

MES Production Confirmation - POC Demo Document

Document Version: 1.0 **Delivery Date:** 08-02-2026 **Prepared By:** Sumeet Gupta **Client:** BLUEMINGO TECH PRIVATE LIMITED

Executive Summary

This POC delivers a functional MES application demonstrating:

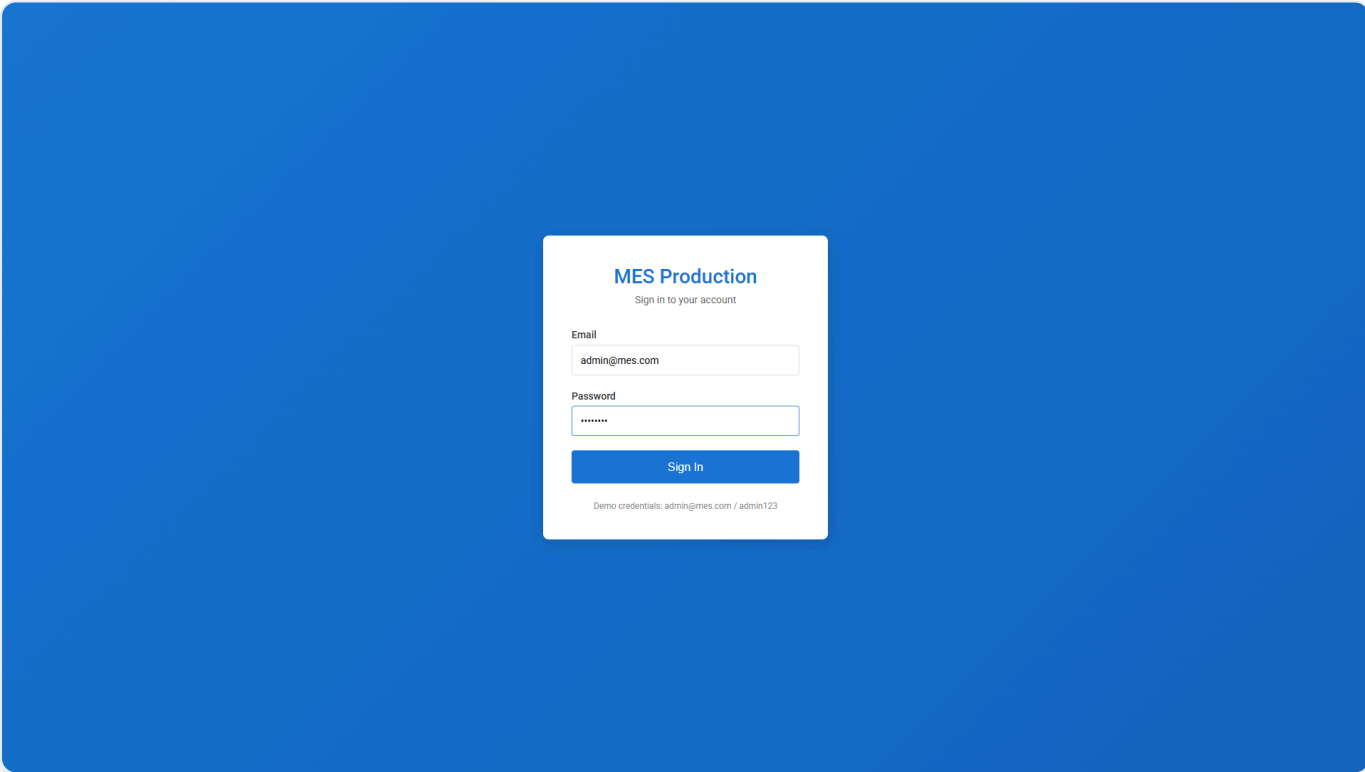
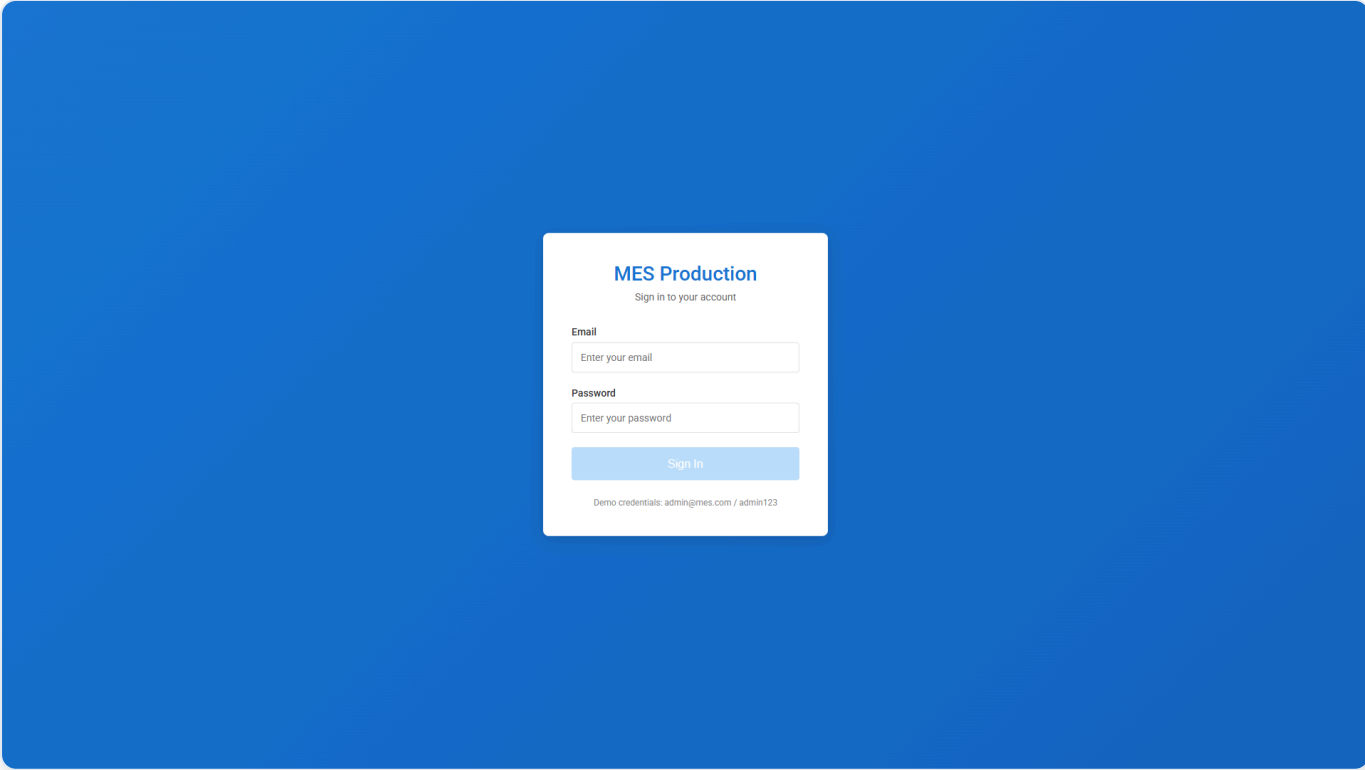
Deliverable	Description	Status
Core Production Engine	Multi-level BOMs, Batch Parent-Child (Split/Merge)	Complete
Execution UI	4 screens: Login, Order Dashboard, Production Confirmation, Traceability	Complete
Business Logic	Consumption validation, scrap tracking, equipment/operator assignment	Complete
Data Foundation	Pre-seeded PostgreSQL database ready for demo	Complete

Demo Access:

- URL: http://localhost:4200
- Email: admin@mes.com
- Password: admin123

Screen 1: Login

Route: /#/login



Login Flow

User enters credentials → System validates → JWT token issued → Redirect to Dashboard

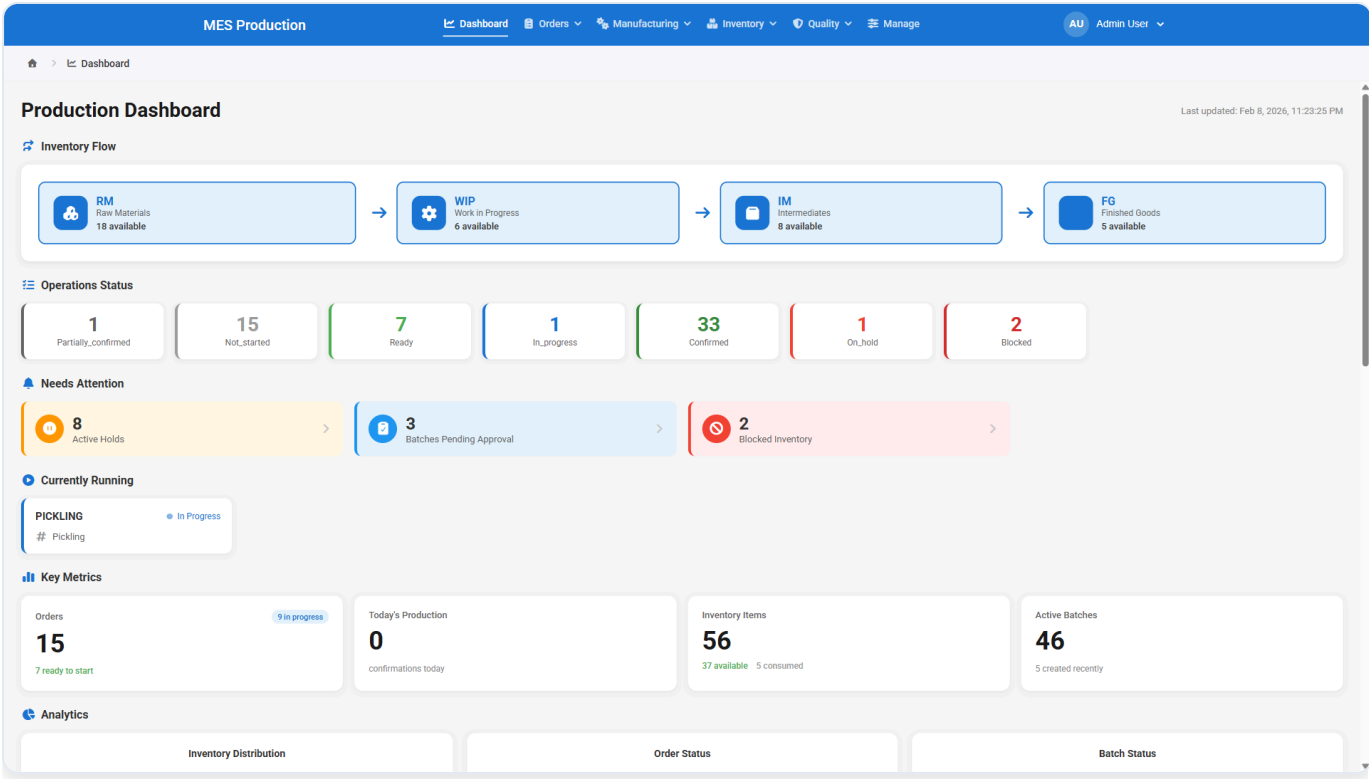
Actions

Action	Result
Enter valid credentials + Login	JWT token stored, redirect to Dashboard
Enter invalid credentials + Login	Error message displayed
Access protected page without token	Redirect to Login

Screen 2: Order Dashboard

Dashboard

Route: /#/dashboard



Dashboard Flow

Dashboard loads → Fetch statistics → Display metrics → Show quick actions

Dashboard Actions

Action	Result
Click "Confirm Production"	Navigate to Production Confirmation
Click "View Orders"	Navigate to Orders list
Click "Batch Traceability"	Navigate to Batches list
Click inventory type (RM/IM/FG)	Navigate to Inventory filtered by type

Orders List

Route: /#/orders

MES Production

Dashboard

Orders

Manufacturing

Inventory

Quality

Manage

AUAdmin User

Orders

Production Orders

+ New Order

Search orders...

Status: All

Order Number	Customer	Product	Quantity	Status	Order Date	Actions
ORD-2026-015	Nordic Steel Trading AB	Steel Billet 100mm	250	BLOCKED	Feb 5, 2026	<button>View</button> <button>Edit</button>
ORD-2026-014	Pacific Metal Works	Cold Rolled Sheet 1mm	90	CANCELLED	Feb 4, 2026	<button>View</button> <button>Edit</button>
ORD-2026-013	Global Manufacturing Ltd	Hot Rolled Coil 4mm	180	COMPLETED	Feb 3, 2026	<button>View</button> <button>Edit</button>
ORD-2026-012	ABC Steel Corporation	Reinforcement Bar 12mm	180	COMPLETED	Feb 2, 2026	<button>View</button> <button>Edit</button>
ORD-2026-011	Oceanic Metals Ltd	Cold Rolled Sheet 2mm	260	IN PROGRESS	Feb 1, 2026	<button>View</button> <button>Edit</button>
ORD-2026-010	African Mining Corp	Steel Billet 100mm	600	CREATED	Jan 31, 2026	<button>View</button> <button>Edit</button>
ORD-2026-009	South American Steel SA	Hot Rolled Coil 3mm	350	CREATED	Jan 30, 2026	<button>View</button> <button>Edit</button>
ORD-2026-008	Asian Electronics Inc	Hot Rolled Coil 2mm	60	ON HOLD	Jan 28, 2026	<button>View</button> <button>Edit</button>
ORD-2026-007	Middle East Metals FZE	Cold Rolled Sheet 1mm	120	CREATED	Jan 25, 2026	<button>View</button> <button>Edit</button>
ORD-2026-006	Nordic Steel Trading AB	Reinforcement Bar 10mm	450	CREATED	Jan 22, 2026	<button>View</button> <button>Edit</button>
ORD-2026-005	European Auto Parts GmbH	Hot Rolled Coil 2mm	75	COMPLETED	Jan 20, 2026	<button>View</button> <button>Edit</button>
ORD-2026-004	Pacific Metal Works	Hot Rolled Coil 2mm	230	CREATED	Jan 18, 2026	<button>View</button> <button>Edit</button>
ORD-2026-003	BuildRight Construction	Reinforcement Bar 10mm	300	IN PROGRESS	Jan 15, 2026	<button>View</button> <button>Edit</button>
ORD-2026-002	Global Manufacturing Ltd	Cold Rolled Sheet 1mm	120	IN PROGRESS	Jan 12, 2026	<button>View</button> <button>Edit</button>
ORD-2026-001	ABC Steel Corporation	Hot Rolled Coil 2mm	200	IN PROGRESS	Jan 10, 2026	<button>View</button> <button>Edit</button>

Showing 1 - 15 of 15

<<

<

1

>

>>

Items per page: 20

Orders List Flow

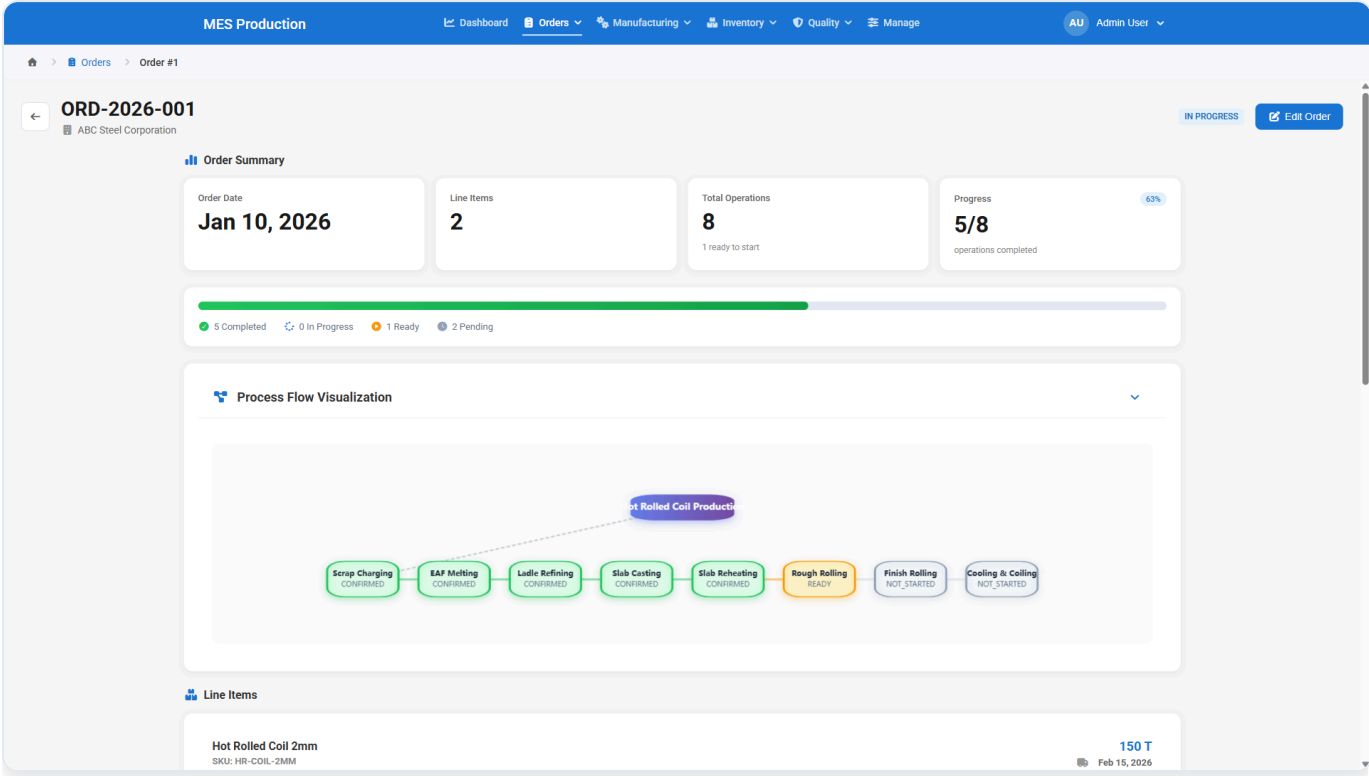
Page loads → Fetch orders → Display in table → User can filter/search

Orders List Actions

Action	Result
Select status filter	Table filtered by selected status
Enter search text	Table filtered by order number/customer
Click order row	Navigate to Order Detail
Click pagination	Load next/previous page

Order Detail

Route: `/#/orders/:id`



Order Detail Flow

Page loads → Fetch order with line items → Fetch operations → Display process flow chart → S...

Order Detail Actions

Action	Result
Click "Start Production" on READY operation	Navigate to Production Confirmation for that operation
Click line item	Expand/collapse operations
Click operation	View operation details
Click "Back"	Return to Orders list

Operation Status Logic

Current Status	Can Confirm?	Next Status After Confirm
NOT_STARTED	No	-
READY	Yes	IN_PROGRESS or CONFIRMED
IN_PROGRESS	Yes	CONFIRMED (if complete)
CONFIRMED	No	-
ON_HOLD	No	-

Status Transition Flow

Order created:
└ All operations → NOT_STARTED
└ First operation → READY

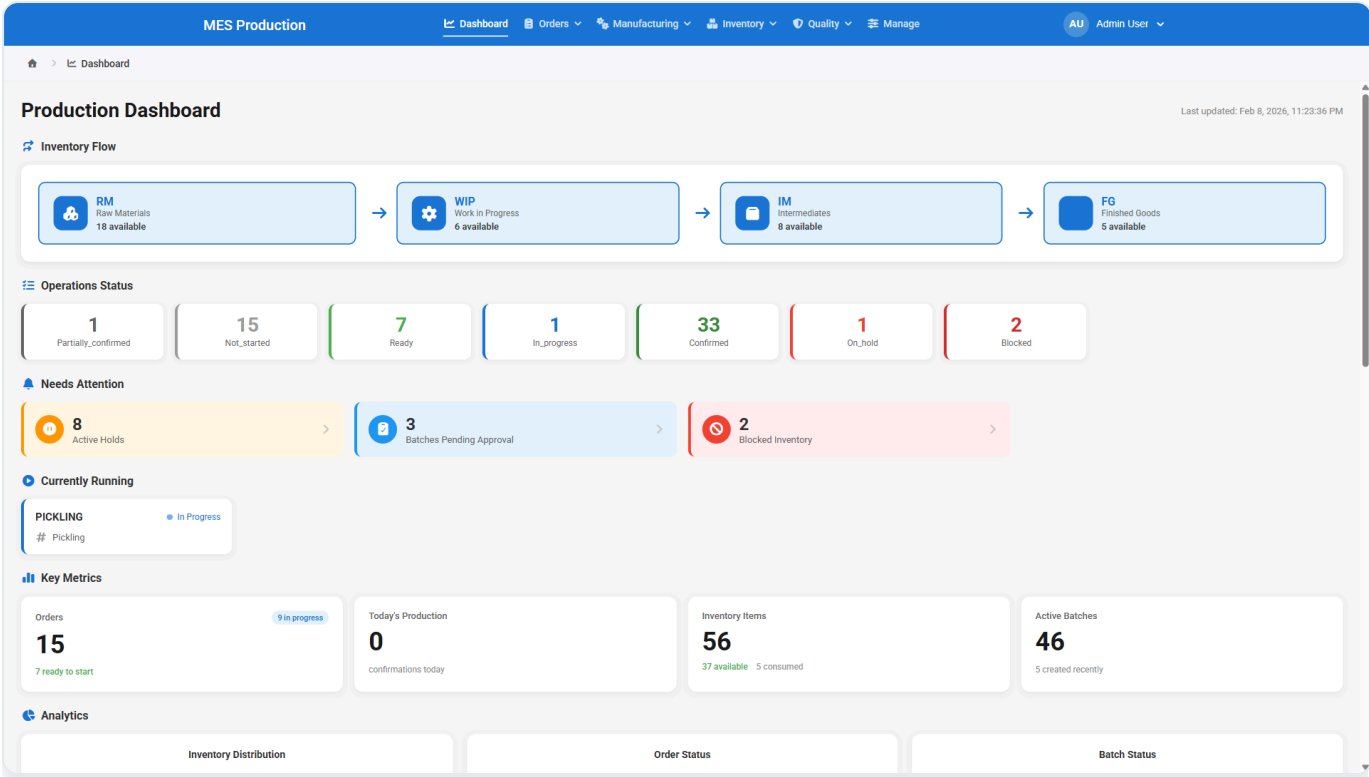
After confirming operation:
└ Current operation → CONFIRMED (if complete) or IN_PROGRESS (if partial)
└ Next operation → READY (if previous confirmed)

All operations confirmed:
└ Order status → COMPLETED

Screen 3: Production Confirmation

Route: `/#/production/confirm` or `/#/production/confirm/:operationId`

Empty Form



With Operation Selected

MES Production

DashboardOrdersManufacturingInventoryQualityManage

AUAdmin User

ProductionConfirm

Back to Order

Production Confirmation

Apply Hold

Operation Details

OPERATION
Rough Rolling (ROLL-RGH)

TYPE
ROLLING

STATUS
READY

PRODUCT
Hot Rolled Coil 2mm (HR-COIL-2MM)

ORDER QUANTITY
150

STAGE
Hot Rolled Coil Production

Production Time

Start Time *
08-02-2026 23:28

End Time *
08-02-2026 23:28

End time must be after start time

Production Quantities

Quantity Produced *
150

Quantity Scrapped
0

Total Production: 150 Yield: 100%

Good (≥95%) Warning (80-95%) Critical (<80%)

Material Consumption

Select Materials

BOM Suggested Consumption

Apply Suggestions

Target Quantity: 150 T Total Required: 791.1825 T

Material	Required Qty	Available	Yield Ratio	Stock Status
Finished HR Coil 2mm (FG-HR-2MM)	147 T	195 T	0.98	Sufficient

Production Confirmation Flow

PRODUCTION CONFIRMATION FLOW

1. SELECT ORDER & OPERATION
 - └ Only orders with READY operations shown
 - └ Only READY operations available for selection
2. VIEW OPERATION DETAILS
 - └ Process name, operation type, target quantity
3. SELECT INPUT MATERIALS
 - └ Available batches shown (status = AVAILABLE)
 - └ Enter quantity to consume from each batch
 - └ Validation: $qty \leq \text{available qty}$
4. ENTER PRODUCTION TIMES
 - └ Start time, End time
 - └ Validation: $\text{end time} \geq \text{start time}$
5. ENTER QUANTITIES
 - └ Produced quantity (good output)
 - └ Scrap quantity (waste)
6. SELECT EQUIPMENT & OPERATORS
 - └ Equipment dropdown (only AVAILABLE equipment)
 - └ Operators dropdown (only ACTIVE operators)
7. ENTER PROCESS PARAMETERS
 - └ Dynamic fields based on operation type
 - └ Validation: values within min/max limits
8. CLICK CONFIRM
 - └ Validation passes → Execute confirmation
 - └ Validation fails → Show errors

Form Sections

1. Material Consumption

ProductionConfirm

Material Consumption

Select Materials

BOM Suggested Consumption

Apply Suggestions

Target Quantity: 150 T

Total Required: 791.1825 T

Material	Required Qty	Available	Yield Ratio	Stock Status
Finished HR Coil 2mm (FG-HR-2MM)	147 T	195 T	0.98	Sufficient
Hot Rolled Strip (IM-HR-ROUGH)	149.625 T	95 T	0.95	Insufficient
Surface Coating Oil (RM-COATING)	3 L	2000 L	1	Sufficient
Steel Slab 200mm (IM-SLAB)	156.24 T	155 T	0.93	Insufficient
Rolling Lubricant (RM-ROLL-LUB)	1.5 L	3000 L	1	Sufficient
Liquid Steel (IM-LIQUID)	155.76 T	100 T	0.88	Insufficient
Mold Powder (RM-MOLD-PWD)	0.75 KG	1000 KG	1	Sufficient
Steel Scrap Grade A (RM-SCRAP-A)	99.75 T	1130 T	0.95	Sufficient
Steel Scrap Grade B (RM-SCRAP-B)	27.6 T	320 T	0.92	Sufficient
Iron Ore Pellets (RM-IRON-ORE)	21.825 T	400 T	0.97	Sufficient
Limestone (RM-LIMESTONE)	12 T	150 T	1	Sufficient
Ferroalloy FeSi (RM-FESI)	0.75 KG	2000 KG	1	Sufficient
Coal / Coke (RM-COAL)	15 T	300 T	1	Sufficient

2. Process Parameters

Process Parameters

Notes

Entry Temperature ^{°C} [100 - 1280]
1200

Finish Temperature ^{°C} [850 - 950]
900

Coiling Temperature ^{°C} [550 - 700]
620

Thickness ^(mm) [1.5 - 3]
2

Speed ^(m/s) [5 - 15]
10

Add any notes about this production confirmation...

3. Equipment & Operators

Equipment & Operator

Delay Tracking

Equipment * (0 selected)

☐ (EAF-001)

☐ (LF-001)

☐ (LF-002)

☐ (CCM-001)

☐ (HSM-001)

Operator * (0 selected)

☐ (OP-001)

☐ (OP-002)

☐ (OP-003)

☐ (OP-004)

☐ (OP-005)

Delay Duration (minutes)

0

Delay Reason

- Select Reason -

4. Output

Production Time

Start Time *

08-02-2026 23:28

End Time *

08-02-2026 23:28

End time must be after start time

Production Quantities

Quantity Produced *

150

Quantity Scrapped

0

Total Production: 150

Yield: 100%

Good (~95%)

Warning (80-95%)

Critical (<80%)

5. Confirm Button

MES Production

DashboardOrdersManufacturingInventoryQualityManage

AUAdmin User

ProductionConfirm

Back to Order

Production Confirmation

Apply Hold

Operation Details

OPERATION

Rough Rolling (ROLL-RGH)

TYPE

ROLLING

STATUS

READY

PRODUCT

Hot Rolled Coil 2mm (HR-COIL-2MM)

ORDER QUANTITY

150

STAGE

Hot Rolled Coil Production

Production Time

Start Time *

08-02-2026 23:28

End Time *

08-02-2026 23:28

End time must be after start time

Production Quantities

Quantity Produced *

150

Quantity Scrapped

0

Total Production: 150

Yield: 100%

Good (~95%)

Warning (80-95%)

Critical (<80%)

Material Consumption

Select Materials

BOM Suggested Consumption

Apply Suggestions

Target Quantity: 150 T

Total Required: 791.1825 T

Material	Required Qty	Available	Yield Ratio	Stock Status
Finished HR Coil 2mm (FG-HR-2MM)	147 T	195 T	0.98	Sufficient

On Confirmation - System Actions

SYSTEM ACTIONS ON CONFIRMATION

1. VALIDATE ALL INPUTS
 - └ Check required fields
 - └ Check quantity validations
 - └ Check parameter limits
2. CREATE PRODUCTION CONFIRMATION RECORD
 - └ Store all entered data
 - └ Link to operation, equipment, operators
 - └ Record process parameters
3. CONSUME INPUT MATERIALS
 - └ For each selected batch:
 - └ Create ConsumedMaterial record
 - └ Update inventory state → CONSUMED
 - └ Record consumed quantity
4. CREATE OUTPUT BATCH
 - └ Generate batch number
 - └ Status = QUALITY_PENDING
 - └ Create BatchRelation (parent → child genealogy)
5. CREATE OUTPUT INVENTORY
 - └ State = PRODUCED
 - └ Link to output batch
6. UPDATE OPERATION STATUS
 - └ If produced qty = target qty → CONFIRMED
 - └ If produced qty < target qty → IN_PROGRESS (partial)
7. ADVANCE NEXT OPERATION
 - └ If operation CONFIRMED and has next:
 - └ Next operation → READY
8. UPDATE ORDER STATUS
 - └ If all operations CONFIRMED → Order status = COMPLETED
9. LOG AUDIT TRAIL
 - └ Record all changes with timestamps
 - └ User attribution

Validation Rules

Field	Validation	Error Message
Order	Required	Please select an order
Operation	Required	Please select an operation
Start Time	Required	Start time is required
End Time	Required, ≥ Start Time	End time must be after start time
Produced Qty	Required, > 0	Produced quantity must be greater than 0
Scrap Qty	≥ 0	Scrap quantity cannot be negative
Material Qty	≤ Available	Cannot consume more than available
Parameters	Within min/max	Value must be between X and Y

Multi-Level BOM Logic

Example: Producing HR Coil

STEP 1: MELTING (consumes raw materials)
Input: B-RM-SCRAP-001 (Steel Scrap)
B-RM-ORE-001 (Iron Ore)
Output: B-WIP-LS-001 (Liquid Steel)

STEP 2: CASTING (consumes WIP from previous step)
Input: B-WIP-LS-001 (Liquid Steel)
Output: B-IM-SLAB-001 (Steel Slab)

STEP 3: ROLLING (consumes IM from previous step)
Input: B-IM-SLAB-001 (Steel Slab)
Output: B-FG-COIL-001 (HR Coil)

Each step creates genealogy links:
B-RM-SCRAP-001 ┐
B-RM-ORE-001 ──┴─> B-WIP-LS-001 → B-IM-SLAB-001 → B-FG-COIL-001

Screen 4: Traceability View

Route: `/#/batches`

Batch List

MES Production

Dashboard

Orders

Manufacturing

Inventory

Quality

Manage

AU

Admin User

Batches

Batch Traceability

State: All States

Search: Search by batch number or material

Batch Number	Material ID	Quantity	UoM	State	Created	Actions
B-IM-011	IM-PICKLED	85	T	AVAILABLE		<div>ViewEditDelete</div>
B-IM-012	IM-CR-STRIP	80	T	PRODUCED		<div>ViewApproveRejectEditDelete</div>
B-IM-013	IM-ANNEALED	75	T	AVAILABLE		<div>ViewEditDelete</div>
B-IM-018	IM-BILLET	60	T	QUALITY PENDING		<div>ViewApproveRejectEditDelete</div>
B-IM-015	IM-LIQUID	130	T	PRODUCED		<div>ViewApproveRejectEditDelete</div>
B-IM-016	IM-SLAB	125	T	PRODUCED		<div>ViewApproveRejectEditDelete</div>
B-FG-001	FG-HR-2MM	75	T	AVAILABLE		<div>ViewEditDelete</div>
B-FG-002	FG-CR-1MM	70	T	AVAILABLE		<div>ViewEditDelete</div>
B-FG-003	FG-REBAR-10	180	T	AVAILABLE		<div>ViewEditDelete</div>
B-FG-004	FG-HR-2MM	120	T	AVAILABLE		<div>ViewEditDelete</div>
B-FG-005	FG-REBAR-10	175	T	PRODUCED		<div>ViewApproveRejectEditDelete</div>
B-FG-006	FG-CR-1MM	55	T	PRODUCED		<div>ViewApproveRejectEditDelete</div>
B-RM-019	RM-SCRAP-A	100	T	BLOCKED		<div>ViewEditDelete</div>
B-IM-017	IM-SLAB	45	T	BLOCKED		<div>ViewEditDelete</div>
B-FG-008	FG-REBAR-10	150	T	AVAILABLE		<div>ViewEditDelete</div>
B-WIP-001	WIP-MELT	85	T	AVAILABLE		<div>ViewEditDelete</div>

Batch List Flow

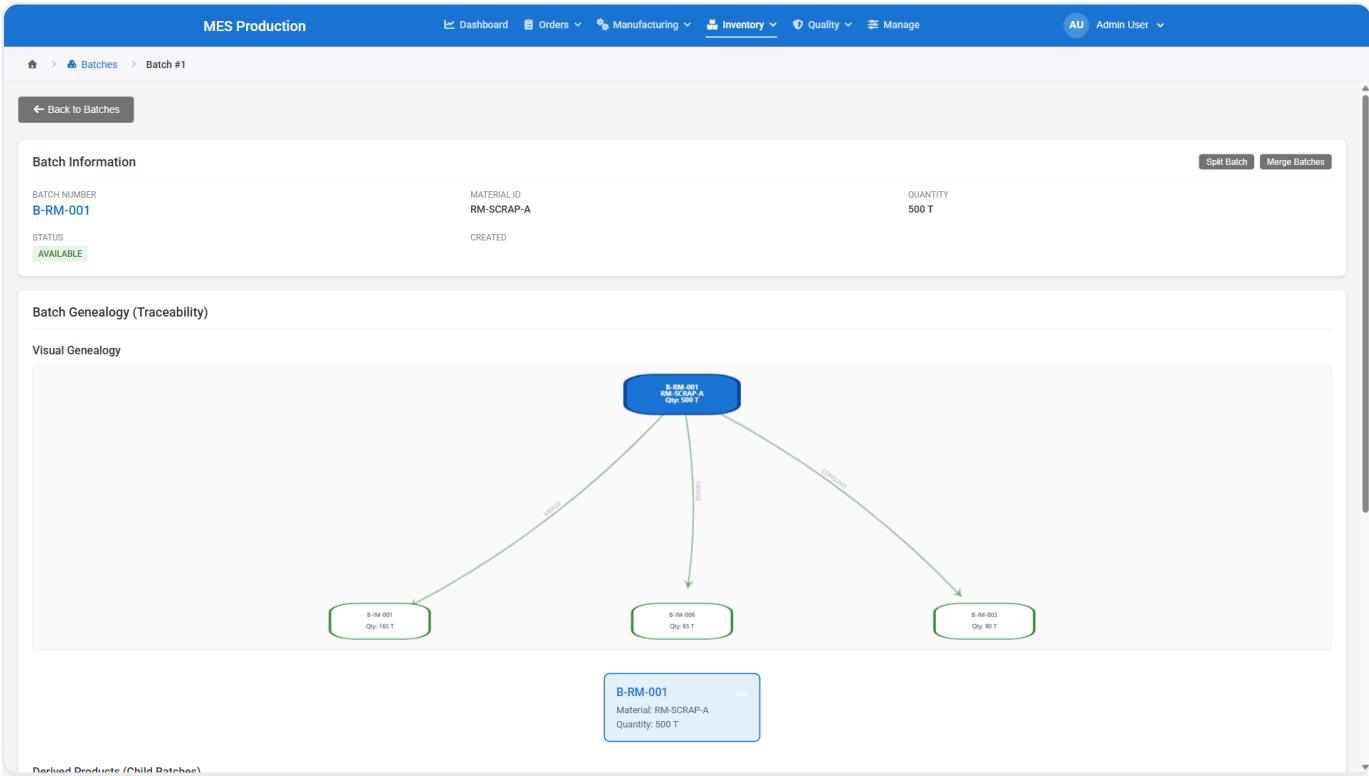
Page loads → Fetch batches → Display in table → User can filter by status

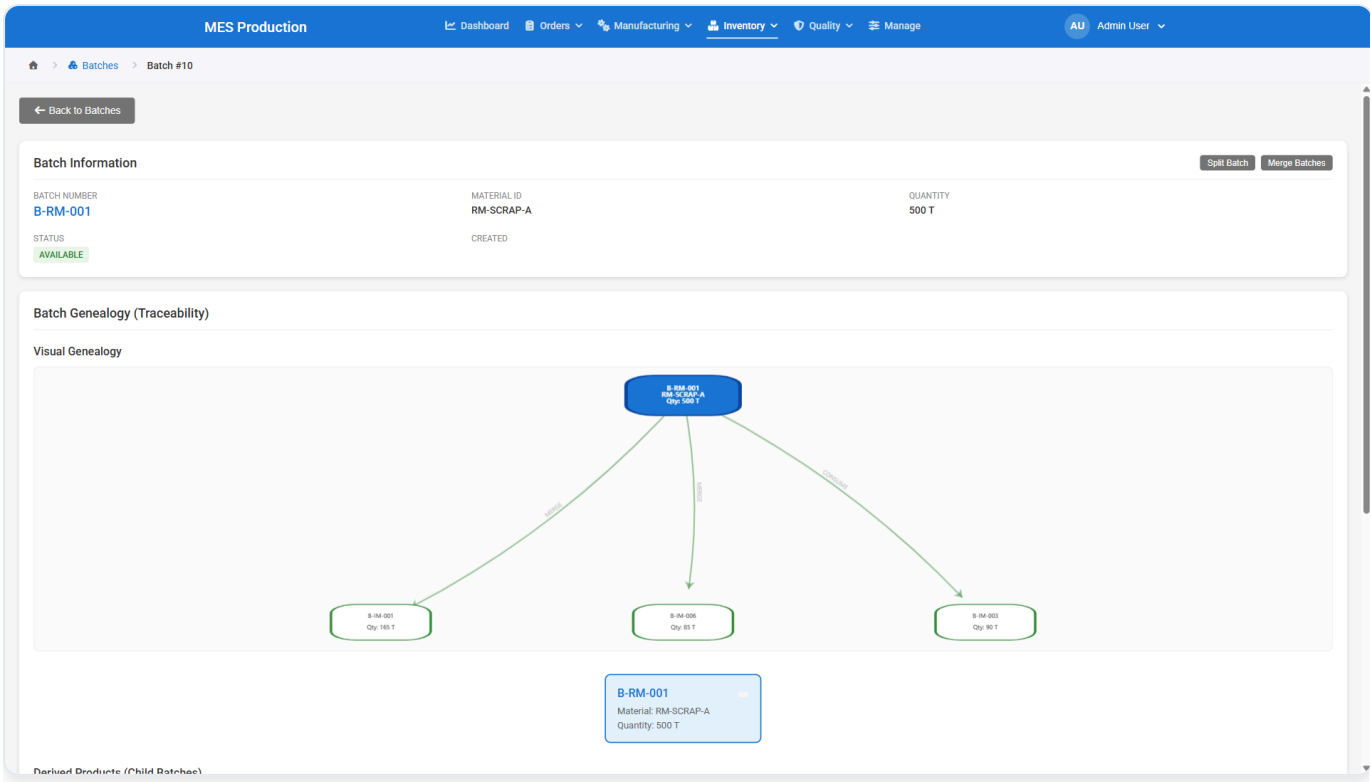
Batch List Actions

Action	Result
Select status filter	Table filtered by batch status
Enter search text	Table filtered by batch number/material
Click batch row	Navigate to Batch Detail
Click "Approve" (if QUALITY_PENDING)	Batch status → AVAILABLE
Click "Reject" (if QUALITY_PENDING)	Batch status → BLOCKED

Batch Detail with Genealogy

Route: `/#/batches/:id`





Batch Detail Flow

Page loads → Fetch batch → Fetch genealogy (parents + children) → Display batch info and genealogy

Genealogy Logic



Batch Actions

Action	Available When	Result
Approve	Status = QUALITY_PENDING	Status → AVAILABLE
Reject	Status = QUALITY_PENDING	Status → BLOCKED
Split	Status = AVAILABLE	Creates child batches, original quantity reduced
Click parent batch	Has parents	Navigate to parent batch
Click child batch	Has children	Navigate to child batch

Split Operation Flow

BEFORE SPLIT:

B-IM-SLAB-001 (Quantity: 100T, Status: AVAILABLE)

SPLIT ACTION:

Split into: 60T, 40T

AFTER SPLIT:

B-IM-SLAB-001 (Quantity: 0T, Status: SPLIT)

└→ B-IM-SLAB-001-A (Quantity: 60T, Status: AVAILABLE)

└→ B-IM-SLAB-001-B (Quantity: 40T, Status: AVAILABLE)

Genealogy: B-IM-SLAB-001 is PARENT of both child batches

Merge Operation Flow

BEFORE MERGE:

B-IM-SLAB-001 (Quantity: 30T, Status: AVAILABLE)

B-IM-SLAB-002 (Quantity: 40T, Status: AVAILABLE)

B-IM-SLAB-003 (Quantity: 30T, Status: AVAILABLE)

MERGE ACTION:

Merge all three batches

AFTER MERGE:

B-IM-SLAB-001 (Status: MERGED)

B-IM-SLAB-002 (Status: MERGED)

B-IM-SLAB-003 (Status: MERGED)

└→ B-IM-SLAB-MERGED-001 (Quantity: 100T, Status: AVAILABLE)

Genealogy: All three original batches are PARENTS of merged batch

Batch Status Flow

NEW BATCH CREATED:

- └ From Production Confirmation → QUALITY_PENDING
- └ From Material Receipt → QUALITY_PENDING

QUALITY DECISION:

- └ Approve → AVAILABLE
- └ Reject → BLOCKED

AVAILABLE BATCH:

- └ Used in production → CONSUMED
- └ Split → SPLIT (original), children = AVAILABLE
- └ Put on hold → ON_HOLD

ON_HOLD BATCH:

- └ Release hold → AVAILABLE

BLOCKED BATCH:

- └ Scrap decision → SCRAPPED

Demo Scenarios

Scenario 1: Complete Production Confirmation

1. Login as admin@mes.com
2. Go to Orders list
3. Click on order ORD-2026-001 (IN_PROGRESS)
4. Find READY operation, click "Start Production"
5. Select input materials, enter quantities
6. Enter start/end times
7. Enter produced quantity, scrap quantity
8. Select equipment and operators
9. Enter process parameters
10. Click "Confirm Production"
11. **Verify:**
 - Success message with new batch number
 - Operation status → CONFIRMED

- Next operation → READY
- Navigate to batch, verify genealogy shows parent batches

Scenario 2: Batch Traceability

1. Go to Batches list
2. Click on a batch (e.g., B-FG-COIL-001)
3. View genealogy section
4. **Backward trace:** Click parent batches to see inputs
5. **Forward trace:** Click child batches to see outputs
6. Navigate complete chain: FG → IM → WIP → RM

Technical Summary

Technology Stack:

- Frontend: Angular 17
- Backend: Spring Boot 3.2
- Database: PostgreSQL 14+
- Authentication: JWT

Demo Data:

Entity	Count
Orders	8
Products	6
Materials	24
Equipment	12
Operators	8
Batches	27

End of Document