MES Production Confirmation POC - Executive Summary

Date: 2026-02-12 | **Version:** 1.0 | **Classification:** Internal

1. Project Snapshot

Attribute	Value
Product Name	MES Production Confirmation POC (Bluemingo POC)
Business Objective	Production confirmation workflows, material consumption tracking, and batch traceability for manufacturing environments
Target Users	Production floor operators, production supervisors, quality inspectors, plant managers, admin staff
Deployment Model	On-premise (Spring Boot + Angular SPA, PostgreSQL)
Current Phase	**MVP / Late Beta** - Core workflows complete, 5 minor gaps remaining
Repository	`bluemingo-poc` (main branch)
Last Commit	`afaf3ac` - R-13 Consumption Reversal (2026-02-11)

2. Functional Scope Summary

Module Count: 22

Category	Modules	Screen Count
Master Data	Customers, Materials, Products, Operators, Equipment	15
Configuration	Hold Reasons, Delay Reasons, Process Parameters, Batch Number, Quantity Type, Batch Size	12
Design & Planning	Processes, Routing, Operation Templates, BOM	12
Execution	Orders, Production, Inventory, Batches, Holds, Operations	22
Reporting / Analytics	Reports (6 sub-reports), Executive Dashboard	8
Admin	Users, Audit Trail, Profile, Change Password	5
Total	**22 Modules**	**~74 Screens**

Module Completion Status

Module	Screens	APIs	Tests (B/F/E2E)	Completion %
Authentication	1	4	9/13/13	**100%**
Dashboard	1	2	6/19/24	**100%**
Orders	3	10	15/98/70	**100%**
Production	3	10	25/102/102	**100%**

Inventory	4	17	34/71/21	**100%**
Batches	3	22	42/67/43	**100%**
Holds	3	6	32/58/5	**100%**
Equipment	3	13	23/59/9	**95%** (GAP-021 pending)
BOM	3	18	29/121/11	**95%** (GAP-018 pending)
Routing	3	20+	35/118/36	**95%** (GAP-017 pending)
Processes	4	6	27/67/26	**100%**
Operations	2	6	29/46/13	**95%** (GAP-016 pending)
Customers	3	7	15/41/5	**100%**
Materials	3	7	19/50/5	**95%** (GAP-022 pending)
Products	3	7	15/47/5	**95%** (GAP-022 pending)
Operators	3	6	11/45/10	**100%**
Operation Templates	3	5	12/23/19	**100%**
Configuration (6 sub)	12	30+	41/158/34	**100%**
Reports (7 sub)	8	8	24/64/24	**100%**
Users	3	9	19/39/14	**100%**
Audit Trail	1	8	17/25/29	**100%**
Profile / Password	2	3	0/30/18	**100%**
OVERALL	**~74**	**150+**	**1,337/1,524/719**	**~97%**

3. Workflow Completion Status

Workflow	Status	E2E Coverage	Risk Level
User Authentication (JWT)	**Complete**	Yes (13 tests)	Low
Order Creation & Management	**Complete**	Yes (70 tests)	Low
Order Line Item Management	**Complete**	Yes (included)	Low
Production Confirmation (full flow)	**Complete**	Yes (102 tests)	Low
Partial Production Confirmation	**Complete**	Yes (10 tests)	Low
Production Reversal (R-13)	**Complete**	Yes (included)	Low
Material Receive (Goods Receipt)	**Complete**	Yes (12 tests)	Low
Material Consumption with BOM	**Complete**	Yes (included)	Low
Batch Split / Merge	**Complete**	Yes (18 tests)	Low
Batch Approval / Rejection	**Complete**	Yes (included)	Low

Batch Genealogy (Traceability)	**Complete**	Yes (included)	Low
Batch Number Configuration	**Complete**	Yes (34 config tests)	Low
Inventory State Transitions	**Complete**	Yes (21 tests)	Low
Hold Apply / Release	**Complete**	Yes (5 tests)	Low
Equipment Maintenance Cycle	**Complete**	Yes (9 tests)	Low
Routing Design (Steps, Sequence)	**Complete**	Yes (36 tests)	Low
Process Parameter Validation	**Complete**	Yes (10 tests)	Low
BOM Tree Management	**Complete**	Yes (11 tests)	Low
Audit Trail & Field-Level Audit	**Complete**	Yes (29 tests)	Low
Reports & Analytics	**Complete**	Yes (24 tests)	Low
Responsive UI (Mobile)	**Complete**	Yes (74 tests)	Low
Operations List Pagination	**Partial**	No	Medium
Routing List Pagination	**Partial**	No	Medium
BOM Products Pagination	**Partial**	No	Medium

4. Services & Architecture Snapshot

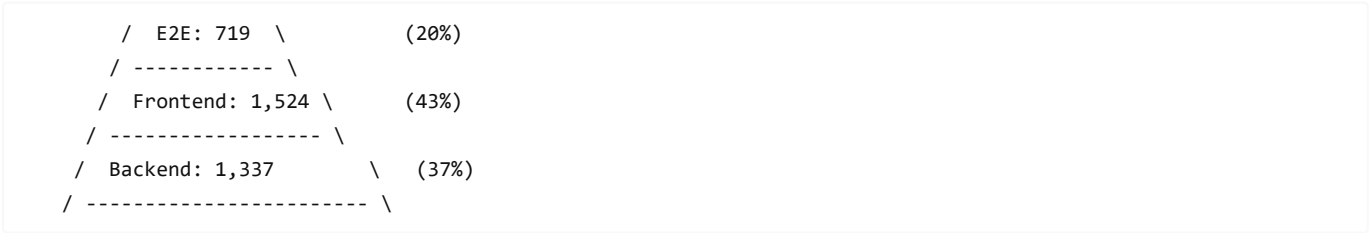| Layer	Technology	Version
Frontend	Angular	17 (Module-based)
Frontend Routing	Angular Router	Hash-based (`/#/path`)
Frontend HTTP	HttpClient + RxJS	7.8.0
Backend	Spring Boot	3.2
Language	Java	17
ORM	Spring Data JPA / Hibernate	6.x
Database	PostgreSQL	14+
Demo Database	H2 In-Memory	Embedded
Auth Model	JWT (JJWT 0.12.3)	Bearer Token
Build (Backend)	Gradle	8.5
Build (Frontend)	Angular CLI / npm	17.x
External Integrations	None	Self-contained POC
Deployment Model	Single server (embedded Tomcat)	No containerization

Architecture Summary

- **28 REST Controllers** with 150+ endpoints
- **42 Service classes** with business logic

- **44 JPA Entity classes** mapped to 34 database tables
- **39 Spring Data Repositories**
- **36 DTO classes** for API serialization
- **51 SQL patches** for schema management
- **67 Angular components** across 22 modules

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5. Testing Maturity Snapshot

Metric	Value
Backend Unit Tests	1,337 test cases (78 test files)
Frontend Component Tests	1,524 test cases (78 spec files)
E2E Tests	719 test cases (53 test suites)
Total Test Cases	**3,580**
Backend Test Framework	JUnit 5 + Spring Boot Test + Mockito
Frontend Test Framework	Karma + Jasmine + Angular TestBed
E2E Test Framework	Playwright (Chromium headless)
Backend Test Status	BUILD SUCCESSFUL (all passing)
Frontend Test Status	1,524/1,524 PASSING
E2E Responsive Tests	622/622 PASSING
CI/CD Automation	**Not configured** (manual test runners only)
Regression Automation	`run-tests.bat` orchestrates all suites locally
Test Database	PostgreSQL `mes_test` with schema reset
Code Coverage Tool	Not integrated

Test Pyramid Distribution

```
    /  E2E: 719  \         (20%)
   / ----------- \
  /  Frontend: 1,524 \     (43%)
 / ----------------- \
 /  Backend: 1,337      \   (37%)
/ ---------------------- \
```

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6. Risk & Gaps

Functional Gaps (5 Remaining)

Gap ID	Description	Priority	Impact
GAP-016	Operations list missing server-side pagination	HIGH	Performance with large datasets
GAP-017	Routing list missing server-side pagination	HIGH	Performance with large datasets
GAP-018	BOM products list missing server-side pagination	MEDIUM	Performance with large datasets

| GAP-021 | Equipment category field missing | MEDIUM | Incomplete classification |
| GAP-022 | Material/Product extended fields (cost, thresholds) | LOW | Not needed for POC |

Test Gaps

Gap	Severity	Details
No CI/CD pipeline	**HIGH**	Tests run manually only; no automated gating
No code coverage metrics	**MEDIUM**	JaCoCo / Istanbul not integrated
No performance / load tests	**LOW**	Acceptable for POC scope
No security penetration tests	**LOW**	JWT auth validated via E2E

Technical Debt

Item	Severity	Details
No CI/CD configuration	HIGH	GitHub Actions / Jenkins not set up
No Docker containerization	MEDIUM	Manual deployment only
No code coverage reporting	MEDIUM	Coverage % unknown
No database migration tool (Flyway/Liquibase)	LOW	Custom SQL patch system works for POC
No API documentation (Swagger/OpenAPI)	LOW	Reference docs maintained manually
Single-user auth model	LOW	No role-based access control (RBAC) beyond admin

Scalability Risks

Risk	Level	Mitigation
Single PostgreSQL instance	LOW (POC)	Acceptable for POC; needs HA for production
No caching layer (Redis)	LOW (POC)	Add for production scale
No message queue (Kafka/RabbitMQ)	LOW (POC)	Needed for async workflows at scale
Client-side pagination on 3 lists	MEDIUM	GAP-016/017/018 address this
Monolithic deployment	LOW (POC)	Microservices not needed at POC scale

7. Executive Assessment

Criterion	Rating	Notes
Functional Completeness	9/10	97% of planned features implemented; 5 minor gaps
Code Quality	8/10	Consistent patterns, proper layering, good separation
Test Coverage	8/10	3,580 tests across 3 layers; no coverage metrics
Documentation	9/10	8 reference docs, gap analysis, session logs maintained
Architecture	8/10	Clean MVC + Module pattern; no over-engineering

Security	7/10	JWT auth; no RBAC, no OWASP hardening
DevOps Maturity	**4/10**	No CI/CD, no containerization, no monitoring
Production Readiness	**6/10**	Needs CI/CD, RBAC, monitoring before production
Overall Maturity	**7.5/10**	Strong POC; clear path to production with defined gaps

Production Readiness Status: POC Complete / Pre-Production

Gate	Status
Core workflows functional	**PASS**
Test suite comprehensive	**PASS**
Documentation complete	**PASS**
CI/CD pipeline	**FAIL** - Not configured
Security hardening	**FAIL** - No RBAC, no OWASP audit
Performance tested	**FAIL** - No load tests
Monitoring / Alerting	**FAIL** - Not implemented

Confidence Level: HIGH for POC / MEDIUM for Production

The system demonstrates full manufacturing workflow capability with robust test coverage. The gap between POC and production is primarily infrastructure (CI/CD, containerization, monitoring) and security (RBAC, audit hardening), not functional.