Da Vinci Smart Manufacturing

BRD S03.01 System Config Plant Config

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1. Plant Configuration

1.1. Introduction

The Plant Configuration module is designed to allow authorized users, to configure and manage critical aspects of plants such as basic plant details, energy prices, workshops, products, functions,

and shift schedules. This document aims to capture the business requirements and process workflows for using and interacting with the Plant Configuration module.

2. Objectives

The primary objective is to develop a user-friendly module that offers the following functionalities:

- **Viewing and managing plant details:** Displaying plant information retrieved from an external system and managing other details captured in MES
- **Managing energy prices:** Adding and updating energy prices, with historical logs maintained.
- **Managing workshops:** Adding, deleting, and validating workshop entries.
- **Managing products:** Activating and deactivating products related to the plant.
- **Mapping functions:** Enabling or disabling menu items for specific functions.
- **Managing shift schedules:** Editing and maintaining valid shift schedules for plant operations.

3. Add Plant Configuration

3.1. Basic Details

The following data will be captured,

- **Plant ID:**
  - A unique identifier for the plant
  - Autopulated, non-editable field with value from Database
  - Mandatory - Yes
  - Default value – Auto-Populated
  - Validation – Unique at DB level
- **Plant Name:**
  - The official name of the plant.
  - Autopulated, non-editable field with value from Database
  - Mandatory - Yes
  - Default value – Auto-Populated
  - Validation – None
- **Area Code:**
  - The geographical or regional code of the plant location.
  - Autopulated, non-editable field with value from Database
  - Mandatory - Yes
  - Default value – Auto-Populated
  - Validation – None
- **Plant Address**
  - Users can input or update the physical address of the plant.
  - Mandatory - Yes
  - Default value - No

- Field Type – User Input
- Validation – Alphanumeric and accepts only "," Min – 4, Max – 50

- **Language**
  - Single Select Dropdown that **d**efines the default language for the user interface and system messages.
  - Mandatory - Yes
  - Default value - No
  - Field Type – Single Select Dropdown
  - Validation – Alphanumeric and accepts only "," Min – 4, Max – 50
  - Values– English, French, Spanish
- **Time Zone:**
  - Single-select dropdown that sets the plant's local time for timestamps, ensuring time-sensitive data is aligned with the plant's region.
  - Mandatory - Yes
  - Default value - No
  - Field Type – Single-select dropdown
  - Values –

(UTC - 05:00) Eastern Time (US & Canada)
(UTC - 06:00) Central Time (US & Canada)
(UTC - 07:00) Mountain Time (US & Canada)
(UTC - 08:00) Pacific Time (US & Canada)
(UTC + 01:00) Central European Time
(UTC - 03:00) Argentina Time
(UTC - 04:00) Venezuelan Standard Time
(UTC + 08:00) China Standard Time

- **Unit System:**
  - Single-select Dropdown that determines whether the plant uses metric (e.g., kilograms, meters) or imperial (e.g., pounds, feet) units for measurements.
  - Mandatory - Yes
  - Default value - No
  - Field Type – Single-select dropdown
  - Values – Metric System, Imperial System

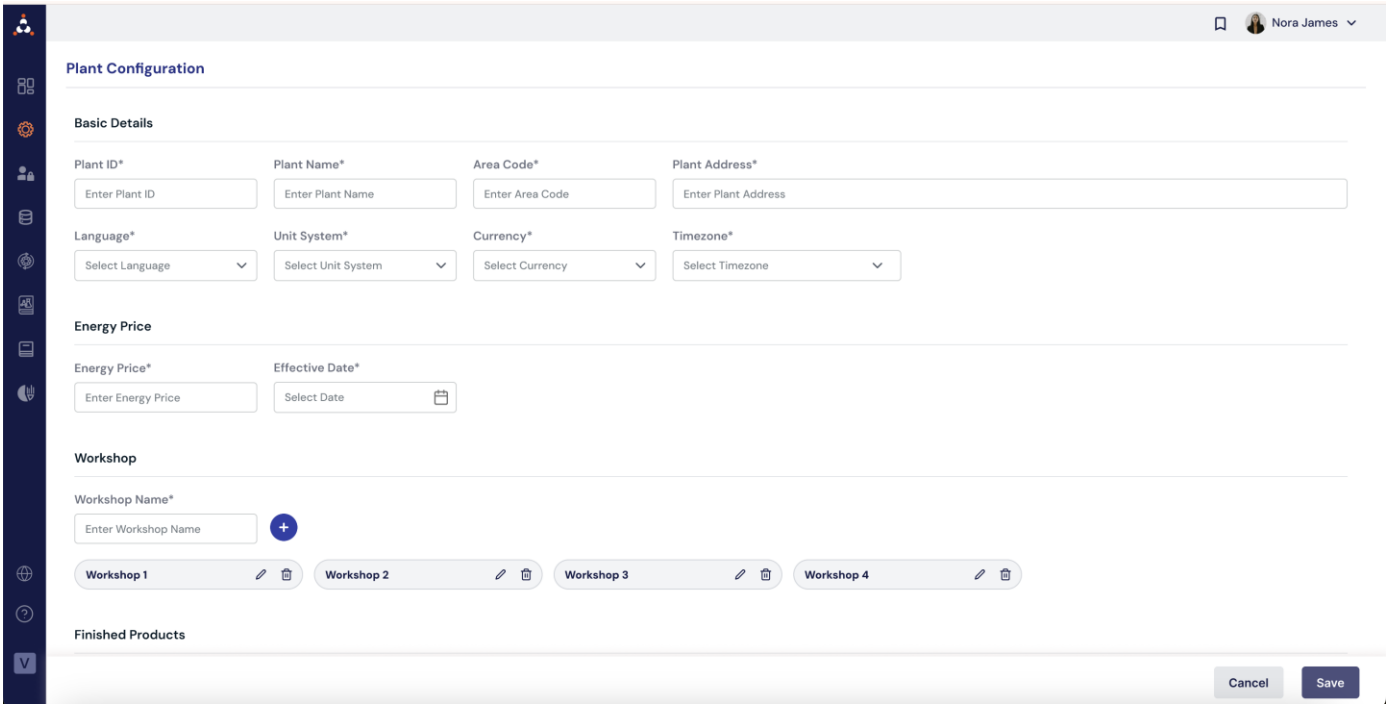
- **Currency:**
  - Single-select Dropdown that sets the currency for financial transactions, pricing, and energy cost data.
  - Mandatory - Yes
  - Default value - No
  - Field Type – Single-select dropdown
  - Values

English	French	Spanish
Euro (EUR)	Euro (EUR)	Euro (EUR)
Bolivar (VEB)	Bolívar (VEB)	Bolívar (VEB)

Yuan (CNY)	Yuan (CNY)	Yuan (CNY)
Dollar (CAD)	Dollar (CAD)	Dólar (CAD)
Kroner (NOK)	Couronne (NOK)	Corona (NOK)
Pound Sterling (GBP)	Livre sterling (GBP)	Libra esterlina (GBP)
Dollar (USD)	Dollar (USD)	Dólar (USD)
Peso (ARS)	Peso (ARS)	Peso (ARS)
Rand (ZAR)	Rand (ZAR)	Rand (ZAR)

Note:

- Data for Plant ID, Plant Name, and Area Code are retrieved from the external system. The plant address is editable, while the other fields are fixed after the first setup.
- Time zone, Language, Unit System, Currency fields are editable only during the initial configuration. Once set, they become non-editable to prevent system disruption, as altering them post-configuration could affect system operations and data consistency.



3.2. Energy Price

Energy prices are maintained per plant with historical logs recorded in an Excel file. Users can add, edit, and download energy price logs.

- **Energy Price**
  - User Input
  - Mandatory - Yes
  - Default value - No
  - Field Type – User Input
  - Validation – Numeric 8 integers + decimal point + 2 decimals, No space allowed
- **Effective Date**

- User selects date from Date Calendar
- Mandatory - Yes
- Default value - No
- Field Type – Calendar Date picker
- Validation – Past, Current and Future date allowed

- The system shall allow users to set Energy Price with an effective date, which can be in the past, present, or future.
  - If the selected date exists in the energy price log, the system displays a prompt: “Some parameters already exist in this date. Do you wish to overwrite them?”
  - If the selected date is new, the system appends the new energy price details to the log without prompting.
  - If no effective date is specified but energy price details are edited, the system overwrites the current record with a prompt for confirmation.
  - Historical and future data can be viewed by downloading the Excel file using the download option.
- After clicking “Save” the Plant Configuration screen will return to non-editable format with a success message: “Plant Configuration Successfully Updated.”
- Log Export: Users can export the energy price log using the Download button.

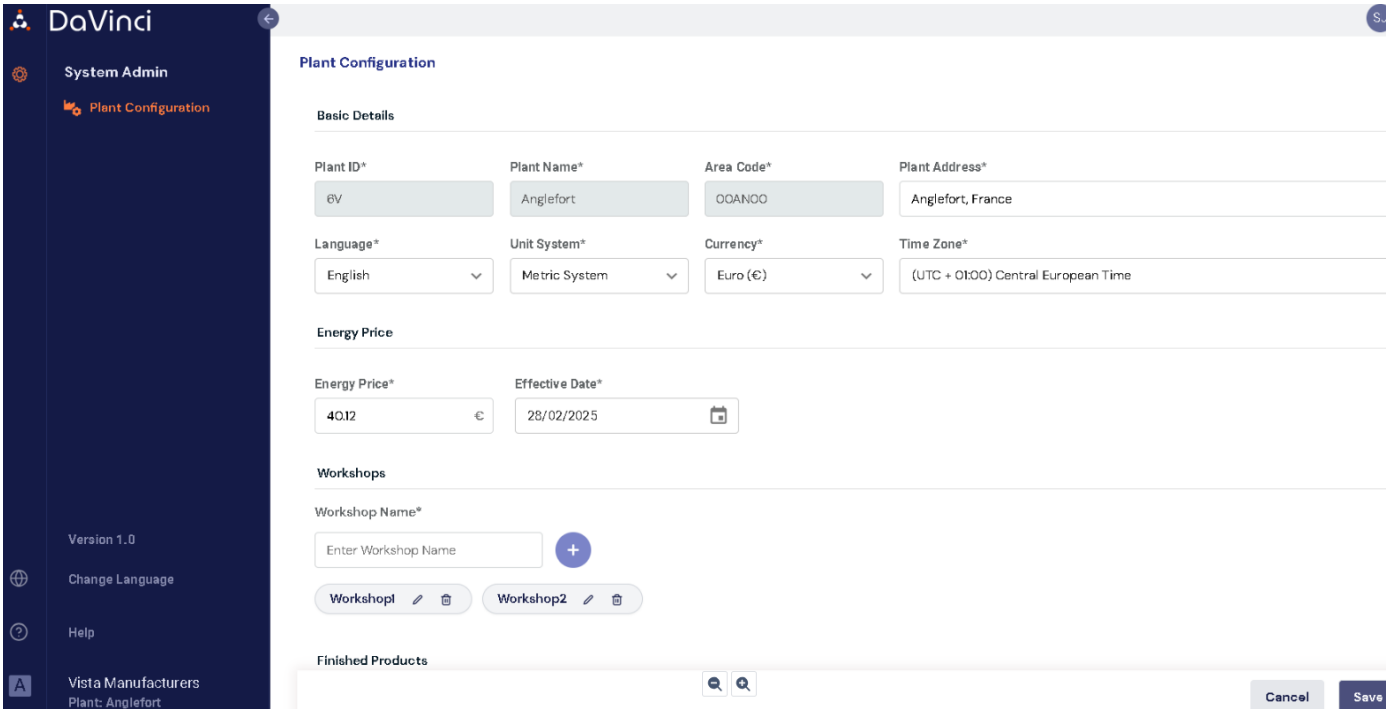
3.3. Workshops

This section allows users to manage plant workshops. Workshops can be added or deleted depending on their association with furnaces.

- Adding a Workshop
  - In the Workshops section, users can enter a new workshop name in the provided text field and click the “+” button.
    - Field name – Workshop Name
    - User Input
    - Mandatory - Yes
    - Default value - No
    - Validation –
      - Unique and case insensitive, Alphanumeric, Min 1, max 20, no space allowed,
      - Atleast one workshop pill should be added to enable Save button
  - Newly added workshops appear as pills below
  - Users can add multiple workshops by repeating the process and click “Save” to save the changes.
  - Workshop names must be unique. If a user attempts to enter a duplicate name, an error message is displayed: “Workshop name already exists”
- Editing a Workshop
  - Once a workshop is added it appears as a pill below. The pill will have the follwoign information
    - Workshop Name
    - Edit Icon
    - Delete Icon

- When the user clicks the edit icon, the workshop name displayed in the pill becomes editable. The same field validations as those used in the “Add Workshop” flow will apply. After modifying the name, the user can either temporarily save the changes or discard them. The updated workshop name is only committed to the database when the entire Plant Configuration page is saved.

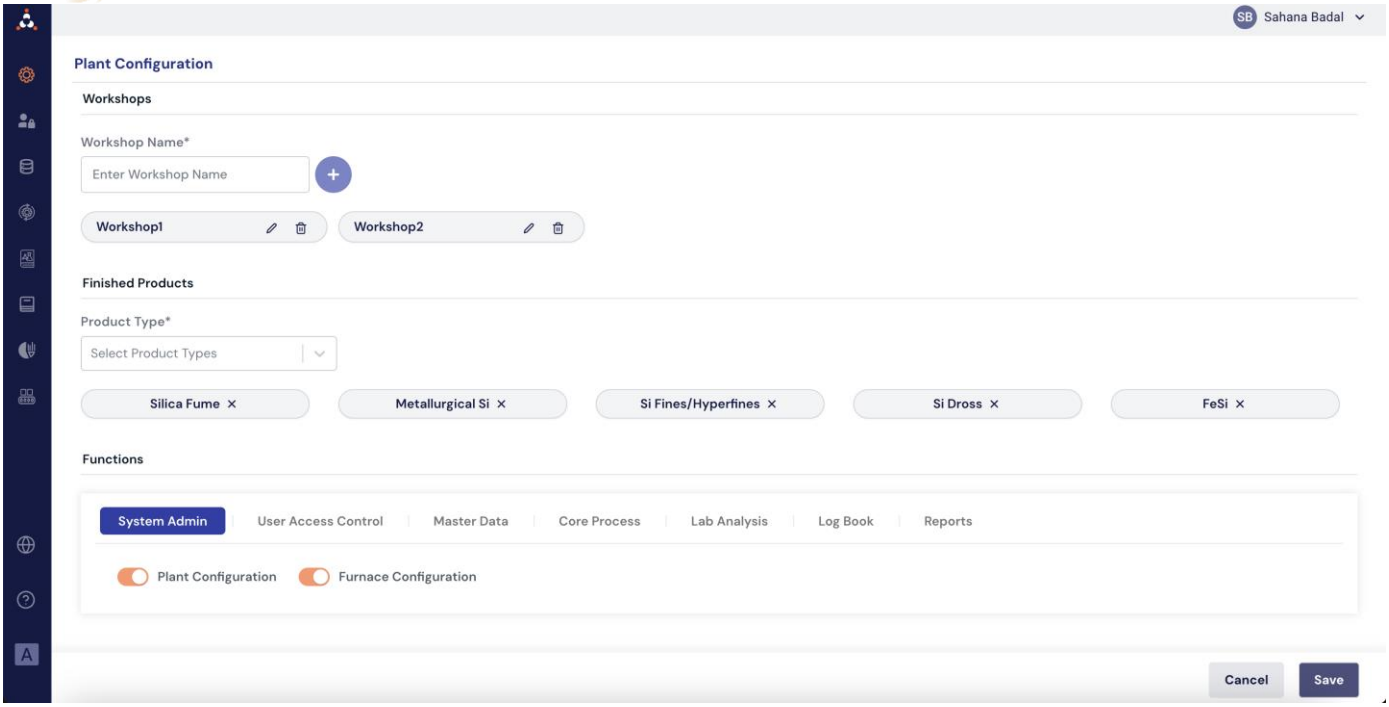
- Deleting a Workshop:
  - If a workshop is not mapped to any furnace, it can be deleted. A confirmation message is displayed before deletion: “Are you sure you want to delete?”
  - If the workshop is mapped to a furnace, an error message prevents the deletion: ”Workshop Name” is mapped with Furnace Config.”



3.4. Finished Products mapping and un-mapping

Users can manage the finished products associated with the plant, mapping or un-mapping them as needed.

- In the Finished Products section, a list of products appears with checkboxes next to each product. This list added from the backend.
  - Field Name – Product Type
  - Field Type – Searchable multiselect dropdown with a Select All option based on the string typed in search field.
  - Values – FeSi, Silica Fume, Metallurgical Si, Si Fines/Hyperfines, Si Dross
  - Mandatory - Yes
  - Default– No
  - Validation - None
- Users can check or uncheck products to map or un-map them and click “Save” to apply the changes.
- Upon saving, the updated products is reflected under the Finished Products section as pills. Users can remove it from the added list by clicking on the close icon in the pills.



3.5. Function Mapping

The **Functions** section allows authorized users to configure functional access and enable/disable specific plant-level features across different functional categories like System Admin, User Access Control, Core Process, etc., based on the selected Product Types.

Function Tabs (Horizontal Navigation):

- Tabs include:
    a. System Admin
    b. User Access Control
    c. Master Data
    d. Core Process
    e. Lab Analysis
    f. Log Book
    g. Reports
2. Only one tab is active at a time.
3. Clicking a tab updates the function toggle options below it.

Function Toggles (Per Tab):

a. Each tab has a unique set of toggle switches representing feature flags for that functional area.
b. Examples:
    i. **System Admin**:
        1. Plant Configuration
        2. Furnace Configuration
    ii. **User Access Control**:
        1. Users

2. Roles

iii. **Master Date**
   1. Material Maintenance
      a. Furnace Raw Material
      b. Additives
      c. By-Products
      d. WIP
      e. Products
   2. Grading Plan

iv. **Core Process**:
   1. Production

v. **Lab Analysis**
   1. Furnace Raw Material Analysis
   2. Spout Analysis
   3. Tap Analysis

vi. **Log Book**
   1. Furnace Bed Log
   2. Tap Hole Log
   3. Furnace Downtime Log

vii. **Reports**
   1. Material Consumption Report
   2. Raw Material Analysis Report
   3. Material Size Analysis Report
   4. Quality Summary Report
   5. Production Report
   6. Tap Analysis Report
   7. Spout Analysis Report
   8. Downtime Analysis Report

c. Toggles are **ON (enabled)** when switched to orange and **OFF (disabled)** when grey.
d. State is persisted only after clicking the **Save** button.
e. Access to enable/disable functions is restricted to users with edit permissions to Plant config screen
f. System Admin and User Access Control menus are mandatory and cannot be disabled.
g. **Changes to menu items prompt the user to log out and log back in to apply the updated menu structure.**

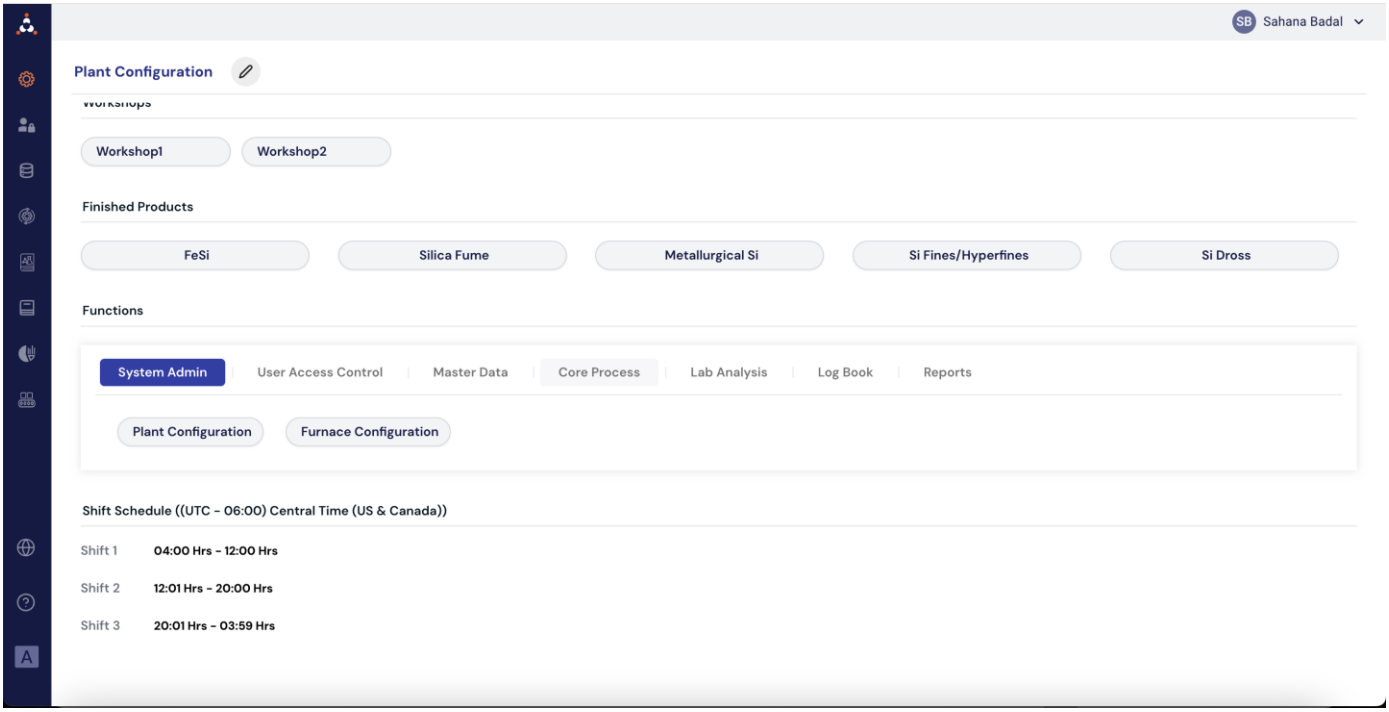
3.6. Shift Schedules Management

This section allows users to manage the plant's shift schedules, ensuring all shifts cover a full 24-hour cycle.

Shift Labels and Time Inputs:

- Three labelled shift rows:
  - **Shift 1***
  - **Shift 2***
  - **Shift 3***
- Each row has:

  - **Start Time (From)**
  - **End Time (To)**
- Time fields are in HH:MM (24-hour format).
- The time zone is displayed prominently to guide users on the basis of which all times are interpreted. Example *"Shift Schedule ((UTC – 06:00) Central Time (US & Canada))"*.
- Users can input or modify start and end times for each of the three shifts.
- Shift times must be entered in **ascending sequential order**: Shift 1 → Shift 2 → Shift 3.
- When the **Shift 1 "From" time** is entered, the system automatically computes the **Shift 3 "To" time** as: Shift 1 "From" time + 23 hours 59 minutes
  - This ensures the full cycle is covered (e.g., if Shift 1 starts at 04:00 → Shift 3 ends at 03:59 next day).
- **No overlap** is allowed between shifts.
  - Example of invalid input: Shift 1 ends at 12:30 and Shift 2 starts at 12:00 → **Error**: "Shift 2 start time overlaps with Shift 1."
- Gaps **are allowed** between shifts.
  - Example: Shift 1 ends at 12:00, Shift 2 starts at 12:10 → Valid.
- **Chronological Order Validation:**
  - Shifts must be defined in chronological sequence:
    - Shift 2 must begin **after** Shift 1 ends.
    - Shift 3 must begin **after** Shift 2 ends.
  - Circular shift logic is allowed for overnight shifts (e.g., Shift 3 from 20:01 to 03:59 next day is valid).
- **Mandatory Field Validation:**
  - All three shifts must have valid time entries before saving.
  - Time fields are **mandatory** (marked with *).
  - If any field is missing or invalid, an error will be shown on Save.
- **Persistence:**
  - Shift data is **saved** only when the user clicks the **Save** button.
  - Clicking **Cancel** will discard any unsaved changes and revert to last saved values.



3. Edit Plant Configuration

Edit mode in the Plant Configuration module allows authorized users to update configurable fields across various sections such as Basic Details, Energy Price, Workshops, Finished Products, Function Mapping, and Shift Schedules. While some fields (like Plant ID, Name, Area Code) remain non-editable and system-defined, others such as Plant Address, Energy Prices, Workshops, and Shift Schedules can be modified as per operational requirements.

Certain configuration parameters—such as Language, Time Zone, Unit System, and Currency—are only editable during the initial setup to preserve system stability and data consistency. Once changes are made, they are only committed to the system after clicking the **Save** button. The **Cancel** action discards all unsaved edits, restoring the last saved state.

3.1 Basic Details

- **Plant ID**: Auto-filled, non-editable, mandatory. Unique at DB level.
- **Plant Name**: Auto-filled, non-editable, mandatory.
- **Area Code**: Auto-filled, non-editable, mandatory.
- **Plant Address**: Editable text input. Mandatory. Alphanumeric, allows “,”, 4-50 characters.
- **Language**: Auto-filled, non-editable, mandatory.
- **Time Zone**: Auto-filled, non-editable, mandatory.
- **Unit System**: Auto-filled, non-editable, mandatory.
- **Currency**: Auto-filled, non-editable, mandatory.

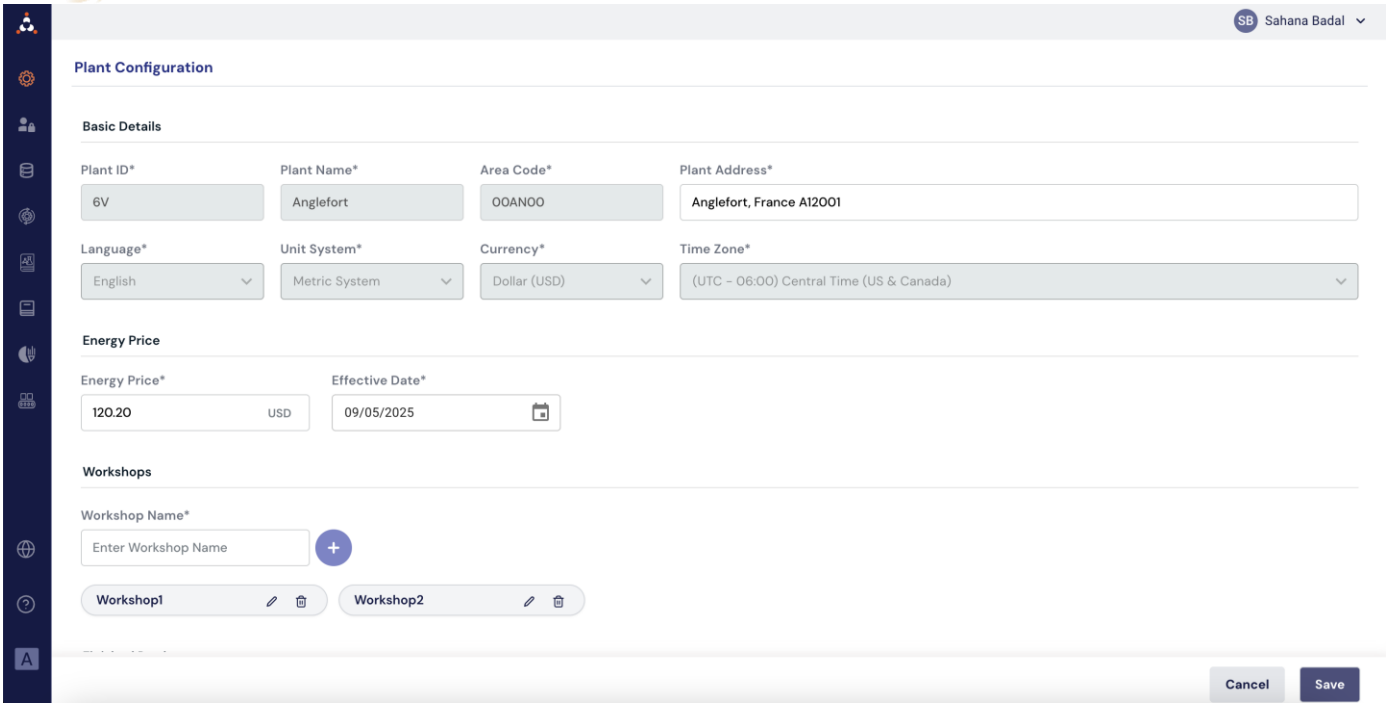
Note: Fields like Language, Time Zone, Unit System, and Currency can be edited only during initial setup. After that, they become read-only.

3.2 Energy Price

- **Energy Price**: Numeric input. Mandatory. Format: Up to 8 digits + 2 decimals.
- **Effective Date**: Date picker. Mandatory. Allows past, current, future dates.
    - If the date exists: prompt to overwrite.
    - If date is new: append to log.
    - If date not selected but value changed: prompt to overwrite current.
    - Log can be exported to Excel.
    - Save returns screen to non-edit mode with success message.

3.3 Workshops

- Auto-populated with already existing Workshops
- Add workshop by typing name and clicking +
    - Field: Mandatory, unique, case-insensitive, alphanumeric, no space, 1-20 characters.
    - At least one workshop required to enable Save.
    - Shows as pill with edit and delete icons.
- **Edit**: Clicking edit icon makes pill editable. Same validation as add. Changes saved only on clicking “Save” on main screen.
- **Delete**: Allowed only if not linked to any furnace. Confirmation shown before delete. Error if linked: “Workshop Name is mapped with Furnace Config.”



3.4 Finished Products Mapping

- Auto-populated with already mapped Products
- Searchable multi-select dropdown with “Select All”.
- Options: FeSi, Silica Fume, Metallurgical Si, Si Fines/Hyperfines, Si Dross.
- Mandatory.
- Selected products appear as pills with remove option.
- Click “Save” to confirm mappings.

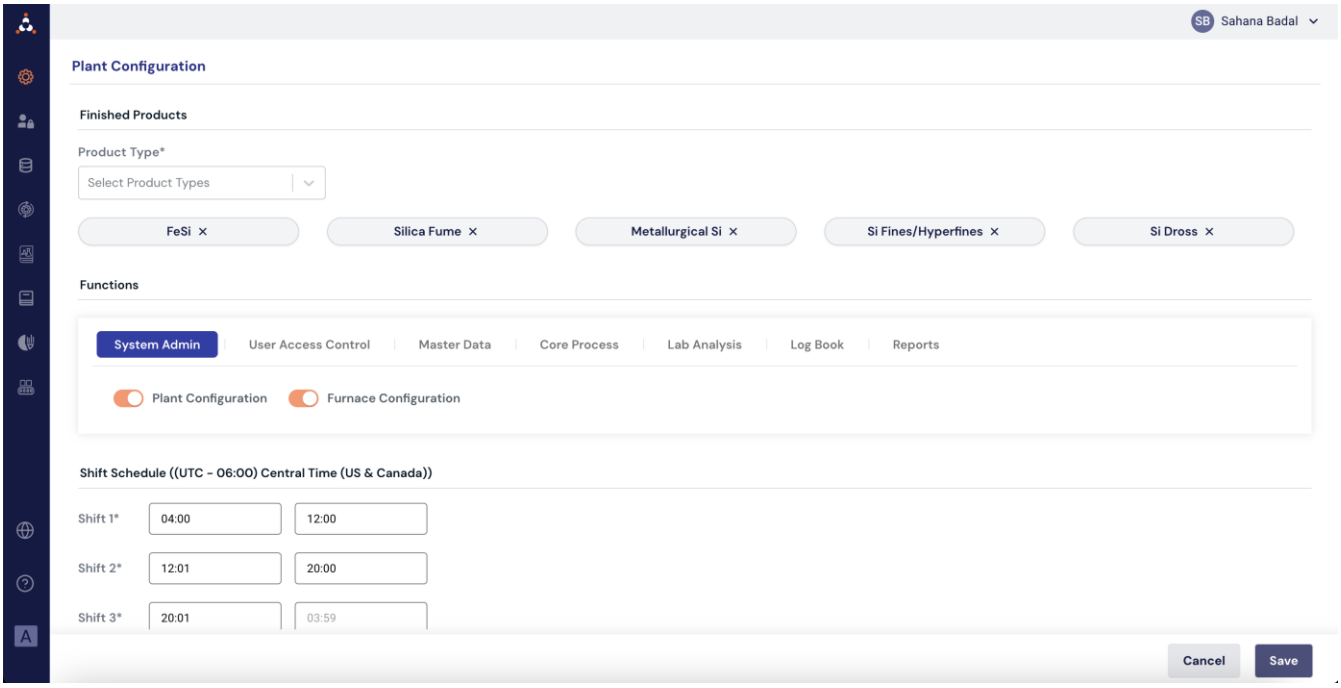
3.5 Function Mapping

- Auto-populated with already mapped Functions.
- Tabs: System Admin, User Access Control, Master Data, Core Process, Lab Analysis, Log Book, Reports.
- Each tab has toggles for plant-level functions.
- Toggles are ON (orange) or OFF (grey).
- Functions per tab include (examples):
    - System Admin: Plant Configuration, Furnace Configuration
    - User Access Control: Users, Roles
    - Master Data: Material Maintenance, WIP, Grading Plan
    - Core Process: Production, Heat Maintenance
    - Lab Analysis: Tap Analysis, Furnace RM Analysis
    - Log Book: Tap Hole Log, Downtime Log
    - Reports: Production Report, Material Analysis Reports
- Only editable by users with permission.
- System Admin and User Access Control are mandatory and cannot be toggled off.
- Any menu change requires logout/login to take effect.

3.6 Shift Schedule Management

- Auto-populated with already entered Shift timings

- Three rows: Shift 1, Shift 2, Shift 3
- Each row has start (From) and end (To) time inputs in HH:MM format.
- Displayed timezone (e.g., UTC-06:00 Central Time US & Canada).
- Entry must be in ascending sequence.
- System auto-calculates Shift 3 end time as Shift 1 start + 23h 59m.
- Overlaps not allowed; gaps allowed.
- Valid examples:
    - Gap: Shift 1 ends 12:00, Shift 2 starts 12:10
    - Invalid: Shift 1 ends 12:30, Shift 2 starts 12:00
- All shift fields are mandatory.
- Changes saved only on clicking Save.
- Cancel discards unsaved changes.



5. View Plant Configuration

The View Mode in the Plant Configuration module presents a read-only snapshot of the plant's current configuration. It allows users (typically with view-only or restricted permissions) to review critical plant setup information, without being able to modify any fields.

Access & Controls

- **Default Landing Mode**: The module opens in View Mode by default.
- **Edit Icon**:
    - Positioned at the top right of the "Plant Configuration" header.
    - Clicking the pencil icon transitions the page into **Edit Mode**, provided the user has necessary permissions.
- **Download Icon in Energy Price**:
    - Present next to the **Energy Price** label.

- On click, triggers a download of the current energy price history (assumed in .csv format; implementation dependent).
- Exported File Name – Plant_EnergyPrice_DDMMYY
- Tooltip reads – Download CSV

Effective Date	Plant Name	Energy Price	Created By	Modified By	Created At	Modified At	
08/05/25	Anglefort	120.20 $	superuser	autosuperuser	08/05/2025 | 07:32 AM	14/07/2025 | 07:19 AM	
09/05/25	Anglefort	120.20 $	autosuperuser	sdevarakonda	14/07/2025 | 07:20 AM	16/07/2025 | 08:09 AM	

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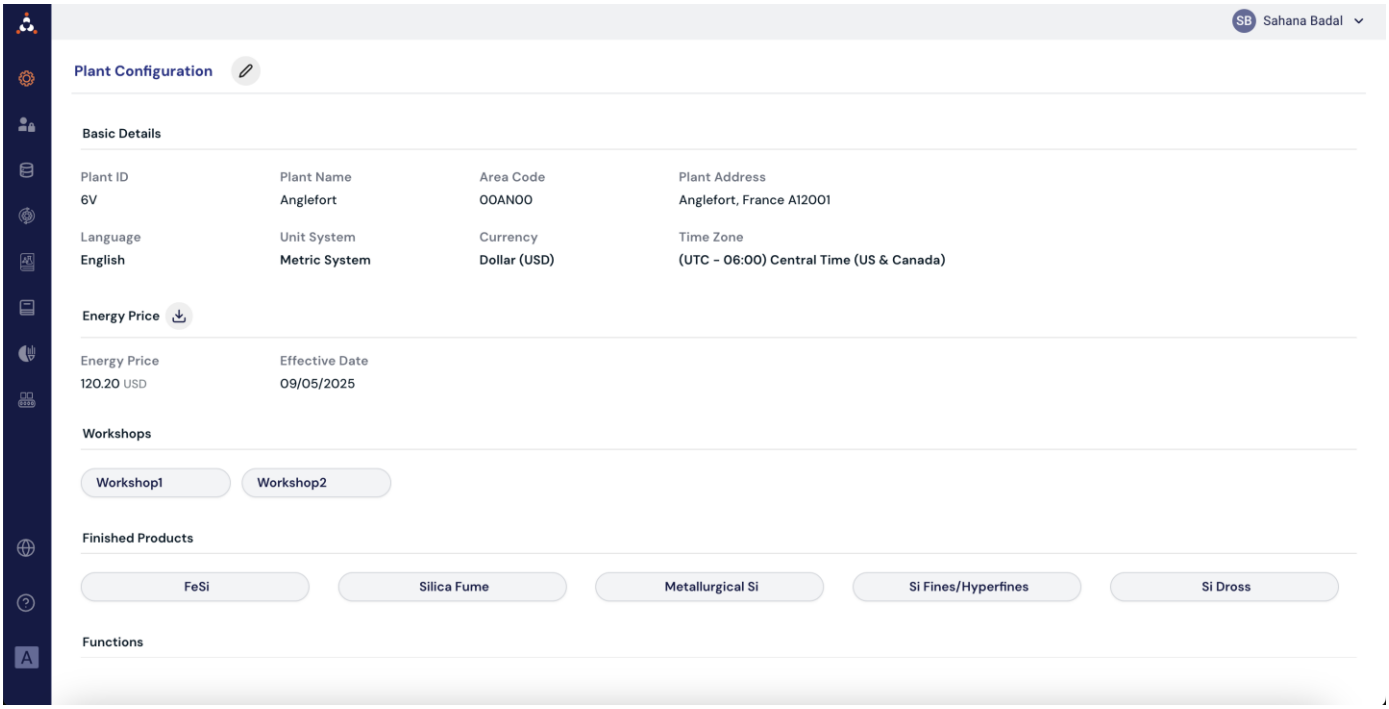
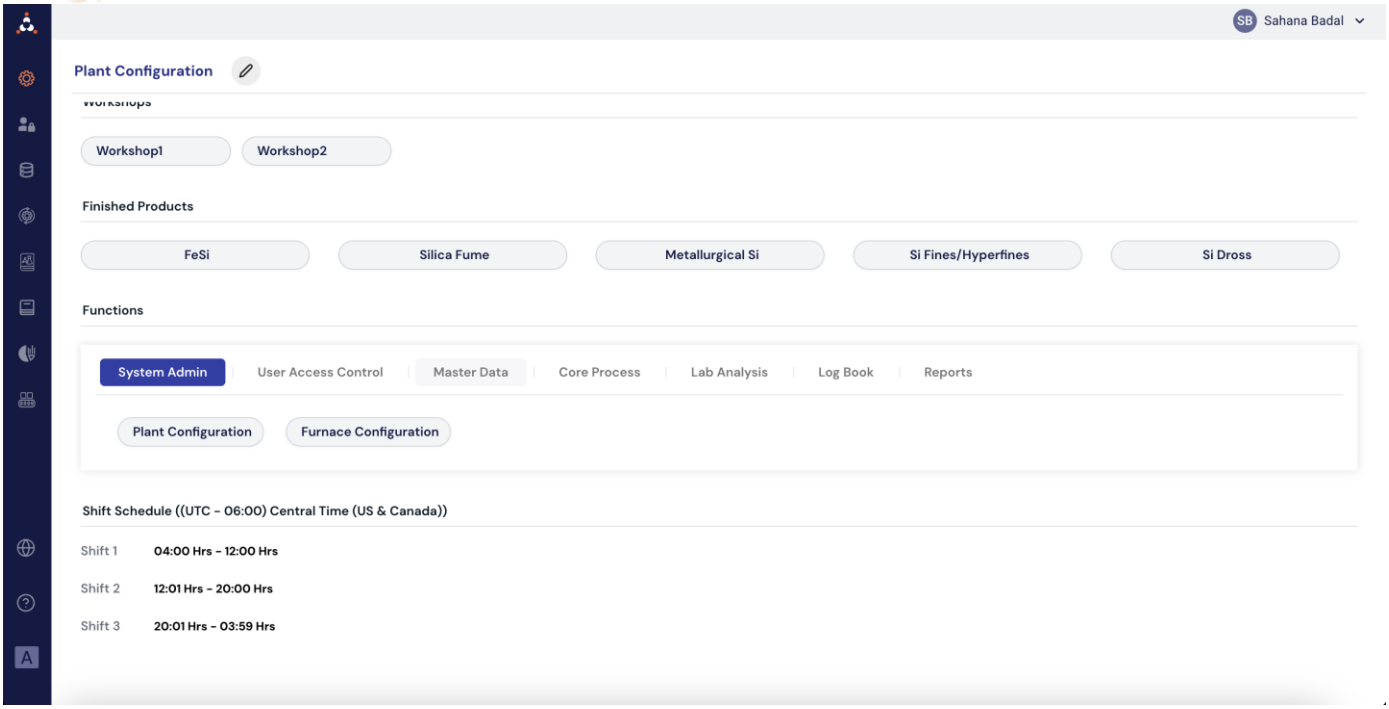
Section	Behavior
Basic Details	All fields (e.g., Plant ID, Name, Area Code, Language, Unit System, Currency, Time Zone) are shown as plain text. None of the fields are editable.
Energy Price	Displays latest energy price and effective date in a formatted view. No edit controls are visible. Download option available.
Workshops	Shown as pill-shaped tags (e.g., Workshop1, Workshop2). Not editable in view mode.
Finished Products	Listed as pill-shaped buttons. Purely informational.

Functions	Modules are displayed as tabs (e.g., Core Process, Reports). Sub-functions appear as pills:• **Enabled**: Bold border or filled pill• **Disabled**: Greyed-out pill style. Purely visual – no interaction in view mode.
Shift Schedule	Displays time slots for Shift 1, Shift 2, and Shift 3. These are non-editable and based on UTC offset of the plant's selected time zone. Display format: HH:mm Hrs – HH:mm Hrs.




Sahana Badal
Plant Configuration
Workshop1
Workshop2
Finished Products
FeSi
Silica Fume
Metallurgical Si
Si Fines/Hyperfines
Si Dross
Functions
System Admin
User Access Control
Master Data
Core Process
Lab Analysis
Log Book
Reports
Plant Configuration
Furnace Configuration
Shift Schedule ((UTC - 06:00) Central Time (US & Canada))
Shift 1
04:00 Hrs - 12:00 Hrs
Shift 2
12:01 Hrs - 20:00 Hrs
Shift 3
20:01 Hrs - 03:59 Hrs