

MES Production Confirmation - POC Specification

Version: 1.0 Date: 2026-01-30 Scope: Proof of Concept

1. POC Objective

Build a standalone Production Confirmation UI that demonstrates:

- Capturing production confirmation at operation level
- Material consumption and production tracking
- Batch traceability
- Status management

Reference Documents:

- MES – Consolidated.docx (Requirements & Data Model)
 - Satyendra MOM.pdf (Meeting Discussion)
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2. POC Scope

In Scope

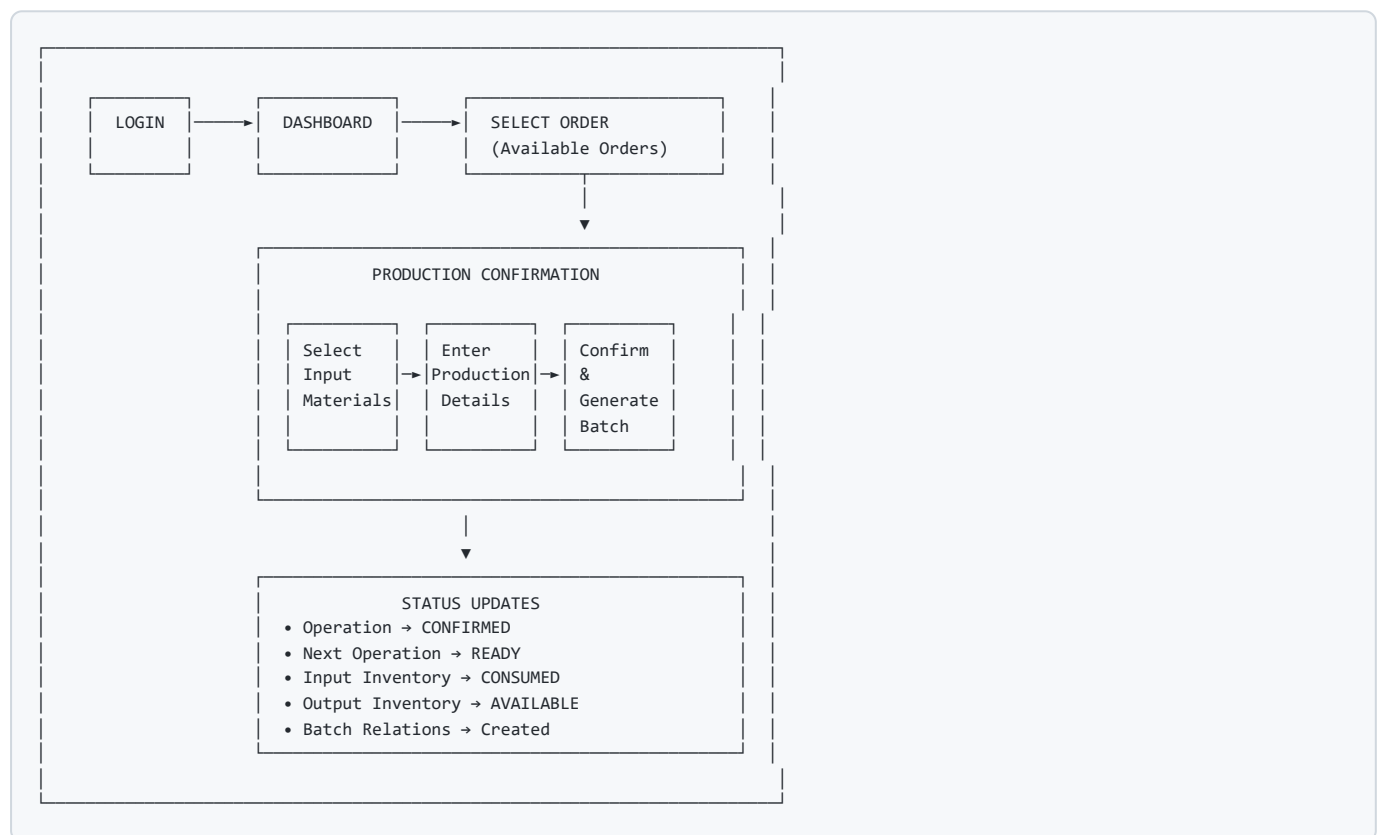
Feature	Description
Login	Single pre-seeded admin user
Order Selection	View and select available orders for production
Production Confirmation	Capture production data at operation level
Material Selection	Select RM/IM batches for consumption
Batch Generation	Generate output batch on confirmation
Status Updates	Update operation, process, order line status
Basic Traceability	View batch parent-child relationships

Out of Scope (Future)

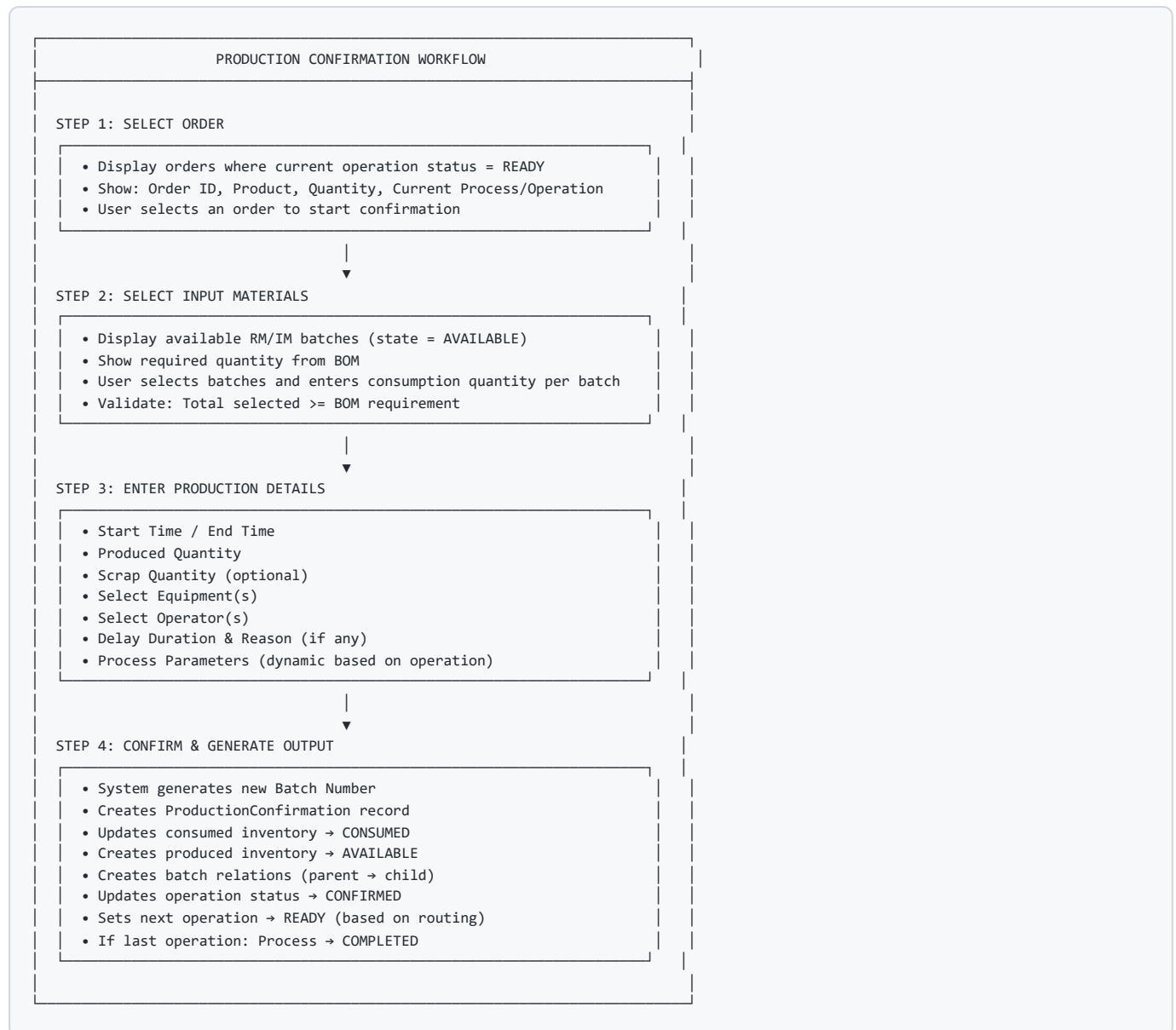
- User management & roles
- Quality control module
- Reporting & analytics
- Notifications
- External integrations

3. Core Workflow

3.1 Main Application Flow

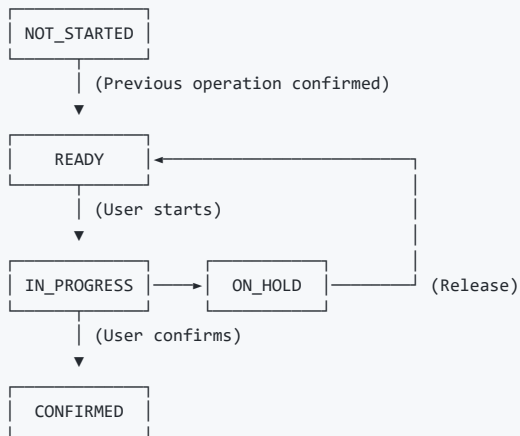


3.2 Production Confirmation Flow (Detailed)

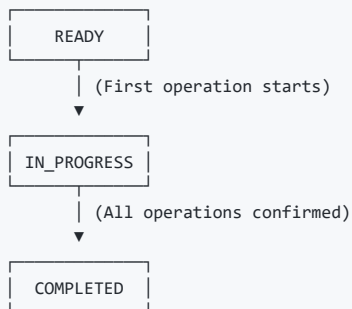


4. Status State Flows

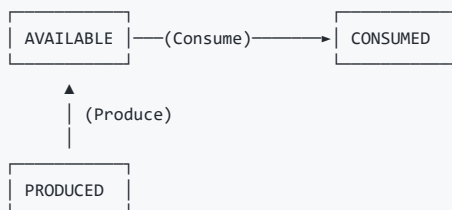
4.1 Operation Status



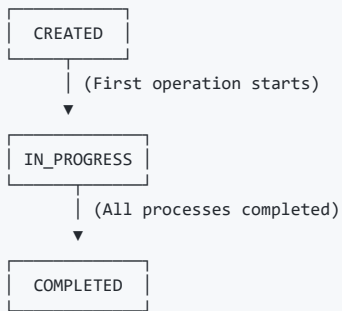
4.2 Process Status



4.3 Inventory State



4.4 Order Line Status



5. POC Wireframes

5.1 Login Screen

A wireframe of a login screen. It features a central dashed box containing the following elements:

- Header: MES Production Confirmation
- Form fields: Email and Password, each with a corresponding input box.
- Button: LOGIN
- Footer: POC: admin@mes.com / admin123

Behavior:

- Single pre-seeded user in database
- On success → Dashboard
- On failure → Show error message

5.2 Dashboard / Order Selection Screen

MES Production Confirmation

[Admin] [Logout]

Available Orders for Production

Orders shown: Operation Status = READY

Order ID	Product	Qty	Process	Operation
ORD-001	Steel Coil	100 T	Rolling	Hot Rolling
ORD-002	Steel Sheet	50 T	Tempering	Heat Treatment
ORD-003	Steel Bar	200 T	Casting	Continuous Cast
ORD-005	Steel Plate	120 T	Melting	Furnace Load

Selected Order Details

Order: ORD-001
Product: Steel Coil (SKU-SC-001)
Order Qty: 100 T
Delivery Date: 2026-02-15

Current Process: Rolling (Process 3 of 5)
Current Operation: Hot Rolling (Op-10)
Operation Status: READY

Process Flow:

Melting
✓

Casting
✓

Rolling
●

Tempering
○

Cutting
○

BOM Input Required: Steel Slab (Cast) - 105 T
Expected Output: Steel Coil (Rolled) - 100 T

[Start Production Confirmation]

Legend: ✓ Completed ● Current ○ Pending

Data Source:

- Orders joined with OrderLineItems, Processes, Operations
- Filter: Operations.Status = 'READY'

5.3 Production Confirmation Screen

MES Production Confirmation

[Admin] [Logout]

[< Back]

Production Confirmation

Order: ORD-001 | Process: Rolling | Operation: Hot Rolling (Op-10)

STEP 1: Input Materials

Required: Steel Slab (Cast) - 105 T (from BOM)

Available Batches:

<input type="checkbox"/>	Batch ID	Material	Available	Consume
<input checked="" type="checkbox"/>	BATCH-CS-001	Steel Slab	60 T	[55]
<input checked="" type="checkbox"/>	BATCH-CS-002	Steel Slab	70 T	[50]
<input type="checkbox"/>	BATCH-CS-003	Steel Slab	45 T	[]

Total Selected: 105 T Required: 105 T ✓ Requirement Met

STEP 2: Production Details

Start Time

End Time

[2026-01-30] [09:00]

[2026-01-30] [11:30]

Produced Quantity

Scrap Quantity

Yield

[100] T

[5] T

95.2%

Equipment

Operator

☒ Rolling Mill #1

☒ John Smith (OP001)

☒ Rolling Mill #2

☒ Mike Wilson (OP002)

☐ Rolling Mill #3

☐ Sarah Brown (OP003)

Delay (if any)

Duration: [30] mins

Reason: [Equipment Issue ▼]

STEP 3: Process Parameters

Temperature

Pressure

Speed

Thickness

[850] °C

[120] bar

[25] m/min

[2.5] mm

Energy Consumption

Coolant Usage

[450] kwh

[150] L

(Parameters are dynamic based on Operation + Product)

STEP 4: Output Batch

New Batch Number:

BATCH-RC-20260130-001 (Auto-generated)

Output Material:

Steel Coil (Rolled)

Output Quantity:

100 T

[Confirm Production]

On Confirm:

1. Create ProductionConfirmation record
2. Update consumed batches: Inventory.State → CONSUMED
3. Create new Inventory record: State = AVAILABLE
4. Create new Batch record
5. Create BatchRelations (parent batches → child batch)
6. Update Operation.Status → CONFIRMED
7. Set next Operation.Status → READY
8. If last operation, update Process.Status → COMPLETED
9. Create AuditTrail entries

5.4 Confirmation Success Screen

MES Production Confirmation

[Admin] [Logout]

✓

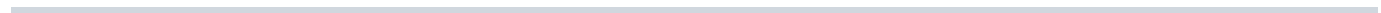
Production Confirmed!

Order: ORD-001
Operation: Hot Rolling (Op-10)
Produced: 100 T
Batch: BATCH-RC-20260130-001

Next Operation: Cold Rolling
Status: READY

Back to Order List

[View Batch Details]



5.5 Batch Traceability Screen

MES Production Confirmation

[Admin] [Logout]

[< Back]

Batch Traceability

Batch Information

Batch Number: BATCH-RC-20260130-001

Material: Steel Coil (Rolled)

Quantity: 100 T

Status: AVAILABLE

Created At: Hot Rolling (Op-10) | Rolling Process

Created On: 2026-01-30 11:30

Genealogy (Input → Output)

INPUT BATCHES (Parents)

OUTPUT BATCH (Child)

BATCH-CS-001

Steel Slab

Consumed: 55 T

Operation: Casting

BATCH-CS-002

Steel Slab

Consumed: 50 T

Operation: Casting

BATCH-RC-20260130-001

Steel Coil (Rolled)

Produced: 100 T

Operation: Rolling

Total Input: 105 T

Total Output: 100 T

Yield: 95.2%

Production Details

Order: ORD-001

Process: Rolling

Operation: Hot Rolling (Op-10)

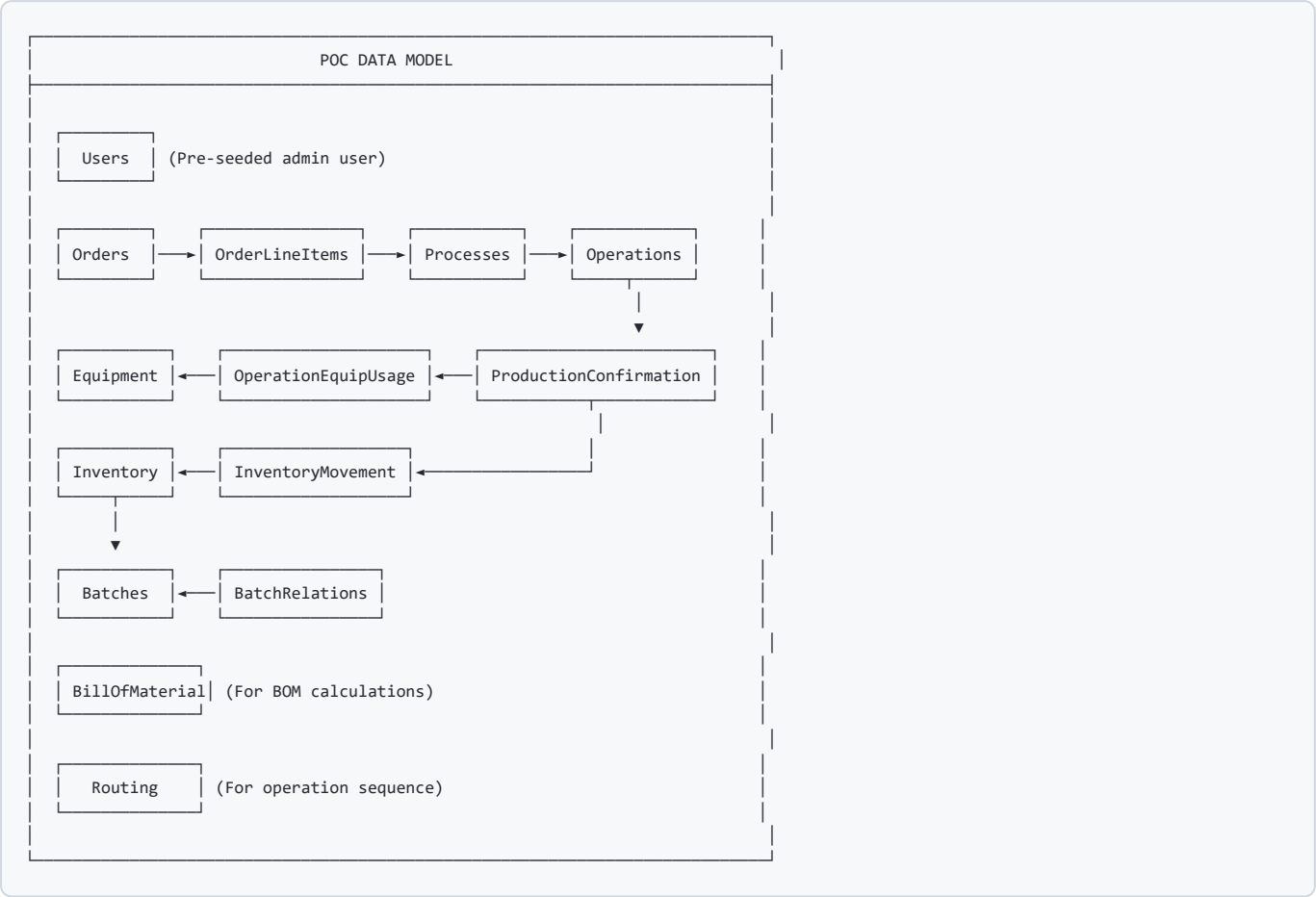
Start: 2026-01-30 09:00 End: 2026-01-30 11:30

Equipment: Rolling Mill #1, Rolling Mill #2

Operator: John Smith, Mike Wilson

6. Data Model (From Consolidated Document)

6.1 Core Tables for POC



6.2 Table Definitions (Key Fields)

Users

UserID (PK)
Email
PasswordHash
Name
Status (ACTIVE)

Orders

OrderID (PK)
CustomerID
OrderDate
Status (CREATED / IN_PROGRESS / COMPLETED)

OrderLineItems

OrderLineID (PK)
OrderID (FK)
ProductSKU
Quantity
DeliveryDate
Status (CREATED / IN_PROGRESS / COMPLETED)

Processes

ProcessID (PK)
OrderLineID (FK)
BOMID (FK)
StageName
Status (READY / IN_PROGRESS / COMPLETED)

Operations

OperationID (PK)
ProcessID (FK)
OperationName
OperationType
Status (NOT_STARTED / READY / IN_PROGRESS / CONFIRMED)

ProductionConfirmation

ConfirmationID (PK)
OperationID (FK)
ProducedQty
ScrapQty
StartTime
EndTime
DelayMinutes
DelayReason
ProcessParameters (JSON)
CreatedBy
CreatedOn

Inventory

InventoryID (PK)
MaterialID
InventoryType (RM / IM / FG)
State (AVAILABLE / CONSUMED / PRODUCED)
Quantity
BatchID (FK)

Batches

BatchID (PK)
MaterialID
BatchNumber
Quantity
GeneratedAtOperationID (FK)
Status (AVAILABLE / CONSUMED)
CreatedOn

BatchRelations

RelationID (PK)
ParentBatchID (FK)
ChildBatchID (FK)
OperationID (FK)
QuantityConsumed
RelationType (MERGE)

Equipment

EquipmentID (PK)
Name
EquipmentType (Batch / Continuous)
Status (AVAILABLE / IN_USE)

BillOfMaterial

BOMID (PK)
ProductSKU
MaterialID
QuantityRequired
YieldLossRatio
SequenceLevel

7. API Endpoints (POC)

Authentication:

POST	/api/auth/login	- Login
POST	/api/auth/logout	- Logout
GET	/api/auth/me	- Current user

Orders:

GET	/api/orders/available	- Orders with READY operations
GET	/api/orders/:id	- Order details with processes

Operations:

GET	/api/operations/:id	- Operation details
GET	/api/operations/:id/bom	- BOM requirements for operation

Inventory:

GET	/api/inventory/available	- Available batches for consumption
GET	/api/inventory/available?materialId=X	- Filter by material

Production:

POST	/api/production/confirm	- Submit production confirmation
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Batches:

GET	/api/batches/:id	- Batch details
GET	/api/batches/:id/genealogy	- Batch traceability

Master Data:

GET	/api/equipment	- List equipment
GET	/api/operators	- List operators
GET	/api/delay-reasons	- List delay reasons

8. Pre-seeded Master Data (POC)

8.1 Sample Data Requirements

Entity	Sample Records
Users	1 admin user
Orders	3-5 orders
Products/SKUs	5-6 products
Processes	4-5 processes per product
Operations	2-3 operations per process
Equipment	5-6 machines
Operators	3-4 operators
Raw Materials	5-6 materials
Inventory/Batches	10-15 batches
BOM	Multi-level BOM for products
Routing	Operation sequences

8.2 Sample Process Flow (Steel Coil)

Product: Steel Coil

Process 1: Melting

- Op-10: Furnace Loading
- Op-20: Melting

Process 2: Casting

- Op-10: Continuous Casting

Process 3: Rolling

- Op-10: Hot Rolling
- Op-20: Cold Rolling

Process 4: Tempering

- Op-10: Heat Treatment

Process 5: Cutting

- Op-10: Slitting

9. Validation Rules (POC)

Field	Rule
Email	Required, valid format
Password	Required
Consumption Qty	> 0, <= Available
Produced Qty	> 0
Scrap Qty	>= 0
Start Time	Required, <= Now
End Time	Required, > Start Time
Equipment	At least 1 selected
Operator	At least 1 selected
Delay Reason	Required if Delay > 0

10. Technology Stack

Layer	Technology
Frontend	Angular 17 (Module-based, not standalone)
UI Components	Angular Material / Bootstrap
Backend	Spring Boot 3.2 (Java 17)
Database	PostgreSQL
Auth	JWT tokens (Spring Security)
ORM	Spring Data JPA / Hibernate
Build	Maven (Backend), Angular CLI (Frontend)
DB Patches	Custom SQL patch mechanism

Database Patching Mechanism

- SQL files in `resources/patches/` folder
- Naming convention: `001_description.sql` , `002_description.sql`
- Applied automatically on application startup
- Tracked in `database_patches` table
- Sequential execution by patch number

11. POC Deliverables

1. **Login Screen** - Authentication with single user
 2. **Dashboard/Order List** - View available orders
 3. **Production Confirmation** - Full workflow
 4. **Batch Traceability** - View parent-child relations
 5. **Database** - Seeded with sample data
 6. **API** - Endpoints for all operations
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