FABRIZON

Ultimate Textile Surface Treatments

Fabrizon:

Automated Fabric Inspection and Plasma Treatment Optimization

Product Presentation

Fabrizon Plasma Technologies Inc

Objective:

Develop an AI-powered system to classify fabrics, detect defects, and optimize hydrophilic surface treatment using Fabrizon's proprietary Atmospheric Pressure Plasma Technology (APPT).

Key Features:

- Use of Atmospheric Pressure Plasma Technology (APPT) for surface modification.
- Artificial intelligence integration for detecting defects and optimizing plasma polymerization processes.
- Environmentally sustainable technology with zero chemical waste and minimal energy consumption.

System Architecture

A) Atmospheric Pressure Plasma Technology (APPT)

Key Features:

- Operates at atmospheric pressure, avoiding complex vacuum systems.
- Provides precise, uniform surface treatment.
- Customizable parameters for specific applications.

Benefits:

- **Eco-Friendly:** Zero chemical waste and low energy consumption.
- **High Efficiency:** Faster treatment times with consistent quality.
- **Versatility:** Adaptable for hydrophilic treatments and potential antimicrobial coatings.

System Architecture

B) Fabric Type Identification Module

Proposed Method:

- Use **Deep Neural Networks (DNNs)** for extracting fabric features and classification.
- Leverage AI models like Swin Transformer to identify fabric types specific to hydrophilic applications.

Implementation Steps:

- Collect a dataset of diverse fabrics (e.g., PPE and medical textiles).
- Train AI models for classification based on fabric characteristics such as thickness and texture.
- Integrate fabric type recognition into the plasma treatment workflow to ensure optimal settings.

System Architecture

C) Fabric Defect Detection Module

Proposed Method:

- Detect defects such as perforations, burns, discolorations, or plasma treatment inconsistencies.
- Use advanced image processing techniques for precise detection.

Defect Detection Steps:

- Preprocessing: Use filters (Gaussian, deconvolution) to clean and enhance images.
- Background Isolation: Remove non-relevant image details with adaptive thresholding.
- Defect Categorization: Identify defects impacting hydrophilic treatment, such as uneven plasma exposure or surface damage.

System Architecture

D) Plasma Treatment Optimization Module

Integration with Fabrizon Technology:

- Utilize AI to dynamically adjust plasma parameters (e.g., gas composition, intensity, and duration) based on real-time surface feedback.
- Ensure consistent hydrophilic coating for optimized water absorption properties.

System Adjustments:

- Sensors measure surface charge and hydrophilicity indicators.
- AI analyzes feedback to recalibrate plasma settings dynamically.

Competitive Advantages

Sustainability

Zero chemical waste and low energy consumption for textile treatment.

Efficiency

Faster production cycles through optimized plasma settings.

Precision

Real-time defect detection and adjustments ensure consistent quality.

Eco-Friendly

Meets global demand for environmentally responsible manufacturing processes.

Expected Outcomes

Enhanced Productivity: Increase throughput with minimal downtime due to defects.

Scalability: Expandability to new fabric types and additional hydrophilic applications.

Optimized Hydrophilic Coating: Achieve uniform surface treatment for improved water absorption.

High Accuracy: Over 98% precision in fabric classification and defect detection.

Hardware and Software

Hardware Requirements:

Cameras: Industrial cameras with high resolution for real-time defect and surface inspection.
Processing Units: Industrial GPUs or processors like NVIDIA Jetson for real-time AI computations.
Plasma Equipment: Fabrizon's proprietary APPT machine with adjustable parameters tailored for hydrophilic coatings.
Sensors: Surface charge measurement sensors to assess hydrophilicity after treatment.

Software:

AI Algorithms:

- Neural networks (e.g., Swin Transformer) for fabric classification.
- Custom image processing algorithms for defect detection and plasma adjustment.
- Control Systems: Node-RED for a user-friendly graphical interface.
- Programming Languages: Python for AI and image processing implementation**.**

Implementation Process

1. Data Collection:

- Gather images of various untreated fabrics and Fabrizon-treated hydrophilic fabrics.
- Annotate defect types for supervised training of AI models.

2. Model Training:

- Train neural networks for fabric type identification and defect detection.
- Develop AI-driven plasma optimization algorithms to enhance hydrophilic properties.

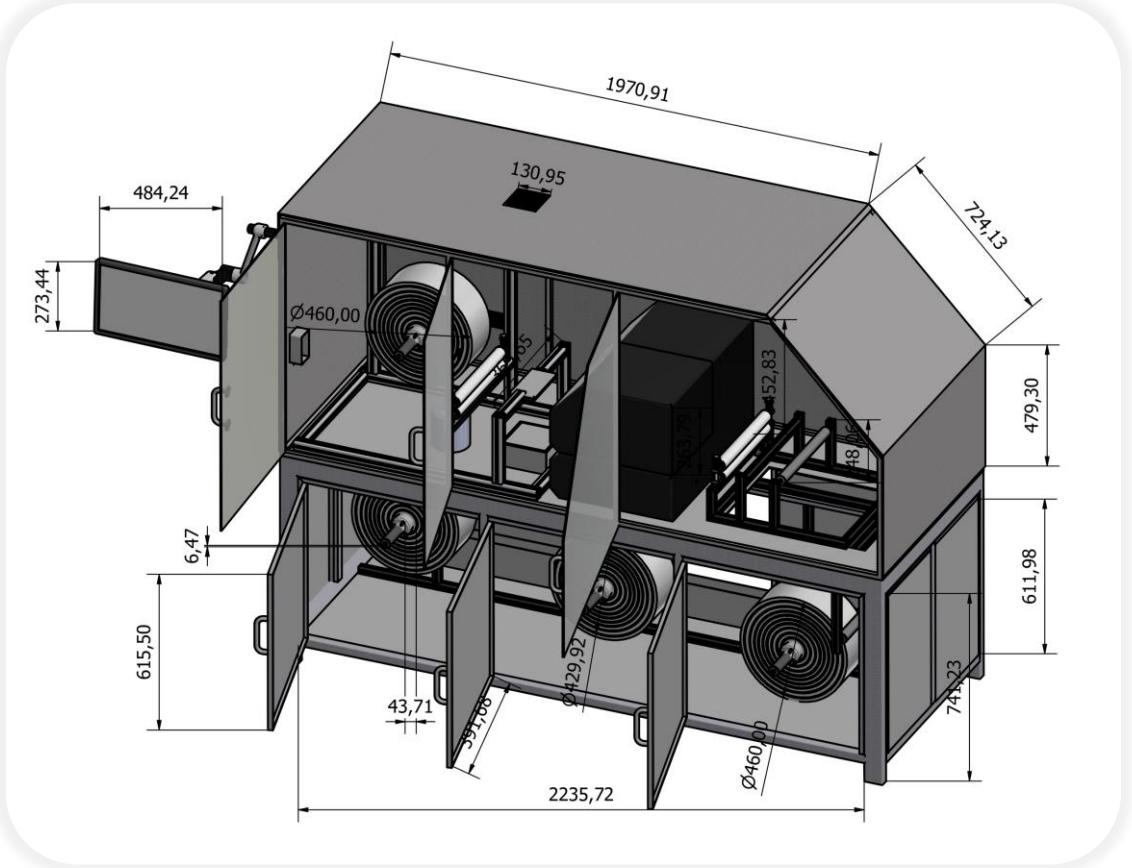
3. Hardware Integration:

- Install cameras and sensors within the APPT system.
- Link real-time sensor feedback to the AI-driven plasma control system.

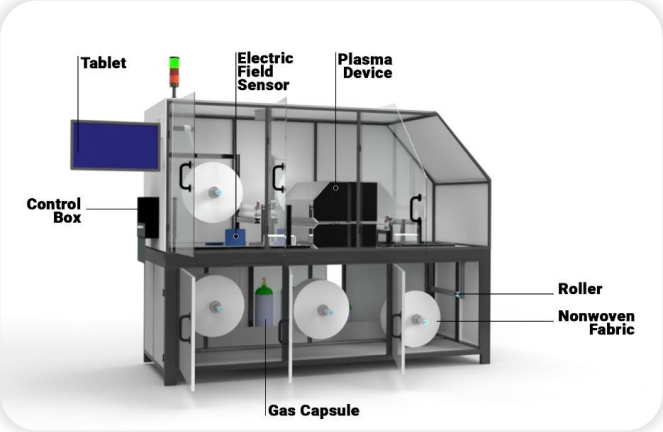
4. Testing and Optimization:

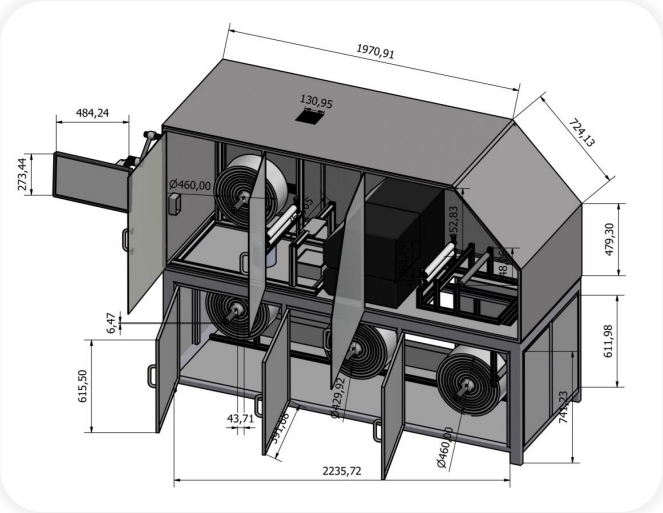
- Conduct initial tests to fine-tune AI models and hardware interactions.
- Optimize plasma settings to maximize hydrophilic surface performance.

PRODUCT PRESENTATION



PRODUCT PRESENTATION





Fabric Entry

- Fabric rolls are fed into the system using rollers to ensure smooth and uniform movement.

Gas Injection

- A controlled mix of gases is supplied to the plasma head for ionization.

Plasma Generation

- The electrode assembly generates plasma by ionizing the gas under atmospheric pressure.

Surface Treatment

- The plasma head applies the ionized gas to the fabric surface, enhancing hydrophilic properties.

Real-Time Monitoring

- Surface sensors measure treatment effectiveness and provide feedback for dynamic adjustments.

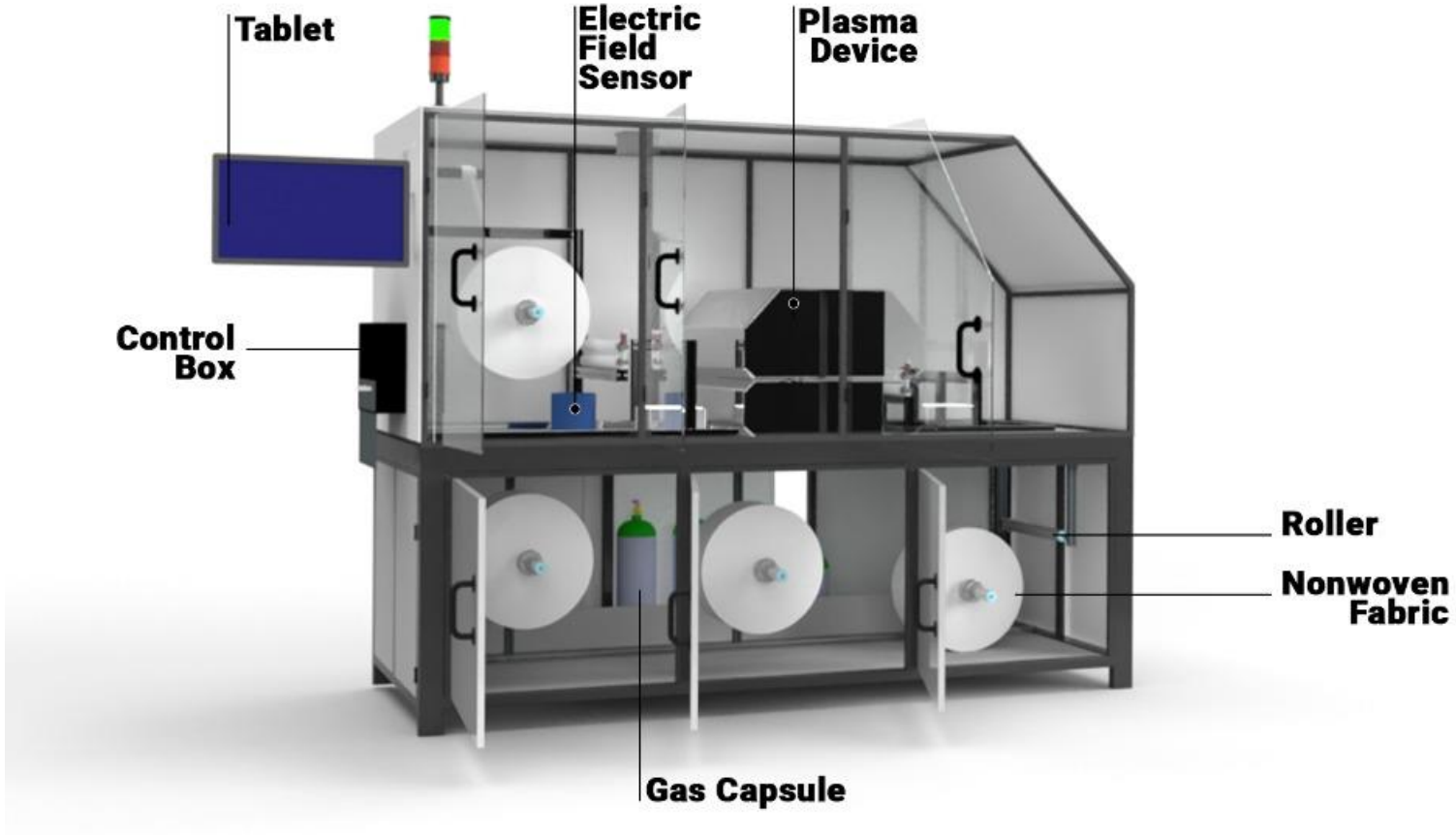
Parameter Adjustment

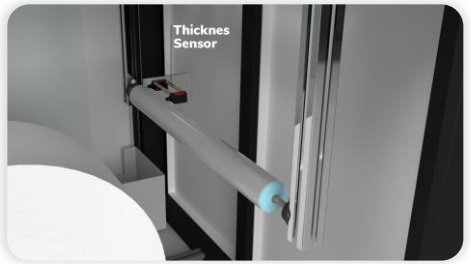
- The system adjusts plasma intensity, gas composition, and duration based on sensor feedback to ensure uniform treatment.

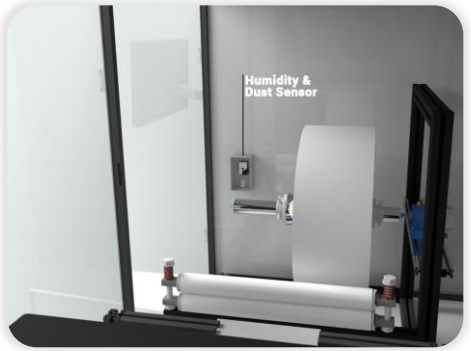
Fabric Exit

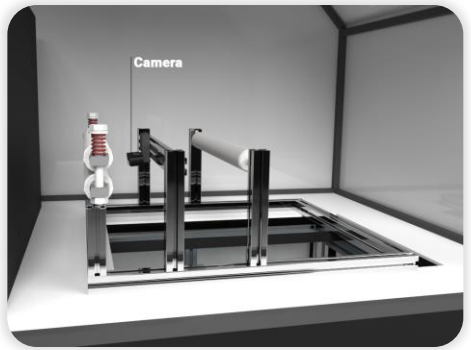
- Treated fabric is collected at the output, ready for further processing or use.

PRODUCT PRESENTATION









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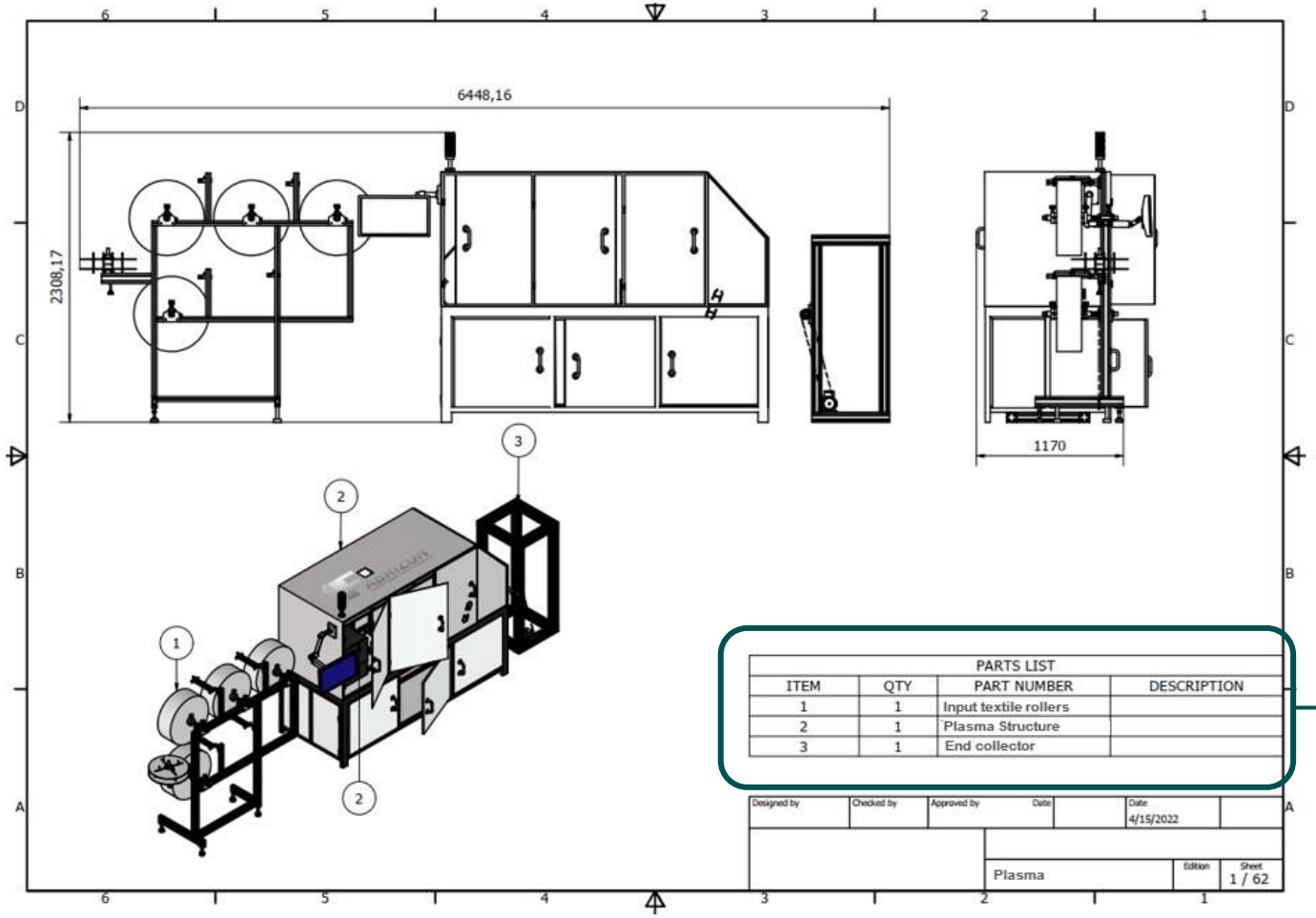


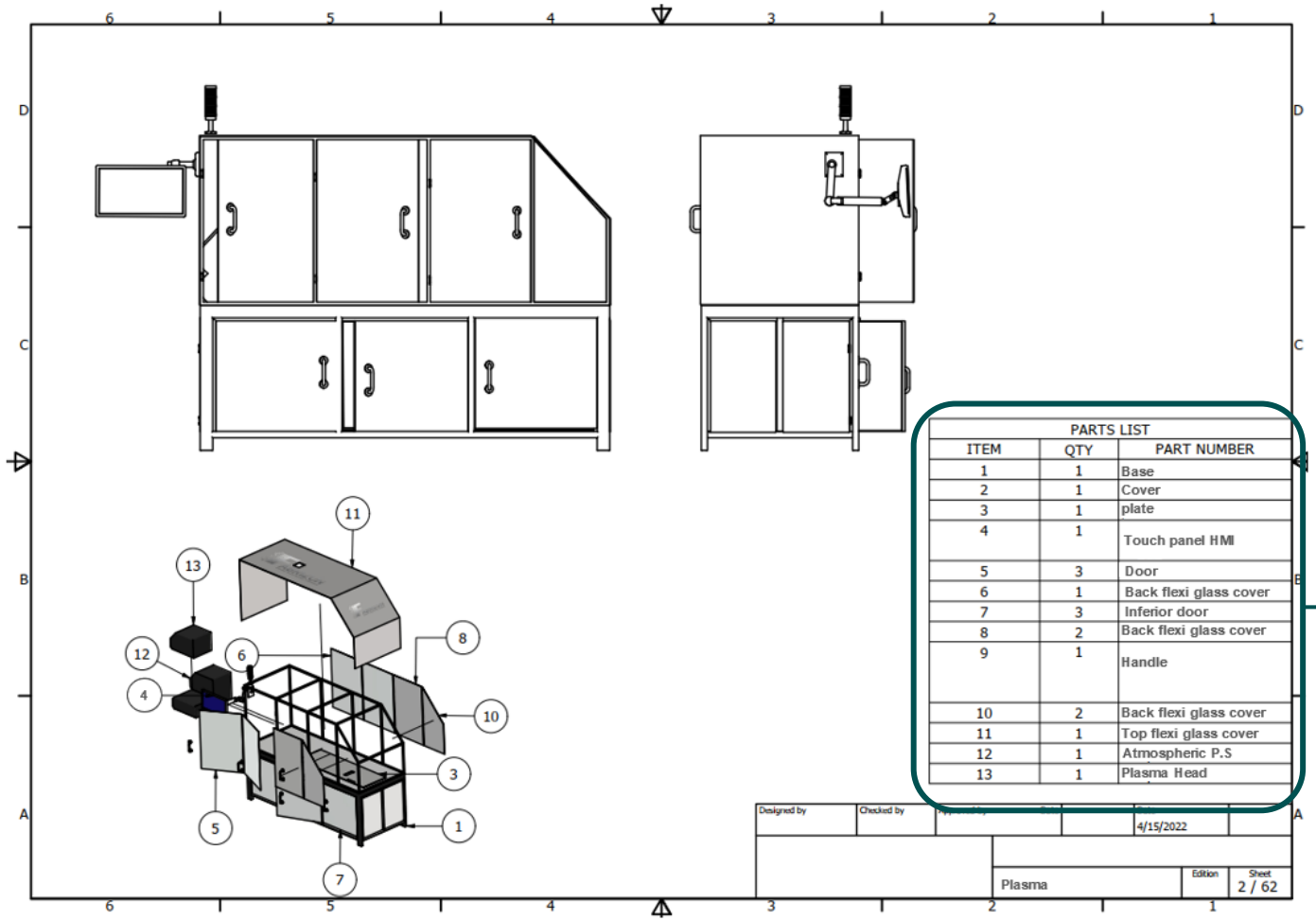
PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	Input textile rollers	
2	1	Plasma Structure	
3	1	End collector	

Designed by	Checked by	Approved by	Date	Date
				4/15/2022

Plasma		Edition	Sheet 1 / 62

1. Input Textile Rollers
2. Plasma structure + traction system
3. End collector

PRODUCT PRESENTATION



1. Base
2. Cover
3. Plate
4. Touch panel HMI
5. Door
6. Back flexi glass cover
7. Inferior door
8. Back flexi glass cover
9. Handle
10. Back flexi glass cover
11. Top flexi glass cover
12. Atmospheric plasma system
13. Plasma Head

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