic materials.

2. Raw Materials

The raw materials in DED technology are supplied in the form of metal powder or wire. The choice of material depends on the application and the mechanical properties required for the final part. Common materials include:

- Stainless steel
- Titanium
- Aluminum
- Carbon Steel

3. Material Feeding System

The raw materials are delivered to the melt zone in the form of powder or wire through:

- Powder Feeding System: Metallic powder is injected into the melt zone using a carrier gas from a storage tank.
- Wire Feeding System: Metallic wire is continuously fed into the melt zone and melted.

4. Transportation System

A multi-axis motion system, typically 3 to 5-axis, is used to precisely move the melt zone and control material deposition. This system includes:

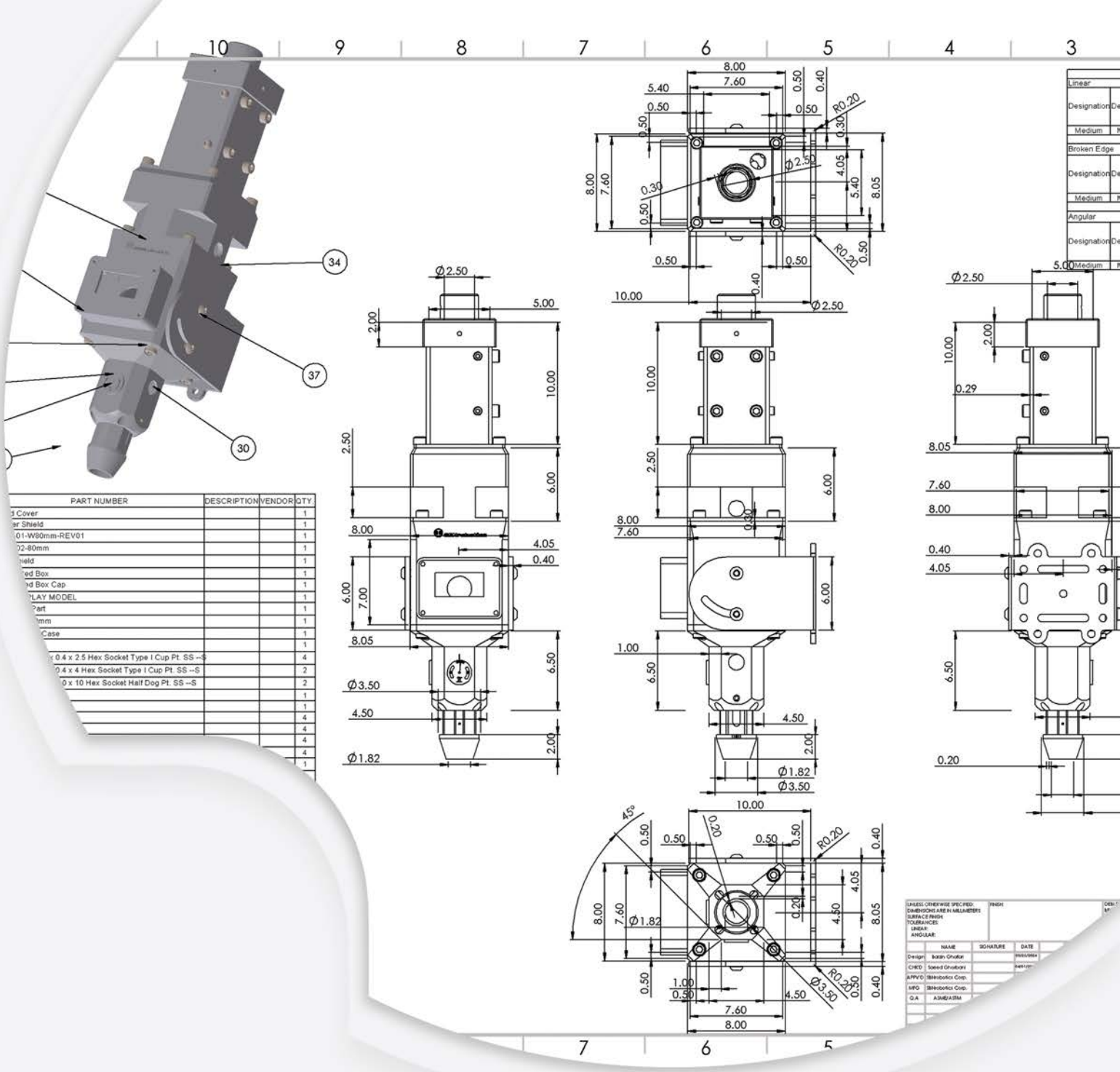
- X, Y, Z Axes: Linear movements.
- Rotational Axes: Angled movements for more precise and complex deposition.

Technical Specifications Table

	P-240-W	P-500-W
Build Dimensions	240x240x120 mm	500x500x250 mm
Material Type	Carbon Steel, Aluminum, Austenitic Steel,	Carbon Steel, Aluminum, Austenitic Steel,
Production Speed	2-4 kg/h	2-4 kg/h
Dimensional Accuracy	±0.2 mm	±0.2 mm
Control System	3-Axis Cartesian Robot	3-Axis Cartesian Robot

Controller and Software	CAD/CAM Software: Integration with various advanced Computer-Aided Design Software Control System: 3 to 5 axis robot with advanced programming capabilities User Interface: 10-inch touchscreen with a user-friendly interface
Material Feeding and Transportation System	Feeding System: Automated with precise wire feeding control Transportation System: High-precision X, Y, Z axes
Monitoring and Feedback System	Sensors: Laser and optical sensors for real-time process monitoring Feedback System: Real-time adjustment of production parameters
Power and Energy	Operating Voltage: 380 V, 50/60 Hz Energy Consumption: 1500 to 3500 W

P-240A



Looking to the Future

DED technology is poised to become a cornerstone of metal part production across various industries. With growing demand for complex and customized parts, this technology offers rapid, precise, and cost-effective manufacturing. Projections indicate that the global metal 3D printer market will exceed $15 billion by 2027, with a compound annual growth rate (CAGR) of approximately 25%.

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