MES Production Confirmation POC - Demo Data Reference

This document provides a complete reference of all seed/demo data in the MES Production Confirmation POC application. It is intended for portal users who do not have direct database access and need to understand what data is available, how entities relate to one another, and what scenarios are pre-configured for demonstration purposes.

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1. Overview

The demo data represents a realistic steel manufacturing environment with complete production workflows spanning melting, casting, rolling, pickling, annealing, and finishing operations. The data covers:

- **12 customers** across 10 countries (11 active, 1 inactive)
- **8 products** spanning hot rolled coils, cold rolled sheets, rebar, and billets
- **32 materials** organized by type: raw materials, intermediates, work-in-progress, and finished goods
- **6 production processes** with 4 active routings containing 22 routing steps
- **8 hierarchical BOM trees** (88 total BOM nodes) covering all products
- **16 equipment items** across 12 categories (melting, casting, rolling, etc.)
- **12 operators** across 6 departments on day and night shifts
- **45 orders** (15 original + 30 additional with multi-stage production)
- **82 order line items** with full operation chains
- **70 batches** across all material types and statuses
- **70 inventory records** across all states
- **12 hold records** (8 active, 4 released) on various entity types
- **35 production confirmations** with equipment and operator assignments
- **11 batch number configuration rules**

All demo data is timestamped in January-February 2026 and reflects various stages of production: orders that are completed, in-progress, on hold, blocked, and cancelled.

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2. User Accounts

The application ships with a single administrator account for demonstration purposes.

Field	Value
Email	`admin@mes.com`
Password	`admin123`
Name	Admin User
Employee ID	EMP-001
Status	ACTIVE
Role	System Administrator

This account has full access to all modules: Dashboard, Orders, Production, Inventory, Batches, Holds, Equipment, Quality, and all Admin/Manage pages.

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3. Customers

There are 12 customers in the system. Eleven are active and available for order creation; one (CUST-012) has been deactivated.

ID	Code	Name	Contact Person	Email	Phone	City	Country	Status
1	CUST-001	ABC Steel Corporation	John Smith	john.smith@abcsteel.com	+1-555-0101	Pittsburgh	USA	ACTIVE
2	CUST-002	Global Manufacturing Ltd	Sarah Johnson	sarah.j@globalmanuf.com	+1-555-0102	Detroit	USA	ACTIVE
3	CUST-003	Pacific Metal Works	Michael Chen	m.chen@pacificmetal.com	+1-555-0103	Los Angeles	USA	ACTIVE
4	CUST-004	European Auto Parts GmbH	Hans Mueller	h.mueller@euroauto.eu	+49-30-5504	Munich	Germany	ACTIVE
5	CUST-005	Asian Electronics Inc	Yuki Tanaka	y.tanaka@asianelec.jp	+81-3-55050	Tokyo	Japan	ACTIVE
6	CUST-006	BuildRight Construction	Tom Bradley	tom.b@buildright.com	+1-555-0106	Chicago	USA	ACTIVE
7	CUST-007	Nordic Steel Trading AB	Erik Lindqvist	erik@nordicsteel.se	+46-8-55070	Stockholm	Sweden	ACTIVE
8	CUST-008	Middle East Metals FZE	Ahmed Al-Rashid	ahmed@memetals.ae	+971-4-5508	Dubai	UAE	ACTIVE
9	CUST-009	South American Steel SA	Carlos Rodriguez	carlos@sasteel.com	+54-11-5550	Buenos Aires	Argentina	ACTIVE
10	CUST-010	African Mining Corp	Kwame Mensah	kwame@afminecorp.com	+27-11-5551	Johannesburg	South Africa	ACTIVE
11	CUST-011	Oceanic Metals Ltd	Bruce Wilson	bruce@oceanicmetals.au	+61-2-55520	Sydney	Australia	ACTIVE
12	CUST-012	Canadian Steel Works	Pierre Dubois	pierre@cansteelworks.ca	+1-514-5553	Montreal	Canada	**INACTIVE**

Customer Distribution by Country

Country	Count	Customer Codes
USA	4	CUST-001, CUST-002, CUST-003, CUST-006
Germany	1	CUST-004
Japan	1	CUST-005
Sweden	1	CUST-007
UAE	1	CUST-008
Argentina	1	CUST-009
South Africa	1	CUST-010
Australia	1	CUST-011
Canada	1	CUST-012 (inactive)

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4. Products

Eight products are configured in the system, spanning three product categories. All products are ACTIVE.

SKU	Product Name	Category	Group	Unit	Price (USD)	Min Order Qty	Lead Time
HR-COIL-2MM	Hot Rolled Coil 2mm	Coils	Hot Rolled	T	700.00	10	14 days
HR-COIL-3MM	Hot Rolled Coil 3mm	Coils	Hot Rolled	T	680.00	10	14 days
HR-COIL-4MM	Hot Rolled Coil 4mm	Coils	Hot Rolled	T	660.00	15	14 days
CR-SHEET-1MM	Cold Rolled Sheet 1mm	Sheets	Cold Rolled	T	850.00	5	21 days
CR-SHEET-2MM	Cold Rolled Sheet 2mm	Sheets	Cold Rolled	T	820.00	5	21 days
REBAR-10MM	Reinforcement Bar 10mm	Rebars	Long Products	T	580.00	20	10 days
REBAR-12MM	Reinforcement Bar 12mm	Rebars	Long Products	T	575.00	20	10 days
STEEL-BILLET-100	Steel Billet 100mm	Billets	Semi-Finished	T	500.00	25	7 days

Product-to-Process Mapping

Each product is manufactured through a specific production process:

Product SKU	Process	Operations Count	Description
HR-COIL-2MM	Process 1: Hot Rolled Coil Production	8	Charge, Melt, Refine, Slab Cast, Reheat, Rough Roll, Finish Roll, Cool/Coil
HR-COIL-3MM	Process 1: Hot Rolled Coil Production	8	Same as HR-COIL-2MM
HR-COIL-4MM	Process 1: Hot Rolled Coil Production	8	Same as HR-COIL-2MM
CR-SHEET-1MM	Process 2: Cold Rolled Sheet Production	3	Pickling, Cold Rolling, Batch Annealing

CR-SHEET-2MM	Process 2: Cold Rolled Sheet Production	3	Same as CR-SHEET-1MM
REBAR-10MM	Process 3: Rebar Production	7	Charge, Melt, Refine, Billet Cast, Reheat, Bar Roll, Quench/Temper
REBAR-12MM	Process 3: Rebar Production	7	Same as REBAR-10MM
STEEL-BILLET-100	Process 4: Billet Production	4	Charge, Melt, Refine, Billet Cast

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5. Materials

There are 32 materials organized into four types reflecting the steel production value chain.

5.1 Raw Materials (RM) - 15 materials

These are purchased inputs consumed during production.

Code	Name	Description	Unit	Group	Std. Cost (USD)	Min Stock	Reorder Point	Lead Time
RM-SCRAP-A	Steel Scrap Grade A	High-quality HMS1 steel scrap	T	Scrap	250.00	100	200	3 days
RM-SCRAP-B	Steel Scrap Grade B	HMS2 mixed steel scrap	T	Scrap	200.00	50	100	3 days
RM-SCRAP-C	Steel Scrap Grade C	Shredded steel scrap	T	Scrap	150.00	30	60	3 days
RM-IRON-ORE	Iron Ore Pellets	DR-grade iron ore pellets, 67% Fe	T	Iron	150.00	80	150	14 days
RM-LIMESTONE	Limestone	High-calcium flux grade limestone	T	Flux	50.00	30	60	5 days
RM-FESI	Ferroalloy - FeSi	Ferrosilicon 75% for deoxidation	KG	Alloy	2.50	500	1,000	7 days
RM-FEMN	Ferroalloy - FeMn	Ferromanganese 78% for strengthening	KG	Alloy	3.00	400	800	7 days
RM-FEV	Ferroalloy - FeV	Ferrovanadium 80% for high-strength steel	KG	Alloy	25.00	100	200	14 days
RM-COAL	Coal / Coke	Met-grade coke for energy and reduction	T	Energy	120.00	50	100	7 days
RM-GRAPHITE	Graphite Electrodes	UHP graphite electrodes 600mm	EA	Consumable	800.00	10	20	21 days
RM-AL-WIRE	Aluminum Wire	Aluminum deoxidizer wire 9.5mm	KG	Alloy	4.50	200	500	5 days
RM-MOLD-PWD	Mold Powder	Continuous casting mold flux powder	KG	Consumable	1.20	500	1,000	7 days
RM-ROLL-LUB	Rolling Lubricant	Hot/cold rolling process lubricant	L	Consumable	5.00	500	1,000	5 days
RM-HCL	Hydrochloric Acid	HCl 18% for pickling line	L	Chemical	0.80	2,000	4,000	3 days
RM-COATING	Surface Coating Oil	Anti-corrosion surface oil	L	Consumable	3.50	500	1,000	5 days

5.2 Intermediate Materials (IM) - 10 materials

These are produced and consumed within the production chain, not sold to customers.

Code	Name	Description	Unit	Group	Std. Cost (USD)
IM-LIQUID	Liquid Steel	Molten steel from EAF	T	Steel	400.00
IM-SLAB	Steel Slab 200mm	Continuously cast steel slab	T	Steel	550.00
IM-BILLET	Steel Billet 100mm	Continuously cast steel billet	T	Steel	500.00
IM-BLOOM	Steel Bloom 200mm	Continuously cast steel bloom	T	Steel	520.00
IM-HR-ROUGH	HR Coil Rough	Rough-rolled hot strip	T	Coil	600.00
IM-PICKLED	Pickled HR Strip	Acid-pickled hot rolled strip	T	Strip	650.00
IM-CR-STRIP	Cold Rolled Strip	Cold-reduced steel strip	T	Strip	750.00
IM-ANNEALED	Annealed CR Strip	Batch-annealed cold rolled strip	T	Strip	780.00
IM-ROLLED-BAR	Rolled Bar	Hot-rolled reinforcement bar	T	Long	540.00
IM-WIRE-ROD	Wire Rod	Hot-rolled wire rod coil	T	Long	560.00

5.3 Work In Progress (WIP) - 4 materials

These represent material actively being processed on equipment.

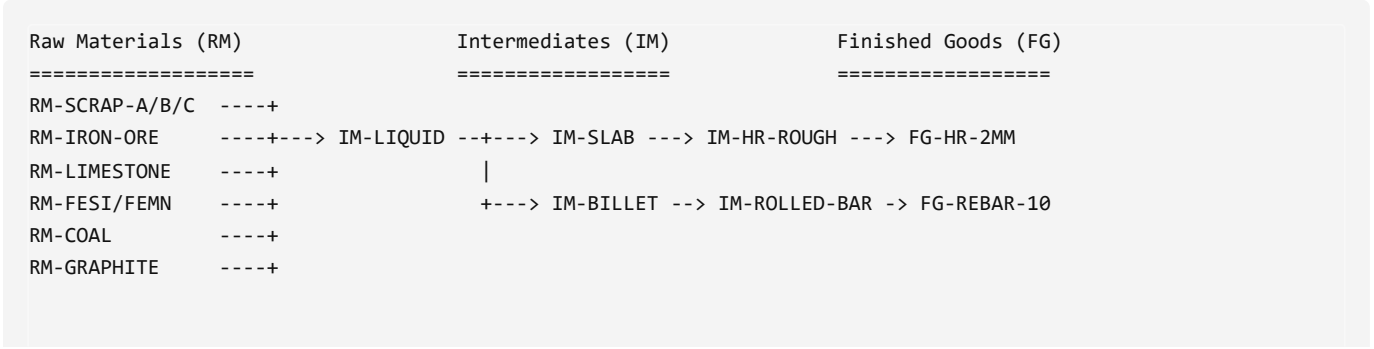
Code	Name	Description	Unit	Group	Std. Cost (USD)
WIP-MELT	Molten Steel (Processing)	Liquid steel in ladle - active refining	T	Steel	380.00
WIP-CAST	Steel Being Cast	Steel in continuous caster - active	T	Steel	420.00
WIP-ROLL	Strip on Rolling Mill	Hot strip on rolling mill - active	T	Coil	550.00
WIP-PICKLE	Strip in Pickling Line	Strip in acid pickling - active	T	Strip	600.00

5.4 Finished Goods (FG) - 3 materials

These correspond to the final products shipped to customers.

Code	Name	Description	Unit	Group	Std. Cost (USD)
FG-HR-2MM	HR Coil 2mm	Hot rolled coil, 2mm thickness	T	Coil	700.00
FG-CR-1MM	CR Sheet 1mm	Cold rolled sheet, 1mm thickness	T	Sheet	850.00
FG-REBAR-10	Rebar 10mm	Reinforcement bar, 10mm diameter	T	Long	580.00

Material Flow Diagram



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IM-HR-ROUGH --> IM-PICKLED --> IM-CR-STRIP --> IM-ANNEALED --> FG-CR-1MM
  (uses RM-HCL)   (uses RM-ROLL-LUB)          (uses RM-COATING)
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6. Processes, Routing, and Operations

6.1 Processes

Six production processes are defined. Four are active with routing configurations; one is in draft and one is inactive.

ID	Process Name	Status	Has Routing	Description
1	Hot Rolled Coil Production	**ACTIVE**	Yes	Full steelmaking + hot rolling (8 operations)
2	Cold Rolled Sheet Production	**ACTIVE**	Yes	Downstream cold processing (3 operations)
3	Rebar Production	**ACTIVE**	Yes	Full steelmaking + bar rolling (7 operations)
4	Billet Production	**ACTIVE**	Yes	Steelmaking + billet casting (4 operations)
5	Wire Rod Production	**DRAFT**	No	Future capability, not yet configured
6	Galvanized Sheet Production	**INACTIVE**	No	Deactivated process

6.2 Routing and Steps

Each active process has one sequential routing. Routing steps link to operation templates and define which steps produce output batches.

Process 1: HR Coil Standard Route (8 steps)

Seq	Operation	Code	Type	Produces Batch	Equipment Type
1	Scrap Charging	MELT-CHRG	FURNACE	No	EAF
2	EAF Melting	MELT-EAF	FURNACE	No	EAF
3	Ladle Refining	MELT-LF	FURNACE	Yes (Liquid Steel)	LF
4	Slab Casting	CAST-SLAB	CASTER	Yes (Steel Slab)	CCM
5	Slab Reheating	ROLL-RHT	FURNACE	No	RHF
6	Rough Rolling	ROLL-RGH	ROLLING	No	HSM
7	Finish Rolling	ROLL-FIN	ROLLING	No	HSM
8	Cooling & Coiling	ROLL-COOL	COOLING	Yes (HR Coil)	HSM

Process 2: CR Sheet Standard Route (3 steps)

Seq	Operation	Code	Type	Produces Batch	Equipment Type
1	Pickling	PKL	PICKLING	Yes (Pickled Strip)	PKL
2	Cold Rolling	CRM	ROLLING	Yes (CR Strip)	CRM
3	Batch Annealing	ANN	HEAT_TREATMENT	Yes (CR Sheet)	BAF

Process 3: Rebar Standard Route (7 steps)

Seq	Operation	Code	Type	Produces Batch	Equipment Type

1	Scrap Charging	MELT-CHRG	FURNACE	No	EAF
2	EAF Melting	MELT-EAF	FURNACE	No	EAF
3	Ladle Refining	MELT-LF	FURNACE	Yes (Liquid Steel)	LF
4	Billet Casting	CAST-BILL	CASTER	Yes (Billet)	CCM
5	Billet Reheating	BAR-RHT	FURNACE	No	RHF
6	Bar Rolling	BAR-ROLL	ROLLING	No	BRM
7	Quenching & Tempering	BAR-QT	HEAT_TREATMENT	Yes (Rebar)	QT

Process 4: Billet Standard Route (4 steps)

Seq	Operation	Code	Type	Produces Batch	Equipment Type
1	Scrap Charging	MELT-CHRG	FURNACE	No	EAF
2	EAF Melting	MELT-EAF	FURNACE	No	EAF
3	Ladle Refining	MELT-LF	FURNACE	Yes (Liquid Steel)	LF
4	Billet Casting	CAST-BILL	CASTER	Yes (Billet)	CCM

6.3 Operation Templates (18 total)

These are the reusable templates from which runtime operations are created:

ID	Name	Code	Type	Qty Type	Duration (min)	Status
1	Scrap Charging	MELT-CHRG	FURNACE	BATCH	60	ACTIVE
2	EAF Melting	MELT-EAF	FURNACE	BATCH	180	ACTIVE
3	Ladle Refining	MELT-LF	FURNACE	BATCH	90	ACTIVE
4	Slab Casting	CAST-SLAB	CASTER	CONTINUOUS	240	ACTIVE
5	Billet Casting	CAST-BILL	CASTER	CONTINUOUS	180	ACTIVE
6	Slab Reheating	ROLL-RHT	FURNACE	BATCH	120	ACTIVE
7	Rough Rolling	ROLL-RGH	ROLLING	CONTINUOUS	60	ACTIVE
8	Finish Rolling	ROLL-FIN	ROLLING	CONTINUOUS	45	ACTIVE
9	Cooling & Coiling	ROLL-COOL	COOLING	CONTINUOUS	30	ACTIVE
10	Pickling	PKL	PICKLING	CONTINUOUS	90	ACTIVE
11	Cold Rolling	CRM	ROLLING	CONTINUOUS	120	ACTIVE
12	Batch Annealing	ANN	HEAT_TREATMENT	BATCH	480	ACTIVE
13	Billet Reheating	BAR-RHT	FURNACE	BATCH	90	ACTIVE
14	Bar Rolling	BAR-ROLL	ROLLING	CONTINUOUS	60	ACTIVE
15	Quenching & Tempering	BAR-QT	HEAT_TREATMENT	CONTINUOUS	30	ACTIVE
16	Quality Inspection	QC	INSPECTION	DISCRETE	60	ACTIVE
17	Packaging	PACK	FINISHING	DISCRETE	45	ACTIVE
18	Galvanizing	GALV	COATING	CONTINUOUS	120	INACTIVE

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7. Bill of Materials (BOM)

Eight BOM trees define the complete material hierarchy for each product. The BOM is hierarchical: the root node is the output product, and child nodes are the inputs required at each production stage. Each node specifies a quantity required per unit of parent output and a yield loss ratio (where 1.00 = no loss).

7.1 HR-COIL-2MM BOM (5 levels, 14 nodes)

```
FG-HR-2MM (1.0000 T, yield 0.98)          <- Finished HR Coil 2mm
+-- IM-HR-ROUGH (1.0500 T, yield 0.95)     <- Hot Rolled Strip
|   +-- IM-SLAB (1.1200 T, yield 0.93)     <- Steel Slab 200mm
|   |   +-- IM-LIQUID (1.1800 T, yield 0.88)    <- Liquid Steel
|   |   |   +-- RM-SCRAP-A (0.7000 T, yield 0.95)
|   |   |   +-- RM-SCRAP-B (0.2000 T, yield 0.92)
|   |   |   +-- RM-IRON-ORE (0.1500 T, yield 0.97)
|   |   |   +-- RM-LIMESTONE (0.0800 T, yield 1.00)
|   |   |   +-- RM-FESI (0.0050 KG, yield 1.00)
|   |   |   +-- RM-COAL (0.1000 T, yield 1.00)
|   |   |   +-- RM-GRAPHITE (0.0030 EA, yield 0.85)
|   |   +-- RM-MOLD-PWD (0.0050 KG, yield 1.00)
|   +-- RM-ROLL-LUB (0.0100 L, yield 1.00)
+-- RM-COATING (0.0200 L, yield 1.00)
```

7.2 CR-SHEET-1MM BOM (6 levels, 14 nodes)

This is the deepest BOM tree, reflecting that cold rolled sheet requires hot rolled coil as an input.

```
FG-CR-1MM (1.0000 T, yield 0.97)          <- Finished CR Sheet 1mm
+-- IM-ANNEALED (1.0300 T, yield 0.97)     <- Annealed CR Strip
|   +-- IM-CR-STRIP (1.0800 T, yield 0.94)    <- Cold Rolled Strip
|       +-- IM-PICKLED (1.1200 T, yield 0.96)     <- Pickled HR Strip
|       |   +-- IM-HR-ROUGH (1.1500 T, yield 0.93)    <- HR Coil Base
|       |   |   +-- RM-SCRAP-A (0.7500 T, yield 0.95)
|       |   |   +-- RM-IRON-ORE (0.2000 T, yield 0.97)
|       |   |   +-- RM-FESI (0.0050 KG, yield 1.00)
|       |   |   +-- RM-LIMESTONE (0.0600 T, yield 1.00)
|       |   |   +-- RM-COAL (0.0800 T, yield 1.00)
|       |   |   +-- RM-AL-WIRE (0.0030 KG, yield 1.00)
|       |   +-- RM-HCL (0.0500 L, yield 1.00)
|       +-- RM-ROLL-LUB (0.0200 L, yield 1.00)
+-- RM-COATING (0.0150 L, yield 1.00)
```

7.3 REBAR-10MM BOM (5 levels, 10 nodes)

```
FG-REBAR-10 (1.0000 T, yield 0.99)        <- Finished Rebar 10mm
+-- IM-ROLLED-BAR (1.0400 T, yield 0.96)   <- Rolled Bar
    +-- IM-BILLET (1.1000 T, yield 0.93)    <- Steel Billet 100mm
    |   +-- IM-LIQUID (1.1500 T, yield 0.90)    <- Liquid Steel
    |   |   +-- RM-SCRAP-A (0.8000 T, yield 0.94)
    |   |   +-- RM-SCRAP-B (0.1800 T, yield 0.92)
    |   |   +-- RM-FEMN (0.0080 KG, yield 1.00)
    |   |   +-- RM-COAL (0.0900 T, yield 1.00)
```

```
    |   +-- RM-LIMESTONE (0.0400 T, yield 1.00)
    +-- RM-ROLL-LUB (0.0050 L, yield 1.00)
```

7.4 HR-COIL-3MM BOM (5 levels, 11 nodes)

Similar structure to HR-COIL-2MM with slightly different quantities for the 3mm thickness.

```
FG-HR-2MM (1.0000 T, yield 0.98)          <- Finished HR Coil 3mm
+-- IM-HR-ROUGH (1.0600 T, yield 0.94)
|   +-- IM-SLAB (1.1400 T, yield 0.92)
|   |   +-- IM-LIQUID (1.2000 T, yield 0.87)
|   |   |   +-- RM-SCRAP-A (0.7200 T, yield 0.95)
|   |   |   +-- RM-SCRAP-B (0.1800 T, yield 0.92)
|   |   |   +-- RM-IRON-ORE (0.1600 T, yield 0.97)
|   |   |   +-- RM-COAL (0.1100 T, yield 1.00)
|   |   +-- RM-MOLD-PWD (0.0055 KG, yield 1.00)
|   +-- RM-ROLL-LUB (0.0120 L, yield 1.00)
+-- RM-COATING (0.0180 L, yield 1.00)
```

7.5 HR-COIL-4MM BOM (5 levels, 10 nodes)

```
FG-HR-2MM (1.0000 T, yield 0.98)          <- Finished HR Coil 4mm
+-- IM-HR-ROUGH (1.0700 T, yield 0.93)
|   +-- IM-SLAB (1.1600 T, yield 0.91)
|   |   +-- IM-LIQUID (1.2200 T, yield 0.86)
|   |   |   +-- RM-SCRAP-A (0.7500 T, yield 0.94)
|   |   |   +-- RM-SCRAP-B (0.1500 T, yield 0.92)
|   |   |   +-- RM-IRON-ORE (0.1700 T, yield 0.97)
|   |   |   +-- RM-COAL (0.1200 T, yield 1.00)
|   +-- RM-ROLL-LUB (0.0140 L, yield 1.00)
+-- RM-COATING (0.0160 L, yield 1.00)
```

7.6 CR-SHEET-2MM BOM (6 levels, 11 nodes)

Similar to CR-SHEET-1MM with quantities adjusted for 2mm thickness.

```
FG-CR-1MM (1.0000 T, yield 0.97)          <- Finished CR Sheet 2mm
+-- IM-ANNEALED (1.0400 T, yield 0.96)
|   +-- IM-CR-STRIP (1.0900 T, yield 0.93)
|       +-- IM-PICKLED (1.1300 T, yield 0.95)
|       |   +-- IM-HR-ROUGH (1.1600 T, yield 0.92)
|       |   |   +-- RM-SCRAP-A (0.7800 T, yield 0.95)
|       |   |   +-- RM-IRON-ORE (0.1800 T, yield 0.97)
|       |   |   +-- RM-COAL (0.0900 T, yield 1.00)
|       |   +-- RM-HCL (0.0450 L, yield 1.00)
|       +-- RM-ROLL-LUB (0.0180 L, yield 1.00)
+-- RM-COATING (0.0140 L, yield 1.00)
```

7.7 REBAR-12MM BOM (5 levels, 10 nodes)

Similar to REBAR-10MM with quantities adjusted for 12mm diameter.

```
FG-REBAR-10 (1.0000 T, yield 0.99)        <- Finished Rebar 12mm
+-- IM-ROLLED-BAR (1.0500 T, yield 0.95)
    +-- IM-BILLET (1.1100 T, yield 0.92)
    |   +-- IM-LIQUID (1.1600 T, yield 0.89)
    |   |   +-- RM-SCRAP-A (0.8200 T, yield 0.94)
    |   |   +-- RM-SCRAP-B (0.1600 T, yield 0.92)
    |   |   +-- RM-FEMN (0.0090 KG, yield 1.00)
    |   |   +-- RM-COAL (0.0950 T, yield 1.00)
    |   +-- RM-LIMESTONE (0.0450 T, yield 1.00)
    +-- RM-ROLL-LUB (0.0060 L, yield 1.00)
```

7.8 STEEL-BILLET-100 BOM (3 levels, 8 nodes)

The simplest BOM tree for the semi-finished billet product.

```
IM-BILLET (1.0000 T, yield 0.98)          <- Steel Billet 100mm
+-- IM-LIQUID (1.0800 T, yield 0.92)      <- Liquid Steel
|   +-- RM-SCRAP-A (0.7000 T, yield 0.95)
|   +-- RM-SCRAP-B (0.2500 T, yield 0.93)
|   +-- RM-IRON-ORE (0.1200 T, yield 0.97)
|   +-- RM-LIMESTONE (0.0500 T, yield 1.00)
|   +-- RM-COAL (0.0800 T, yield 1.00)
+-- RM-MOLD-PWD (0.0040 KG, yield 1.00)
```

BOM Summary Table

Product SKU	BOM Version	Levels	Total Nodes	Key Raw Materials
HR-COIL-2MM	V1	5	14	Scrap A/B, Iron Ore, Limestone, FeSi, Coal, Graphite
HR-COIL-3MM	V1	5	11	Scrap A/B, Iron Ore, Coal
HR-COIL-4MM	V1	5	10	Scrap A/B, Iron Ore, Coal
CR-SHEET-1MM	V1	6	14	Scrap A, Iron Ore, FeSi, Limestone, Coal, Al Wire, HCl
CR-SHEET-2MM	V1	6	11	Scrap A, Iron Ore, Coal, HCl
REBAR-10MM	V1	5	10	Scrap A/B, FeMn, Coal, Limestone
REBAR-12MM	V1	5	10	Scrap A/B, FeMn, Coal, Limestone
STEEL-BILLET-100	V1	3	8	Scrap A/B, Iron Ore, Limestone, Coal

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8. Equipment

Sixteen pieces of equipment are configured across the production facility.

ID	Code	Name	Type	Category	Capacity	Unit	Location	Status
1	EAF-001	Electric Arc Furnace #1	BATCH	MELTING	120	T	Melting Shop	**AVAILABLE**
2	EAF-002	Electric Arc Furnace #2	BATCH	MELTING	100	T	Melting Shop	**IN_USE**
3	EAF-003	Electric Arc Furnace #3	BATCH	MELTING	80	T	Melting Shop	**MAINTENANCE**
4	LF-001	Ladle Furnace #1	BATCH	REFINING	120	T	Melting Shop	**AVAILABLE**

5	LF-002	Ladle Furnace #2	BATCH	REFINING	100	T	Melting Shop	**AVAILABLE**
6	CCM-001	Continuous Caster #1	CONTINUOUS	CASTING	50	T/hr	Casting Area	**AVAILABLE**
7	CCM-002	Continuous Caster #2	CONTINUOUS	CASTING	45	T/hr	Casting Area	**IN_USE**
8	HSM-001	Hot Strip Mill #1	CONTINUOUS	HOT_ROLLING	30	T/hr	Hot Rolling Mill	**AVAILABLE**
9	HSM-002	Hot Strip Mill #2	CONTINUOUS	HOT_ROLLING	35	T/hr	Hot Rolling Mill	**AVAILABLE**
10	CRM-001	Cold Rolling Mill #1	CONTINUOUS	COLD_ROLLING	20	T/hr	Cold Mill	**AVAILABLE**
11	BAF-001	Batch Annealing Furnace #1	BATCH	HEAT_TREATMENT	60	T	Annealing Bay	**AVAILABLE**
12	BRM-001	Bar Rolling Mill #1	CONTINUOUS	BAR_ROLLING	40	T/hr	Bar Mill	**AVAILABLE**
13	PKL-001	Pickling Line #1	CONTINUOUS	PICKLING	25	T/hr	Pickling Bay	**ON_HOLD**
14	COAT-001	Galvanizing Line #1	CONTINUOUS	COATING	30	T/hr	Coating Bay	**AVAILABLE**
15	WIRE-001	Wire Drawing Machine #1	CONTINUOUS	WIRE_DRAWING	10	T/hr	Wire Mill	**AVAILABLE**
16	PACK-001	Packaging Line #1	BATCH	PACKAGING	50	T	Shipping	**AVAILABLE**

Equipment Status Summary

Status	Count	Equipment
AVAILABLE	11	EAF-001, LF-001, LF-002, CCM-001, HSM-001, HSM-002, CRM-001, BAF-001, BRM-001, COAT-001, WIRE-001
IN_USE	2	EAF-002, CCM-002
MAINTENANCE	1	EAF-003
ON_HOLD	1	PKL-001 (acid leak - safety inspection)
Not in active use	1	PACK-001 (available but no current production)

Equipment by Location

Location	Equipment
Melting Shop	EAF-001, EAF-002, EAF-003, LF-001, LF-002
Casting Area	CCM-001, CCM-002
Hot Rolling Mill	HSM-001, HSM-002
Cold Mill	CRM-001
Annealing Bay	BAF-001
Bar Mill	BRM-001
Pickling Bay	PKL-001
Coating Bay	COAT-001

Wire Mill	WIRE-001
Shipping	PACK-001

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9. Operators

Twelve operators are configured across six departments. Eleven are active; one (OP-012) is inactive.

ID	Code	Name	Department	Shift	Status
1	OP-001	John Smith	Melting	Day	**ACTIVE**
2	OP-002	Mike Wilson	Melting	Night	**ACTIVE**
3	OP-003	Sarah Brown	Casting	Day	**ACTIVE**
4	OP-004	David Lee	Hot Rolling	Day	**ACTIVE**
5	OP-005	Emily Chen	Cold Rolling	Day	**ACTIVE**
6	OP-006	Robert Garcia	Quality	Day	**ACTIVE**
7	OP-007	Jennifer Martinez	Quality	Night	**ACTIVE**
8	OP-008	William Johnson	Maintenance	Day	**ACTIVE**
9	OP-009	David Park	Finishing	Day	**ACTIVE**
10	OP-010	Maria Santos	Coating	Night	**ACTIVE**
11	OP-011	Ahmed Hassan	Melting	Night	**ACTIVE**
12	OP-012	Lisa Chen	Quality	Day	**INACTIVE**

Operators by Department

Department	Day Shift	Night Shift
Melting	OP-001 (John Smith)	OP-002 (Mike Wilson), OP-011 (Ahmed Hassan)
Casting	OP-003 (Sarah Brown)	-
Hot Rolling	OP-004 (David Lee)	-
Cold Rolling	OP-005 (Emily Chen)	-
Quality	OP-006 (Robert Garcia), OP-012 (Lisa Chen - inactive)	OP-007 (Jennifer Martinez)
Maintenance	OP-008 (William Johnson)	-
Finishing	OP-009 (David Park)	-
Coating	-	OP-010 (Maria Santos)

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10. Orders

There are 45 orders in the system, organized into two groups: the original 15 orders and 30 additional orders that include multi-stage production scenarios.

10.1 Original Orders (1-15)

ID	Order Number	Customer	Product(s)	Qty	Status	Date
1	ORD-2026-001	ABC Steel Corporation	HR-COIL-2MM (150T), HR-COIL-3MM (50T)	200T	IN_PROGRESS	2026-01-10
2	ORD-2026-002	Global Manufacturing Ltd	CR-SHEET-1MM (80T), CR-SHEET-2MM (40T)	120T	IN_PROGRESS	2026-01-12
3	ORD-2026-003	BuildRight Construction	REBAR-10MM (200T), REBAR-12MM (100T)	300T	IN_PROGRESS	2026-01-15
4	ORD-2026-004	Pacific Metal Works	HR-COIL-2MM (100T), CR-SHEET-1MM (50T), REBAR-10MM (80T)	230T	CREATED	2026-01-18
5	ORD-2026-005	European Auto Parts GmbH	HR-COIL-2MM (75T)	75T	COMPLETED	2026-01-20
6	ORD-2026-006	Nordic Steel Trading AB	REBAR-10MM (300T), REBAR-12MM (150T)	450T	CREATED	2026-01-22
7	ORD-2026-007	Middle East Metals FZE	CR-SHEET-1MM (120T)	120T	CREATED	2026-01-25
8	ORD-2026-008	Asian Electronics Inc	HR-COIL-2MM (60T)	60T	ON_HOLD	2026-01-28
9	ORD-2026-009	South American Steel SA	HR-COIL-3MM (250T), HR-COIL-4MM (100T)	350T	CREATED	2026-01-30
10	ORD-2026-010	African Mining Corp	STEEL-BILLET-100 (400T), REBAR-10MM (200T)	600T	CREATED	2026-01-31
11	ORD-2026-011	Oceanic Metals Ltd	CR-SHEET-2MM (180T), HR-COIL-2MM (80T)	260T	IN_PROGRESS	2026-02-01
12	ORD-2026-012	ABC Steel Corporation	REBAR-12MM (180T)	180T	COMPLETED	2026-02-02
13	ORD-2026-013	Global Manufacturing Ltd	HR-COIL-4MM (120T), CR-SHEET-2MM (60T)	180T	COMPLETED	2026-02-03
14	ORD-2026-014	Pacific Metal Works	CR-SHEET-1MM (90T)	90T	CANCELLED	2026-02-04
15	ORD-2026-015	Nordic Steel Trading AB	STEEL-BILLET-100 (250T)	250T	BLOCKED	2026-02-05

10.2 Additional Orders (16-45)

These orders include multi-stage production types where one product feeds into another.

ID	Order Number	Customer	Type	Product Line Items	Status	Date
16	ORD-2026-016	Asian Electronics Inc	Single	HR-COIL-2MM (110T)	IN_PROGRESS	2026-02-06
17	ORD-2026-017	Oceanic Metals Ltd	Single	HR-COIL-3MM (170T)	IN_PROGRESS	2026-02-06
18	ORD-2026-018	South American Steel SA	Single	HR-COIL-4MM (190T)	COMPLETED	2026-02-06
19	ORD-2026-019	Asian Electronics Inc	Single	CR-SHEET-1MM (60T)	IN_PROGRESS	2026-02-07

20	ORD-2026-020	Asian Electronics Inc	Single	CR-SHEET-2MM (60T)	CREATED	2026-02-07
21	ORD-2026-021	Global Manufacturing Ltd	Single	REBAR-10MM (190T)	IN_PROGRESS	2026-02-07
22	ORD-2026-022	ABC Steel Corporation	Single	REBAR-12MM (250T)	BLOCKED	2026-02-08
23	ORD-2026-023	ABC Steel Corporation	Single	STEEL-BILLET-100 (500T)	ON_HOLD	2026-02-08
24	ORD-2026-024	Middle East Metals FZE	Single	REBAR-10MM (190T)	IN_PROGRESS	2026-02-08
25	ORD-2026-025	Pacific Metal Works	Single	HR-COIL-2MM (240T)	CANCELLED	2026-02-09
26	ORD-2026-026	Asian Electronics Inc	**HR->CR**	HR-COIL-2MM (140T) + CR-SHEET-1MM (110T)	CREATED	2026-02-09
27	ORD-2026-027	Global Manufacturing Ltd	**HR->CR**	HR-COIL-3MM (100T) + CR-SHEET-2MM (120T)	CREATED	2026-02-09
28	ORD-2026-028	Pacific Metal Works	**HR->CR**	HR-COIL-4MM (170T) + CR-SHEET-1MM (110T)	ON_HOLD	2026-02-10
29	ORD-2026-029	European Auto Parts GmbH	**HR->CR**	HR-COIL-2MM (120T) + CR-SHEET-2MM (80T)	COMPLETED	2026-02-10
30	ORD-2026-030	BuildRight Construction	**Billet->Rebar**	STEEL-BILLET-100 (220T) + REBAR-10MM (180T)	COMPLETED	2026-02-10
31	ORD-2026-031	European Auto Parts GmbH	**Billet->Rebar**	STEEL-BILLET-100 (360T) + REBAR-12MM (310T)	CREATED	2026-02-11
32	ORD-2026-032	African Mining Corp	**Billet->Rebar**	STEEL-BILLET-100 (180T) + REBAR-10MM (120T)	ON_HOLD	2026-02-11
33	ORD-2026-033	Asian Electronics Inc	**Full Pipeline**	HR-COIL-2MM (160T) + CR-SHEET-1MM (110T) + REBAR-10MM (260T)	IN_PROGRESS	2026-02-11
34	ORD-2026-034	Oceanic Metals Ltd	**Full Pipeline**	HR-COIL-3MM (90T) + CR-SHEET-2MM (80T) + REBAR-12MM (140T)	CANCELLED	2026-02-12
35	ORD-2026-035	Middle East Metals FZE	**Triple Process**	STEEL-BILLET-100 (340T) + HR-COIL-4MM (150T) + CR-SHEET-2MM (120T)	CREATED	2026-02-12
36	ORD-2026-036	Asian Electronics Inc	**Mixed HR**	HR-COIL-2MM (70T) + HR-COIL-3MM (110T)	CREATED	2026-02-12
37	ORD-2026-037	Nordic Steel Trading AB	**Mixed Rebar**	REBAR-10MM (130T) + REBAR-12MM (170T)	COMPLETED	2026-02-13
38	ORD-2026-038	Nordic Steel Trading AB	**Mixed CR**	CR-SHEET-1MM (50T) + CR-SHEET-2MM (70T)	IN_PROGRESS	2026-02-13
39	ORD-2026-039	South American Steel SA	**Heavy HR->CR**	HR-COIL-2MM (220T) + HR-COIL-4MM (180T) + CR-SHEET-1MM (170T)	COMPLETED	2026-02-13
40	ORD-2026-040	Middle East Metals FZE	**HR->CR**	HR-COIL-3MM (120T) + CR-SHEET-1MM (90T)	CREATED	2026-02-14
41	ORD-2026-041	European Auto Parts GmbH	**Billet->Rebar**	STEEL-BILLET-100 (380T) + REBAR-12MM (340T)	CREATED	2026-02-14
42	ORD-2026-042	European Auto Parts GmbH	**4-Stage Pipeline**	STEEL-BILLET-100 (110T) + HR-COIL-2MM (110T) + CR-SHEET-2MM (80T) + REBAR-10MM (120T)	CREATED	2026-02-14

43	ORD-2026-043	Oceanic Metals Ltd	**Mixed HR**	HR-COIL-2MM (100T) + HR-COIL-3MM (70T) + HR-COIL-4MM (80T)	COMPLETED	2026-02-15
44	ORD-2026-044	South American Steel SA	**Billet+Rebar+CR**	STEEL-BILLET-100 (250T) + REBAR-12MM (170T) + CR-SHEET-1MM (80T)	IN_PROGRESS	2026-02-15
45	ORD-2026-045	Global Manufacturing Ltd	Single	STEEL-BILLET-100 (470T)	CREATED	2026-02-15

Order Status Summary (All 45)

Status	Count	Order IDs
CREATED	12	4, 6, 7, 9, 10, 20, 26, 27, 31, 35, 36, 40, 41, 42, 45
IN_PROGRESS	12	1, 2, 3, 11, 16, 17, 19, 21, 24, 33, 38, 44
COMPLETED	10	5, 12, 13, 18, 29, 30, 37, 39, 43
ON_HOLD	4	8, 23, 28, 32
BLOCKED	2	15, 22
CANCELLED	3	14, 25, 34

Multi-Stage Order Types Explained

Type	Description	Processes Involved	Total Ops
HR->CR	Hot Rolled Coil feeds into Cold Rolled Sheet	Process 1 (8 ops) + Process 2 (3 ops)	11
Billet->Rebar	Billets are cast, then rolled into rebar	Process 4 (4 ops) + Process 3 (7 ops)	11
Full Pipeline	HR Coil + CR Sheet + Rebar in one order	Process 1 + Process 2 + Process 3	18
Triple Process	Billet + HR Coil + CR Sheet	Process 4 + Process 1 + Process 2	15
4-Stage Pipeline	All four processes in one order	Process 4 + Process 1 + Process 2 + Process 3	22
Heavy HR->CR	Multiple HR Coil variants feeding CR Sheet	Process 1 (x2) + Process 2	19
Mixed	Multiple variants of the same product type	Same process, different SKUs	Varies

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11. Batches

There are 70 batches in the system representing material at various production stages and statuses.

11.1 Raw Material Batches (28 batches)

Batch #	Material	Quantity	Unit	Status	Notes
B-RM-001	RM-SCRAP-A (Steel Scrap Grade A)	500	T	AVAILABLE	Primary scrap supply
B-RM-002	RM-SCRAP-A (Steel Scrap Grade A)	350	T	AVAILABLE	
B-RM-003	RM-SCRAP-B (Steel Scrap Grade B)	200	T	AVAILABLE	
B-RM-004	RM-IRON-ORE (Iron Ore Pellets)	400	T	AVAILABLE	
B-RM-005	RM-LIMESTONE (Limestone)	150	T	AVAILABLE	

B-RM-006	RM-FESI (Ferroalloy FeSi)	2,000	KG	AVAILABLE	
B-RM-007	RM-FEMN (Ferroalloy FeMn)	1,500	KG	AVAILABLE	
B-RM-008	RM-COAL (Coal / Coke)	300	T	AVAILABLE	
B-RM-009	RM-GRAPHITE (Graphite Electrodes)	50	EA	AVAILABLE	
B-RM-010	RM-SCRAP-A (Steel Scrap Grade A)	180	T	**ON_HOLD**	Quality investigation
B-RM-011	RM-SCRAP-B (Steel Scrap Grade B)	120	T	AVAILABLE	
B-RM-012	RM-HCL (Hydrochloric Acid)	5,000	L	AVAILABLE	
B-RM-013	RM-COATING (Surface Coating Oil)	2,000	L	AVAILABLE	
B-RM-014	RM-ROLL-LUB (Rolling Lubricant)	3,000	L	AVAILABLE	
B-RM-015	RM-MOLD-PWD (Mold Powder)	1,000	KG	AVAILABLE	
B-RM-016	RM-AL-WIRE (Aluminum Wire)	500	KG	AVAILABLE	
B-RM-017	RM-SCRAP-C (Steel Scrap Grade C)	250	T	AVAILABLE	
B-RM-018	RM-FEV (Ferroalloy FeV)	100	KG	AVAILABLE	
B-RM-019	RM-SCRAP-A (Steel Scrap Grade A)	100	T	**BLOCKED**	High sulfur content
B-RM-020	RM-COAL (Coal / Coke)	25	T	**SCRAPPED**	Contaminated
B-RM-021	RM-SCRAP-A (Steel Scrap Grade A)	280	T	AVAILABLE	
B-RM-022	RM-SCRAP-B (Steel Scrap Grade B)	150	T	AVAILABLE	
B-RM-023	RM-SCRAP-A (Steel Scrap Grade A)	400	T	AVAILABLE	
B-RM-024	RM-SCRAP-B (Steel Scrap Grade B)	300	T	AVAILABLE	
B-RM-025	RM-IRON-ORE (Iron Ore Pellets)	250	T	AVAILABLE	
B-RM-026	RM-LIMESTONE (Limestone)	200	T	AVAILABLE	
B-RM-027	RM-FEMN (Ferroalloy FeMn)	2,000	KG	AVAILABLE	
B-RM-028	RM-FESI (Ferroalloy FeSi)	1,500	KG	AVAILABLE	

11.2 Intermediate Batches (28 batches)

Batch #	Material	Quantity	Unit	Status	Notes
B-IM-001	IM-LIQUID (Liquid Steel)	165	T	CONSUMED	Used in slab casting
B-IM-002	IM-SLAB (Steel Slab 200mm)	155	T	AVAILABLE	
B-IM-003	IM-LIQUID (Liquid Steel)	90	T	CONSUMED	
B-IM-004	IM-LIQUID (Liquid Steel)	220	T	CONSUMED	Used for rebar billet
B-IM-005	IM-BILLET (Steel Billet 100mm)	210	T	AVAILABLE	
B-IM-006	IM-LIQUID (Liquid Steel)	85	T	CONSUMED	
B-IM-007	IM-SLAB (Steel Slab 200mm)	82	T	CONSUMED	
B-IM-008	IM-HR-ROUGH (HR Coil Rough)	78	T	CONSUMED	
B-IM-009	IM-SLAB (Steel Slab 200mm)	30	T	QUALITY_PENDING	Surface cracks detected
B-IM-010	IM-BILLET (Steel Billet 100mm)	195	T	AVAILABLE	
B-IM-011	IM-PICKLED (Pickled HR Strip)	85	T	AVAILABLE	

B-IM-012	IM-CR-STRIP (Cold Rolled Strip)	80	T	PRODUCED	
B-IM-013	IM-ANNEALED (Annealed CR Strip)	75	T	AVAILABLE	
B-IM-014	IM-ROLLED-BAR (Rolled Bar)	190	T	AVAILABLE	
B-IM-015	IM-LIQUID (Liquid Steel)	130	T	PRODUCED	
B-IM-016	IM-SLAB (Steel Slab 200mm)	125	T	PRODUCED	
B-IM-017	IM-SLAB (Steel Slab 200mm)	45	T	**BLOCKED**	Thickness out of spec
B-IM-018	IM-BILLET (Steel Billet 100mm)	60	T	QUALITY_PENDING	
B-IM-019	IM-HR-ROUGH (HR Coil Rough)	95	T	AVAILABLE	
B-IM-020	IM-LIQUID (Liquid Steel)	100	T	AVAILABLE	
B-IM-021	IM-BLOOM (Steel Bloom 200mm)	160	T	AVAILABLE	
B-IM-022	IM-BLOOM (Steel Bloom 200mm)	140	T	AVAILABLE	
B-IM-023	IM-WIRE-ROD (Wire Rod)	120	T	AVAILABLE	
B-IM-024	IM-WIRE-ROD (Wire Rod)	95	T	AVAILABLE	
B-IM-025	IM-LIQUID (Liquid Steel)	200	T	AVAILABLE	
B-IM-026	IM-LIQUID (Liquid Steel)	180	T	AVAILABLE	
B-IM-027	IM-SLAB (Steel Slab 200mm)	200	T	AVAILABLE	
B-IM-028	IM-HR-ROUGH (HR Coil Rough)	110	T	AVAILABLE	

11.3 Work In Progress Batches (6 batches)

These batches represent material actively being processed on equipment.

Batch #	Material	Quantity	Unit	Status	Equipment Location
B-WIP-001	WIP-MELT (Molten Steel)	85	T	AVAILABLE	EAF #1
B-WIP-002	WIP-MELT (Molten Steel)	92	T	AVAILABLE	EAF #2
B-WIP-003	WIP-CAST (Steel Being Cast)	78	T	AVAILABLE	Caster #1
B-WIP-004	WIP-ROLL (Strip on Hot Mill)	65	T	AVAILABLE	Hot Mill #1
B-WIP-005	WIP-PICKLE (Strip in Pickle Line)	45	T	AVAILABLE	Pickle Line #1
B-WIP-006	WIP-ROLL (Strip on Cold Mill)	55	T	AVAILABLE	Cold Mill #1

11.4 Finished Goods Batches (8 batches)

Batch #	Material	Quantity	Unit	Status	Notes
B-FG-001	FG-HR-2MM (HR Coil 2mm)	75	T	AVAILABLE	Order 5 completed
B-FG-002	FG-CR-1MM (CR Sheet 1mm)	70	T	AVAILABLE	
B-FG-003	FG-REBAR-10 (Rebar 10mm)	180	T	AVAILABLE	
B-FG-004	FG-HR-2MM (HR Coil 2mm)	120	T	AVAILABLE	
B-FG-005	FG-REBAR-10 (Rebar 10mm)	175	T	PRODUCED	
B-FG-006	FG-CR-1MM (CR Sheet 1mm)	55	T	PRODUCED	
B-FG-007	FG-HR-2MM (HR Coil 2mm)	25	T	QUALITY_PENDING	QC inspection pending

B-FG-008	FG-REBAR-10 (Rebar 10mm)	150	T	AVAILABLE	

Batch Status Summary

Status	Count	Description
AVAILABLE	50	Ready for use in production or shipment
CONSUMED	5	Used up in production (historical)
PRODUCED	4	Recently produced, awaiting quality release
QUALITY_PENDING	3	Awaiting quality inspection or approval
BLOCKED	2	Blocked due to quality issues
ON_HOLD	1	Temporarily held pending investigation
SCRAPPED	1	Disposed of due to contamination

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12. Inventory

There are 70 inventory records tracking material at specific locations. Each inventory record is linked to a batch.

Inventory by Type and State

Type	AVAILABLE	CONSUMED	PRODUCED	RESERVED	BLOCKED	ON_HOLD	SCRAPPED	**Total**
RM (Raw Material)	22	0	0	2	1	1	1	**27**
IM (Intermediate)	11	5	3	0	1	2	0	**22**
WIP (Work In Progress)	6	0	0	0	0	0	0	**6**
FG (Finished Goods)	5	0	2	0	0	1	0	**8**
Total	**44**	**5**	**5**	**2**	**2**	**4**	**1**	**63**

Note: Some inventory IDs have gaps due to the data structure. The actual record count is 70 (IDs 1-70 with gaps at 30-56 range).

Key Inventory Locations

Location	Material Types	Count
Scrap Yard A/B/C/D	RM-SCRAP-A, RM-SCRAP-B, RM-SCRAP-C	9
Alloy Store / Alloy Store B	RM-FESI, RM-FEMN, RM-FEV	5
Ore Storage / Ore Storage B	RM-IRON-ORE	2
Flux Store / Flux Store B	RM-LIMESTONE	2
Coal Yard	RM-COAL	1
Chemical Store	RM-HCL	1
Oil Store	RM-COATING, RM-ROLL-LUB	2
Slab Yard / Slab Yard B	IM-SLAB	3
Billet Yard	IM-BILLET	2

Ladle / Ladle #2 / Ladle #3	IM-LIQUID	3
Hot Mill	IM-HR-ROUGH	2
Bloom Yard	IM-BLOOM	2
Wire Rod Bay	IM-WIRE-ROD	2
FG Warehouse 1/2/3	FG-HR-2MM, FG-CR-1MM, FG-REBAR-10	6
Quarantine Area / QC Area	Blocked/On Hold items	4
Historical	Consumed records	5
Disposal	Scrapped items	1

Notable Inventory Items

Description	Location	State	Reason
180T Steel Scrap Grade A	Scrap Yard C	ON_HOLD	Quality investigation pending
100T Steel Scrap (Blocked)	Quarantine Area	BLOCKED	High sulfur content
45T Steel Slab (Blocked)	QC Area	BLOCKED	Thickness out of spec
30T Steel Slab (QC Pending)	QC Area	ON_HOLD	Surface defects
60T Steel Billet (QC)	QC Area	ON_HOLD	Quality review
25T HR Coil (QC Pending)	QC Area	ON_HOLD	Pending inspection
200T Scrap A (Reserved)	Scrap Yard A	RESERVED	Reserved for Order ORD-2026-009
100T Scrap B (Reserved)	Scrap Yard B	RESERVED	Reserved for Order ORD-2026-009
25T Coal (Contaminated)	Disposal	SCRAPPED	Contaminated, disposed

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13. Hold Records

There are 12 hold records in the system: 8 currently active and 4 that have been released.

13.1 Active Holds (8)

Hold ID	Entity Type	Entity	Reason	Comments	Applied By	Applied Date
1	BATCH	B-RM-010 (Scrap A, 180T)	QUALITY_INVESTIGATION	Suspected contamination in scrap shipment - pending lab report	OP-006 (Robert Garcia)	2026-01-25
2	INVENTORY	Inv #39 (Scrap A, 100T)	QUALITY_INVESTIGATION	Chemical analysis failed - high sulfur content detected	OP-006 (Robert Garcia)	2026-01-26
3	INVENTORY	Inv #41 (Steel Slab, 30T)	QUALITY_INVESTIGATION	Surface defects found during slab inspection	OP-007 (Jennifer Martinez)	2026-01-27
4	OPERATION	Op #27 (Scrap Charging, Ord 8)	MATERIAL_SHORTAGE	Waiting for scrap availability	OP-004 (David Lee)	2026-01-28
5	BATCH	B-IM-009 (Steel Slab, 30T)	SAFETY_CONCERN	Slab surface cracks detected - requires ultrasonic testing	OP-006 (Robert Garcia)	2026-01-29

6	EQUIPMENT	PKL-001 (Pickling Line #1)	SAFETY_CONCERN	Acid leak detected in pickling line - safety inspection required	OP-008 (William Johnson)	2026-01-28
7	ORDER	ORD-2026-008 (60T HR Coil 2mm)	CUSTOMER_REQUEST	Customer requested hold pending design review	Admin	2026-01-29
8	BATCH	B-IM-017 (Steel Slab, 45T)	SPEC_DEVIATION	Slab thickness out of specification - requires disposition	OP-006 (Robert Garcia)	2026-02-01

13.2 Released Holds (4)

Hold ID	Entity Type	Entity	Reason	Released By	Release Date	Release Comment
9	BATCH	B-RM-003 (Scrap B, 200T)	QUALITY_INVESTIGATION	OP-007 (Jennifer Martinez)	2026-01-21	Lab results clear - release approved
10	INVENTORY	Inv #5 (Limestone, 150T)	CONTAMINATION	OP-006 (Robert Garcia)	2026-01-23	Moisture test passed - OK to use
11	OPERATION	Op #16 (Billet Reheating)	EQUIP_BREAKDOWN	OP-008 (William Johnson)	2026-01-25	Maintenance completed - equipment OK
12	EQUIPMENT	EAF-003 (Arc Furnace #3)	SAFETY_CONCERN	OP-008 (William Johnson)	2026-01-26	Inspection passed - cleared for use

Hold Distribution by Entity Type

Entity Type	Active	Released	Total
BATCH	3	1	4
INVENTORY	2	1	3
OPERATION	1	1	2
EQUIPMENT	1	1	2
ORDER	1	0	1
Total	**8**	**4**	**12**

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14. Batch Number Configuration

Eleven batch numbering rules control how batch numbers are automatically generated during production confirmation.

Config Name	Operation Type	Product SKU	Prefix	Separator	Date Format	Seq Length	Seq Reset	Priority
Default	(any)	(any)	B	-	yyyyMMdd	4	DAILY	100
Melting	MELTING	(any)	MELT	-	yyyyMMdd	3	DAILY	10
Casting Slab	CASTING	(any)	SLB	-	yyyyMMdd	3	DAILY	10
Casting Billet	CASTING	STEEL-BILLET-100	BLT	-	yyyyMMdd	3	DAILY	5
Hot Rolling	HOT_ROLLING	(any)	HR	-	yyyyMMdd	3	DAILY	10
Cold Rolling	COLD_ROLLING	(any)	CR	-	yyyyMMdd	3	DAILY	10

Bar Rolling	BAR_ROLLING	(any)	BAR	-	yyyyMMdd	3	DAILY	10
Rebar 10mm	(any)	REBAR-10MM	RB10	-	yyyyMMdd	4	DAILY	5
Rebar 12mm	(any)	REBAR-12MM	RB12	-	yyyyMMdd	4	DAILY	5
HR Coil 2mm	(any)	HR-COIL-2MM	HRC2	-	yyyyMMdd	4	DAILY	5
CR Sheet 1mm	(any)	CR-SHEET-1MM	CRS1	-	yyyyMMdd	4	DAILY	5

How Batch Numbers Are Generated

The system selects the highest-priority (lowest number) matching rule. Product-specific rules (priority 5) take precedence over operation-type rules (priority 10), which take precedence over the default rule (priority 100).

Example batch numbers:

- Melting operation: `MELT-20260215-001`
- HR Coil 2mm production: `HRC2-20260215-0001`
- Rebar 10mm production: `RB10-20260215-0001`
- Billet casting (for STEEL-BILLET-100): `BLT-20260215-001`
- Slab casting (general): `SLB-20260215-001`
- Default (no matching rule): `B-20260215-0001`

Sequences reset daily, so the first batch each day starts at 001 (or 0001).

---

15. Production Confirmations

There are 35 production confirmations recording completed production operations across multiple orders.

Confirmations by Order

Order 1 (ORD-2026-001): HR Coil 2mm - IN_PROGRESS

Conf ID	Operation	Produced	Scrap	Duration	Operator	Equipment	Notes
1	Scrap Charging	160 T	3 T	4h	OP-001 (John Smith)	EAF-001	Scrap charging complete, 160T loaded
2	EAF Melting	155 T	5 T	5.5h	OP-001	EAF-001	Electrode change, 20min delay
3	Ladle Refining	152 T	3 T	2.5h	OP-001	LF-001	Chemistry adjusted
4	Slab Casting	148 T	4 T	6h	OP-003 (Sarah Brown)	CCM-001	Minor mold issue, 15min delay
5	Slab Reheating	148 T	0 T	3h	OP-004 (David Lee)	HSM-001	Slabs reheated to 1250C

Operations 6-8 (Rough Roll, Finish Roll, Cool/Coil) are pending. Operation 6 is READY.

Order 3 (ORD-2026-003): Rebar 10mm - IN_PROGRESS

Conf ID	Operation	Produced	Scrap	Duration	Operator	Equipment	Notes
6	Scrap Charging	210 T	5 T	4h	OP-001	EAF-002	Rebar order scrap charge
7	EAF Melting	205 T	5 T	6.5h	OP-001	EAF-002	Temp correction, 30min quality delay
8	Ladle Refining	200 T	5 T	3h	OP-001	LF-001	

9	Billet Casting	195 T	5 T	8h	OP-003	CCM-002	Billet casting 100mm square

Operations 16-18 (Billet Reheat, Bar Roll, Quench/Temper) are pending. Operation 16 is READY.

Order 5 (ORD-2026-005): HR Coil 2mm - COMPLETED (all 8 operations)

Conf ID	Operation	Produced	Scrap	Operator	Equipment
10	Scrap Charging	82 T	1 T	OP-001	EAF-001
11	EAF Melting	80 T	2 T	OP-001	EAF-001
12	Ladle Refining	79 T	1 T	OP-001	LF-001
13	Slab Casting	77 T	2 T	OP-003	CCM-001
14	Slab Reheating	77 T	0 T	OP-004	HSM-001
15	Rough Rolling	76 T	1 T	OP-004	HSM-001
16	Finish Rolling	75.5 T	0.5 T	OP-004	HSM-001
17	Cooling & Coiling	75 T	0.5 T	OP-004	HSM-001

This is the only fully completed order in the original 15 that has all confirmations. Final output: 75T HR Coil 2mm (batch B-FG-001).

Order 12 (ORD-2026-012): Rebar 12mm - COMPLETED (all 7 operations)

Conf ID	Operation	Produced	Scrap	Operator	Equipment
18	Scrap Charging	190 T	5 T	OP-002 (Mike Wilson)	EAF-002
19	EAF Melting	185 T	5 T	OP-002	EAF-002
20	Ladle Refining	182 T	3 T	OP-002	LF-002
21	Billet Casting	178 T	4 T	OP-003	CCM-002
22	Billet Reheating	178 T	0 T	OP-004	HSM-001
23	Bar Rolling	175 T	3 T	OP-004	BRM-001
24	Quenching & Tempering	175 T	0 T	OP-004	BRM-001

Final output: 175T Rebar 12mm (batch B-FG-005).

Order 13 (ORD-2026-013): HR Coil 4mm - COMPLETED (all 8 operations)

Conf ID	Operation	Produced	Scrap	Operator	Equipment
25	Scrap Charging	130 T	2 T	OP-001	EAF-001
26	EAF Melting	127 T	3 T	OP-001	EAF-001
27	Ladle Refining	125 T	2 T	OP-001	LF-001
28	Slab Casting	122 T	3 T	OP-003	CCM-001
29	Slab Reheating	122 T	0 T	OP-004	HSM-001
30	Rough Rolling	120 T	2 T	OP-004	HSM-001
31	Finish Rolling	118 T	2 T	OP-004	HSM-001
32	Cooling & Coiling	118 T	0 T	OP-004	HSM-001

Final output: 118T HR Coil 4mm (batch B-FG-004).

Additional In-Progress Confirmations

Conf ID	Order	Operation	Produced	Scrap	Operator	Notes
33	Ord 11 (Oceanic)	Scrap Charging	85 T	2 T	OP-011 (Ahmed Hassan)	HR Coil production
34	Ord 9 (S. American)	Scrap Charging	125 T	5 T	OP-001	Partial: 125T of 250T target
35	Ord 11 (Oceanic)	Pickling	90 T	2 T	OP-005 (Emily Chen)	Most recent confirmation

Confirmation Summary Statistics

Metric	Value
Total Confirmations	35
Total Produced (gross)	~5,070 T
Total Scrap	~88 T
Avg. Scrap Rate	~1.7%
Confirmations with Delays	2 (Conf #2: Maintenance, Conf #7: Quality Issue)
Operators Used	7 (OP-001 through OP-005, OP-011)
Equipment Used	7 (EAF-001/002, LF-001/002, CCM-001/002, HSM-001, BRM-001, PKL-001)

---

16. Product-Process-BOM Cross Reference

This section ties together products, their production processes, routing steps, BOM hierarchy, and which orders reference each product.

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

Aspect	Details
Process	Process 1: Hot Rolled Coil Production (8 steps)
Routing	Charge -> Melt -> Refine -> Slab Cast -> Reheat -> Rough Roll -> Finish Roll -> Cool/Coil
BOM Depth	5 levels, 14 nodes
Key Materials	RM-SCRAP-A (0.70T), RM-SCRAP-B (0.20T), RM-IRON-ORE (0.15T), RM-COAL (0.10T) per ton
Orders	ORD-001 (150T), ORD-004 (100T), ORD-005 (75T, completed), ORD-008 (60T, on hold), ORD-011 (80T), ORD-016 (110T), ORD-025 (240T, cancelled), ORD-026 (140T), ORD-029 (120T, completed), ORD-033 (160T), ORD-036 (70T), ORD-039 (220T, completed), ORD-042 (110T), ORD-043 (100T, completed)

HR-COIL-3MM (Hot Rolled Coil 3mm)

Aspect	Details
Process	Process 1: Hot Rolled Coil Production (8 steps)
Routing	Same as HR-COIL-2MM
BOM Depth	5 levels, 11 nodes

Key Materials	RM-SCRAP-A (0.72T), RM-SCRAP-B (0.18T), RM-IRON-ORE (0.16T), RM-COAL (0.11T) per ton
Orders	ORD-001 (50T), ORD-009 (250T), ORD-017 (170T), ORD-027 (100T), ORD-034 (90T, cancelled), ORD-036 (110T), ORD-040 (120T), ORD-043 (70T, completed)

HR-COIL-4MM (Hot Rolled Coil 4mm)

Aspect	Details
Process	Process 1: Hot Rolled Coil Production (8 steps)
Routing	Same as HR-COIL-2MM
BOM Depth	5 levels, 10 nodes
Key Materials	RM-SCRAP-A (0.75T), RM-SCRAP-B (0.15T), RM-IRON-ORE (0.17T), RM-COAL (0.12T) per ton
Orders	ORD-009 (100T), ORD-013 (120T, completed), ORD-018 (190T, completed), ORD-028 (170T, on hold), ORD-035 (150T), ORD-039 (180T, completed), ORD-043 (80T, completed)

CR-SHEET-1MM (Cold Rolled Sheet 1mm)

Aspect	Details
Process	Process 2: Cold Rolled Sheet Production (3 steps)
Routing	Pickling -> Cold Rolling -> Batch Annealing
BOM Depth	6 levels, 14 nodes (deepest BOM - requires HR coil as input)
Key Materials	RM-SCRAP-A (0.75T), RM-IRON-ORE (0.20T), RM-HCL (0.05L), RM-COATING (0.015L) per ton
Orders	ORD-002 (80T), ORD-004 (50T), ORD-007 (120T), ORD-014 (90T, cancelled), ORD-019 (60T), ORD-026 (110T), ORD-028 (110T, on hold), ORD-033 (110T), ORD-039 (170T, completed), ORD-040 (90T), ORD-044 (80T)

CR-SHEET-2MM (Cold Rolled Sheet 2mm)

Aspect	Details
Process	Process 2: Cold Rolled Sheet Production (3 steps)
Routing	Same as CR-SHEET-1MM
BOM Depth	6 levels, 11 nodes
Key Materials	RM-SCRAP-A (0.78T), RM-IRON-ORE (0.18T), RM-HCL (0.045L) per ton
Orders	ORD-002 (40T), ORD-011 (180T), ORD-013 (60T, completed), ORD-020 (60T), ORD-027 (120T), ORD-029 (80T, completed), ORD-034 (80T, cancelled), ORD-035 (120T), ORD-038 (70T), ORD-042 (80T)

REBAR-10MM (Reinforcement Bar 10mm)

Aspect	Details
Process	Process 3: Rebar Production (7 steps)
Routing	Charge -> Melt -> Refine -> Billet Cast -> Reheat -> Bar Roll -> Quench/Temper

BOM Depth	5 levels, 10 nodes
Key Materials	RM-SCRAP-A (0.80T), RM-SCRAP-B (0.18T), RM-FEMN (0.008 KG), RM-COAL (0.09T) per ton
Orders	ORD-003 (200T), ORD-004 (80T), ORD-006 (300T), ORD-010 (200T), ORD-021 (190T), ORD-024 (190T), ORD-030 (180T, completed), ORD-032 (120T, on hold), ORD-033 (260T), ORD-037 (130T, completed), ORD-042 (120T)

REBAR-12MM (Reinforcement Bar 12mm)

Aspect	Details
Process	Process 3: Rebar Production (7 steps)
Routing	Same as REBAR-10MM
BOM Depth	5 levels, 10 nodes
Key Materials	RM-SCRAP-A (0.82T), RM-SCRAP-B (0.16T), RM-FEMN (0.009 KG), RM-COAL (0.095T) per ton
Orders	ORD-003 (100T), ORD-006 (150T), ORD-012 (180T, completed), ORD-022 (250T, blocked), ORD-031 (310T), ORD-034 (140T, cancelled), ORD-037 (170T, completed), ORD-041 (340T), ORD-044 (170T)

STEEL-BILLET-100 (Steel Billet 100mm)

Aspect	Details
Process	Process 4: Billet Production (4 steps)
Routing	Charge -> Melt -> Refine -> Billet Cast
BOM Depth	3 levels, 8 nodes (simplest BOM)
Key Materials	RM-SCRAP-A (0.70T), RM-SCRAP-B (0.25T), RM-IRON-ORE (0.12T), RM-COAL (0.08T) per ton
Orders	ORD-010 (400T), ORD-015 (250T, blocked), ORD-023 (500T, on hold), ORD-030 (220T, completed), ORD-031 (360T), ORD-032 (180T, on hold), ORD-035 (340T), ORD-041 (380T), ORD-042 (110T), ORD-044 (250T), ORD-045 (470T)

---

17. Lookup and Configuration Data

17.1 Hold Reasons (10)

Reason Code	Description	Applicable To
EQUIP_BREAKDOWN	Equipment Breakdown	OPERATION, EQUIPMENT
QUALITY_INVESTIGATION	Quality Investigation	OPERATION, BATCH, INVENTORY
MATERIAL_SHORTAGE	Material Shortage	OPERATION, ORDER_LINE
OPERATOR_UNAVAIL	Operator Unavailability	OPERATION
SAFETY_CONCERN	Safety Concern	OPERATION, BATCH, EQUIPMENT
REGULATORY_HOLD	Regulatory Hold	BATCH, INVENTORY

CUSTOMER_REQUEST	Customer Request	ORDER, ORDER_LINE
CONTAMINATION	Contamination Suspected	BATCH, INVENTORY
SPEC_DEVIATION	Specification Deviation	BATCH, INVENTORY
OTHER	Other	OPERATION, ORDER_LINE, BATCH, INVENTORY, EQUIPMENT

17.2 Delay Reasons (10)

Reason Code	Description
EQUIP_BREAKDOWN	Equipment Breakdown
MATERIAL_SHORTAGE	Material Shortage
OPERATOR_UNAVAIL	Operator Unavailable
QUALITY_ISSUE	Quality Issue
SCHEDULING	Scheduling Conflict
MAINTENANCE	Scheduled Maintenance
POWER_OUTAGE	Power Outage
TOOL_CHANGE	Tool/Die Change
CALIBRATION	Equipment Calibration
OTHER	Other

17.3 Process Parameters Configuration

Process parameters define the acceptable ranges for each operation type and product combination.

Operation Type	Product	Parameter	Unit	Min	Max	Default	Required
FURNACE	HR-COIL-2MM	Temperature	C	1500	1800	1650	Yes
FURNACE	HR-COIL-2MM	Holding Time	min	30	180	90	Yes
FURNACE	HR-COIL-2MM	Power Input	MW	20	80	50	No
CASTER	HR-COIL-2MM	Casting Speed	m/min	0.8	2.5	1.5	Yes
CASTER	HR-COIL-2MM	Mold Temperature	C	200	400	300	Yes
CASTER	HR-COIL-2MM	Slab Width	mm	1000	1600	1250	Yes
ROLLING	HR-COIL-2MM	Entry Temperature	C	1100	1280	1200	Yes
ROLLING	HR-COIL-2MM	Finish Temperature	C	850	950	900	Yes
ROLLING	HR-COIL-2MM	Coiling Temperature	C	550	700	620	Yes
ROLLING	HR-COIL-2MM	Thickness	mm	1.5	3.0	2.0	Yes
ROLLING	HR-COIL-2MM	Speed	m/s	5	15	10	Yes
FURNACE	CR-SHEET-1MM	Temperature	C	1500	1750	1620	Yes
FURNACE	CR-SHEET-1MM	Holding Time	min	30	150	80	Yes
CASTER	CR-SHEET-1MM	Casting Speed	m/min	0.8	2.0	1.4	Yes
CASTER	CR-SHEET-1MM	Mold Temperature	C	200	380	280	Yes
ROLLING	CR-SHEET-1MM	Entry Temperature	C	1100	1250	1180	Yes

ROLLING	CR-SHEET-1MM	Thickness	mm	0.5	2.0	1.0	Yes
ROLLING	CR-SHEET-1MM	Reduction Ratio	%	40	80	60	Yes
PICKLING	CR-SHEET-1MM	Acid Concentration	%	12	22	18	Yes
PICKLING	CR-SHEET-1MM	Line Speed	m/min	5	30	15	Yes
FURNACE	REBAR-10MM	Temperature	C	1550	1800	1680	Yes
FURNACE	REBAR-10MM	Holding Time	min	30	120	75	Yes
CASTER	REBAR-10MM	Casting Speed	m/min	2.0	5.0	3.5	Yes
CASTER	REBAR-10MM	Billet Size	mm	100	150	130	Yes
ROLLING	REBAR-10MM	Entry Temperature	C	1050	1200	1100	Yes
ROLLING	REBAR-10MM	Finish Temperature	C	900	1050	980	Yes
ROLLING	REBAR-10MM	Bar Diameter	mm	8	32	10	Yes
COOLING	REBAR-10MM	Quench Temperature	C	200	500	350	Yes
COOLING	REBAR-10MM	Tempering Temperature	C	400	650	550	Yes

17.4 Units of Measure (14)

Code	Name	Type	Precision	Base Unit
T	Metric Ton	WEIGHT	2	Yes
KG	Kilogram	WEIGHT	2	No
LB	Pound	WEIGHT	2	No
G	Gram	WEIGHT	3	No
L	Liter	VOLUME	2	Yes
ML	Milliliter	VOLUME	0	No
GAL	Gallon	VOLUME	2	No
M	Meter	LENGTH	2	Yes
MM	Millimeter	LENGTH	0	No
CM	Centimeter	LENGTH	1	No
EA	Each	COUNT	0	Yes
PC	Piece	COUNT	0	No
HR	Hour	TIME	2	Yes
MIN	Minute	TIME	0	No

---

18. Summary Counts

Entity	Count	Details
Users	1	Admin only
Customers	12	11 active, 1 inactive

Products	8	3 HR Coils, 2 CR Sheets, 2 Rebars, 1 Billet
Materials	32	15 RM, 10 IM, 4 WIP, 3 FG
Processes	6	4 active, 1 draft, 1 inactive
Routings	4	One per active process
Routing Steps	22	8 + 3 + 7 + 4 steps
Operation Templates	18	17 active, 1 inactive
BOM Trees	8	One per product, 88 total nodes
Equipment	16	11 available, 2 in use, 1 maintenance, 1 on hold, 1 packaging
Operators	12	11 active, 1 inactive
Orders	45	12 created, 12 in-progress, 10 completed, 4 on-hold, 2 blocked, 3 cancelled
Order Line Items	82	25 original + 57 additional
Operations (Runtime)	425	Across all orders and line items
Batches	70	28 RM, 28 IM, 6 WIP, 8 FG
Inventory Records	70	44 available, 5 consumed, 5 produced, 2 reserved, 2 blocked, 4 on-hold, 1 scrapped
Hold Records	12	8 active, 4 released
Production Confirmations	35	Across 5 completed + 3 in-progress orders
Batch Relations	40	Genealogy chains for traceability
Batch Number Configs	11	Operation-type and product-specific rules
Process Parameters	29	For HR Coil, CR Sheet, and Rebar products
Hold Reasons	10	Quality, Safety, Equipment, Customer, etc.
Delay Reasons	10	Equipment, Material, Operator, Quality, etc.
Units of Measure	14	Weight, Volume, Length, Count, Time
Unit Conversions	16	Between related units
Equipment Type Configs	13	Capacity, temperature, maintenance intervals
Inventory Form Configs	9	Storage requirements by material form
Audit Trail Entries	~250	Full history of all entity changes

---

19. Batch Genealogy (Traceability)

The system maintains parent-child relationships between batches through batch relations. This enables both forward traceability (what was this material used for?) and backward traceability (what materials went into this product?).

19.1 Genealogy: Order 5 (HR Coil 2mm - COMPLETED)

This order demonstrates a complete traceability chain from raw materials to finished goods.

```
BACKWARD TRACE (from finished product to raw materials):

B-FG-001 (HR Coil 2mm, 75T, AVAILABLE)
  |-- consumed from B-IM-008 (HR Coil Rough, 78T)
       |-- consumed from B-IM-007 (Steel Slab, 82T)
```

```
            |-- consumed from B-IM-006 (Liquid Steel, 85T)
                 |-- consumed from B-RM-001 (Scrap A, 56T)
                 |-- consumed from B-RM-003 (Scrap B, 16T)
                 |-- consumed from B-RM-004 (Iron Ore, 12T)
                 +-- consumed from B-RM-008 (Coal, 8T)
```

19.2 Genealogy: Order 1 (HR Coil 2mm - IN_PROGRESS)

The in-progress chain shows partial traceability up to the current production stage.

```
Raw Materials --> Liquid Steel --> Steel Slab --> (pending rolling)

B-RM-001 (Scrap A, 105T) ----+
B-RM-003 (Scrap B, 30T)  ----+---> B-IM-001 (Liquid Steel, 165T, CONSUMED)
B-RM-004 (Iron Ore, 22T) ----+         |
B-RM-008 (Coal, 15T)     ----+         +--> B-IM-002 (Steel Slab, 155T, AVAILABLE)
B-RM-002 (Scrap A, 40T)  ----+              (awaiting rolling operations)
B-RM-006 (FeSi, 3 KG)    ----+
```

19.3 Genealogy: Order 3 (Rebar 10mm - IN_PROGRESS)

```
Raw Materials --> Liquid Steel --> Steel Billet --> (pending reheat/roll/quench)

B-RM-002 (Scrap A, 160T) ----+
B-RM-011 (Scrap B, 36T)  ----+---> B-IM-004 (Liquid Steel, 220T, CONSUMED)
B-RM-004 (Iron Ore, 30T) ----+         |
B-RM-008 (Coal, 18T)     ----+         +--> B-IM-005 (Steel Billet, 210T, AVAILABLE)
B-RM-006 (FeSi, 2 KG)    ----+              (awaiting billet reheating)
```

19.4 Genealogy: Order 12 (Rebar 12mm - COMPLETED)

```
Full chain: Raw Materials --> Liquid Steel --> Billet --> Rolled Bar --> Rebar

B-RM-002 (Scrap A, 140T) ----+
B-RM-017 (Scrap C, 45T)  ----+---> B-IM-015 (Liquid Steel, 130T, PRODUCED)
B-RM-007 (FeMn, 8 KG)    ----+         |
                                        +--> B-IM-010 (Billet, 180T)
                                                  |
                                                  +--> B-IM-014 (Rolled Bar, 178T)
                                                            |
                                                            +--> B-FG-005 (Rebar 10mm, 175T, PRODUCED)
```

19.5 Genealogy: Order 13 (HR Coil 4mm - COMPLETED)

```
Full chain: Raw Materials --> Liquid Steel --> Slab --> HR Rough --> HR Coil 4mm

B-RM-021 (Scrap A, 100T) ----+
B-RM-022 (Scrap B, 30T)  ----+---> B-IM-020 (Liquid Steel, 100T, AVAILABLE)
B-RM-004 (Iron Ore, 10T) ----+         |
                                        +--> B-IM-016 (Steel Slab, 125T, PRODUCED)
                                                  |
                                                  +--> B-IM-019 (HR Rough, 120T)
```

```
                                                    |
                                                    +--> B-FG-004 (HR Coil 2mm, 118T, AVAILABLE)
```

19.6 CR Sheet Production Chain (Cross-Order)

The CR Sheet traceability shows material flowing through pickling, cold rolling, and annealing.

```
B-IM-019 (HR Rough, 90T) --> B-IM-011 (Pickled Strip, 85T)
                                  |
                                  +--> B-IM-012 (CR Strip, 80T, PRODUCED)
                                           |
                                           +--> B-IM-013 (Annealed Strip, 75T)
                                                    |
                                                    +--> B-FG-002 (CR Sheet 1mm, 70T, AVAILABLE)
```

19.7 Batch Split Example

One batch split is recorded in the demo data:

```
B-IM-002 (Steel Slab 200mm, 155T, AVAILABLE)
  |
  +-- SPLIT --> B-IM-009 (Steel Slab 200mm, 30T, QUALITY_PENDING)
                [Split off 30T for quality investigation - surface cracks detected]
```

Batch Relation Types

Relation Type	Meaning	Count in Demo
MERGE	Multiple parent batches combined into one child	35
SPLIT	One parent batch divided into multiple children	1
CONSUME	Parent batch consumed during production	4

---

20. Demo Scenarios for Testing

The demo data has been designed to support several key testing and demonstration scenarios. Here is a guide to what you can demonstrate with the pre-configured data.

20.1 Production Confirmation Demo

Scenario: Confirm production for an in-progress order

Available READY operations for immediate confirmation:

- **Operation 6** (Order 1): Rough Rolling for HR-COIL-2MM, 150T
- **Operation 9** (Order 2): Pickling for CR-SHEET-1MM, 80T
- **Operation 16** (Order 3): Billet Reheating for REBAR-10MM, 200T
- **Operation 50** (Order 11): EAF Melting for HR-COIL-2MM, 80T
- **Operation 52** (Order 4): Scrap Charging for HR-COIL-2MM, 100T
- **Operation 53** (Order 6): Scrap Charging for REBAR-10MM, 300T
- **Operations 61, 69, 72, 79, 86** and many more from additional orders

20.2 Hold Management Demo

Scenario: Apply and release holds on various entity types

- **Apply hold:** Select any available batch, inventory item, or operation
- **View active holds:** 8 active holds across BATCH, INVENTORY, OPERATION, EQUIPMENT, and ORDER types
- **Release hold:** The 4 released holds demonstrate the release workflow with comments

20.3 Inventory Management Demo

Scenario: View and manage inventory across all states

- **Available inventory:** 44 records ready for production or shipment
- **Blocked inventory:** 2 records requiring disposition
- **On-hold inventory:** 4 records under investigation
- **Reserved inventory:** 2 records allocated to Order ORD-2026-009
- **Historical consumed:** 5 records showing past consumption

20.4 Batch Traceability Demo

Scenario: Trace a finished product back to its raw material sources

- **Best demo path:** Start with B-FG-001 (HR Coil 2mm, 75T from Order 5) and trace backward through 4 levels to raw materials
- **Forward trace:** Start with B-RM-001 (Scrap A) and see how it was used in multiple production runs

20.5 Multi-Stage Order Demo

Scenario: View orders that span multiple production processes

- **Order 33 (Full Pipeline):** HR-COIL-2MM + CR-SHEET-1MM + REBAR-10MM across 3 processes (18 total operations)
- **Order 42 (4-Stage):** STEEL-BILLET-100 + HR-COIL-2MM + CR-SHEET-2MM + REBAR-10MM across all 4 processes (22 total operations)
- **Order 29 (HR->CR, Completed):** Shows complete multi-stage production flow

20.6 Equipment Status Demo

Scenario: View equipment across different operational states

- **Available (11):** Ready for assignment to production operations
- **In Use (2):** EAF-002 and CCM-002 actively assigned
- **Maintenance (1):** EAF-003 undergoing maintenance
- **On Hold (1):** PKL-001 with active safety hold (Hold #6)

20.7 Order Lifecycle Demo

Scenario: View orders at every stage of their lifecycle

- **Created:** 12 orders awaiting scheduling
- **In Progress:** 12 orders with active production
- **Completed:** 10 orders fully produced and shipped
- **On Hold:** 4 orders temporarily paused
- **Blocked:** 2 orders with blocking issues
- **Cancelled:** 3 orders that were cancelled

20.8 Quality Management Demo

Scenario: Review quality-related holds and pending inspections

- **Quality holds:** Holds #1, #2, #3, #5, #8 are all quality-related

- **Quality pending batches:** B-IM-009 (slab), B-IM-018 (billet), B-FG-007 (HR coil)
- **Blocked batches:** B-RM-019 (high sulfur), B-IM-017 (thickness deviation)
- **Released quality holds:** Hold #9 (lab results clear), Hold #10 (moisture test passed)

---

21. Customer Order History

This section provides a view of orders grouped by customer for relationship management.

Customer	Orders	Total Qty (T)	Statuses
ABC Steel Corporation (CUST-001)	ORD-001, ORD-012, ORD-022, ORD-023	~1,040	1 in-progress, 1 completed, 1 blocked, 1 on-hold
Global Manufacturing Ltd (CUST-002)	ORD-002, ORD-013, ORD-021, ORD-027, ORD-045	~1,000	1 in-progress, 1 completed, 1 in-progress, 2 created
Pacific Metal Works (CUST-003)	ORD-004, ORD-014, ORD-025, ORD-028	~820	1 created, 1 cancelled, 1 cancelled, 1 on-hold
European Auto Parts GmbH (CUST-004)	ORD-005, ORD-029, ORD-031, ORD-041, ORD-042	~1,945	2 completed, 3 created
Asian Electronics Inc (CUST-005)	ORD-008, ORD-016, ORD-019, ORD-020, ORD-026, ORD-033, ORD-036	~1,130	1 on-hold, 3 in-progress, 3 created
BuildRight Construction (CUST-006)	ORD-003, ORD-030	~700	1 in-progress, 1 completed
Nordic Steel Trading AB (CUST-007)	ORD-006, ORD-015, ORD-037, ORD-038	~870	1 created, 1 blocked, 1 completed, 1 in-progress
Middle East Metals FZE (CUST-008)	ORD-007, ORD-024, ORD-035, ORD-040	~950	2 created, 1 in-progress, 1 created
South American Steel SA (CUST-009)	ORD-009, ORD-018, ORD-039, ORD-044	~1,540	1 created, 2 completed, 1 in-progress
African Mining Corp (CUST-010)	ORD-010, ORD-032	~900	1 created, 1 on-hold
Oceanic Metals Ltd (CUST-011)	ORD-011, ORD-017, ORD-034, ORD-043	~820	1 in-progress, 1 in-progress, 1 cancelled, 1 completed
Canadian Steel Works (CUST-012)	(none)	0	Inactive customer, no orders

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This document was generated from the demo data SQL files located at:

- `backend/src/main/resources/demo/data.sql` *(H2 demo mode)*
- `backend/src/main/resources/patches/002_seed_data.sql` *(PostgreSQL production/test mode)*

Last updated: February 2026