



IX[®] Case Study

Restarting and Scaling Modular Battery Manufacturing Under Extreme Conditions



IMPLEMENTATION
ENGINEERS[®]
BEYOND CONSULTING

IX® in Action



70X
increase in
weekly
capacity

1000%
increase in
daily output

Client Profile

A global leader in the energy transition, this electronics manufacturer designs and produces **advanced, modular battery hardware** for grid-scale energy storage systems. Their products play a critical role in enabling renewable energy integration and grid resiliency worldwide.

Executive Summary

In the summer heat of Phoenix, Arizona—where temperatures reached **115°F**—a dormant manufacturing facility producing large modular battery rack enclosures was restarted and scaled in record time.

Within **four weeks**, Implementation Engineers transformed the operation from producing **one unit per week** to a sustained rate of **three units per day**, with throughput reaching **up to five units per shift**. This rapid recovery was achieved through disciplined operational execution, lean production control, and the **real-time development of digital tracking tools built directly on the shop floor**.

The engagement demonstrates how hands-on implementation—combining operations engineering, lean execution, and pragmatic digital solutions—can rapidly restore flow and unlock capacity, even under extreme conditions.

The Challenge

The Phoenix facility was a critical manufacturing node for battery rack enclosures. Prior to Implementation Engineers' involvement, the operation faced severe constraints:

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- ❖ Output limited to **one unit per week**
 - ❖ Incomplete or missing weld fixtures and tooling
 - ❖ Disconnected feeder welding factories upstream
 - ❖ No visual production control or real-time performance visibility
 - ❖ Fragmented material flow across welding, paint, subassembly, and final integration

The result was stalled production, delayed shipments, and limited confidence in the site's ability to scale.

Objectives

Implementation Engineers was engaged to:

- 1 Re-establish end-to-end production flow** across eight feeder welding factories through final integration
- 2 Implement lean production control systems** to stabilize material flow and WIP
- 3 Create digital visibility tools in real time**—without waiting on IT systems or external vendors
- 4 Achieve sustainable throughput within four weeks**, despite extreme operating conditions

Implementation Approach

Hands-On Operational Execution

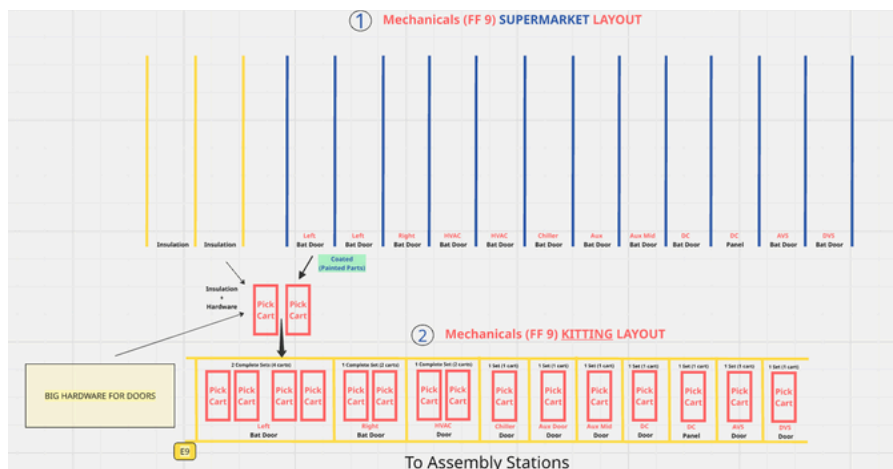
The team embedded directly on the shop floor and moved immediately into action:

- ◆ Reconnected **eight feeder welding factories** and synchronized them to downstream demand
- ◆ Designed and implemented **supermarket and Kanban systems** to establish pull-based material flow
- ◆ Built weld fixtures and paint carts **by hand**, enabling production to resume without tooling delays
- ◆ Stabilized paint, subassembly, and final integration through line balancing and standard work
- ◆ Implemented **5S and point-of-use organization** to eliminate searching, excess movement, and delays

5S, floor markings, and lanes



From Chaos to Controlled Flow



These actions restored physical flow and created the foundation for scalable production.

Digital Solutions Built in Real Time

Rather than waiting for enterprise systems, the IE team designed and deployed digital tools on the fly, directly aligned to operational needs:

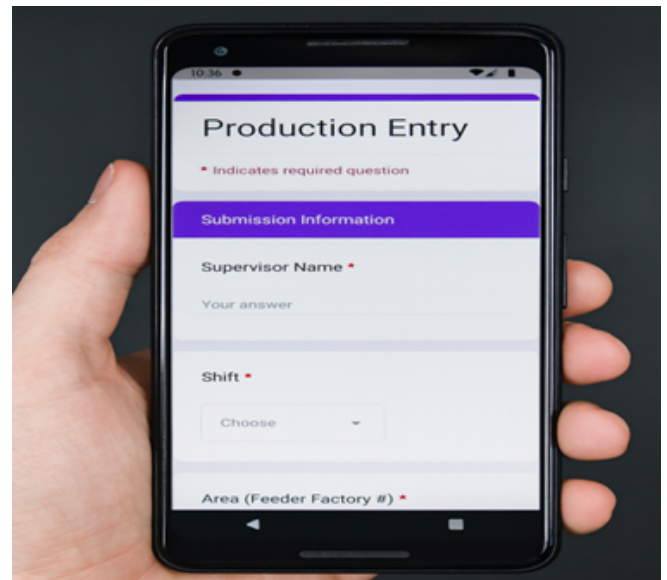
- ◆ **QR code tracking systems** developed and implemented during execution
- ◆ Live visibility into:
 - Inventory status across the shop floor
 - Planned vs. actual output in all feeder factories
 - Cycle time and throughput performance on the integration line
- ◆ Visual production boards combining physical and digital signals to drive daily accountability

These tools were not pilots or prototypes—they were fully operational systems built, tested, and used in real time to manage production

Real-Time Production Performance Displayed on the Shop Floor



Operator-Level Production Data Capture via QR Code Entry



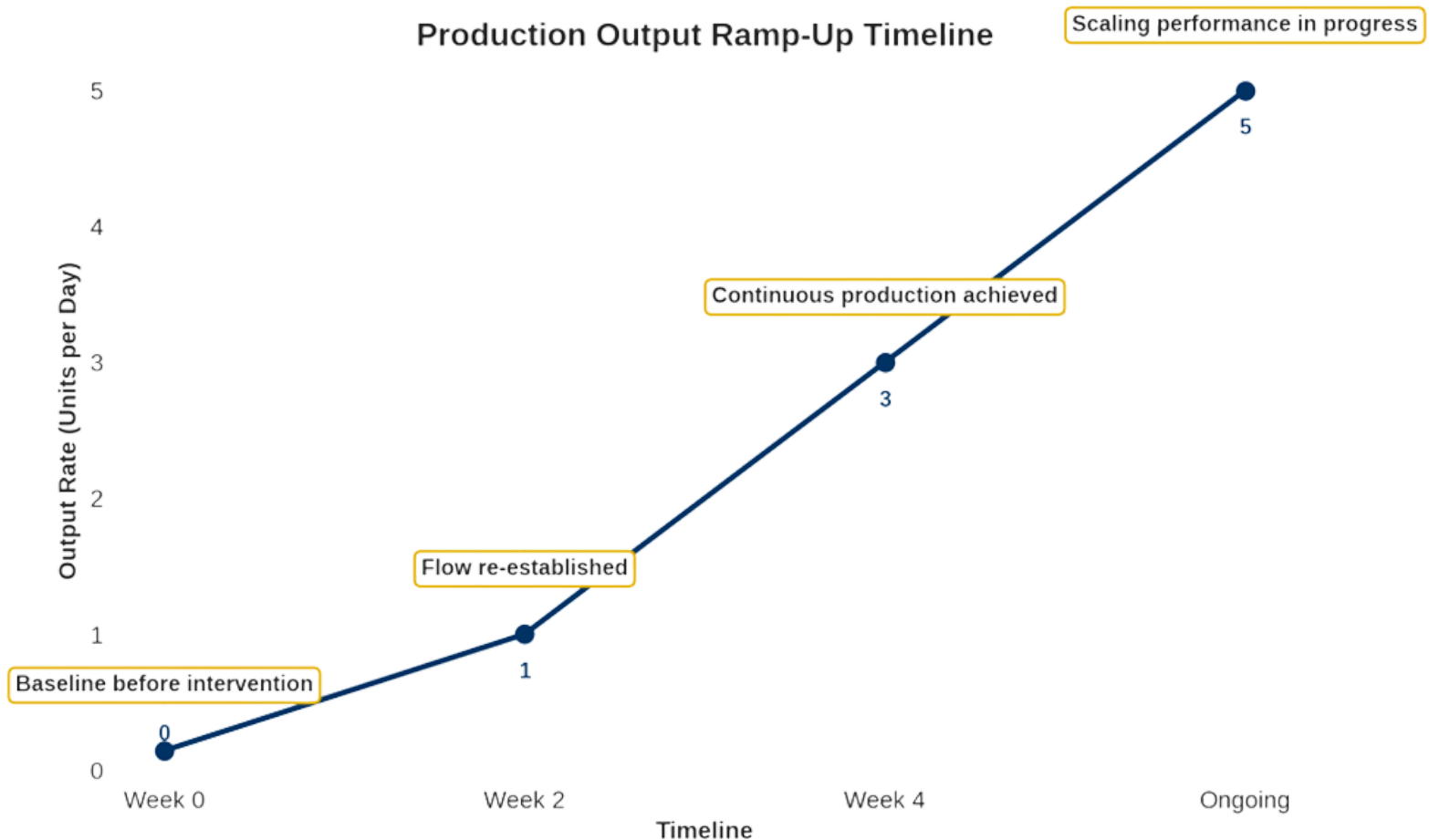
Leadership by Action

Implementation Engineers worked **shoulder-to-shoulder with operators and supervisors**, solving problems as they emerged. Solutions—whether mechanical, operational, or digital—were conceived, built, and deployed **within hours**, not weeks.

This approach accelerated adoption, reinforced accountability, and ensured changes were embedded into daily operations rather than left behind as documentation.

Throughput Improvement

Production Output Ramp-Up Timeline



IX® in Action (continued)**Additional Outcomes**

- ◆ Eight feeder welding factories fully synchronized
- ◆ Stabilized paint and subassembly flow
- ◆ Digital QR tracking providing real-time production visibility
- ◆ Visual management systems driving daily execution discipline
- ◆ Production continuity maintained despite **115°F operating conditions**

Key Takeaways

- ◆ **Flow is built through execution**, not planning alone
- ◆ **Digital value emerges fastest when built alongside operations**, not after
- ◆ Multidisciplinary teams enable rapid problem-solving without external dependencies
- ◆ Visual control systems create instant alignment and accountability
- ◆ Hands-on leadership accelerates both results and adoption

Conclusion

This recovery was not driven by plans, presentations, or ideal conditions. It was delivered through disciplined execution, direct ownership, and engineers embedded where production actually happens. Implementation Engineers rebuilt flow end to end—synchronizing eight feeder factories, stabilizing final integration, and creating real-time production visibility while the line was running. Systems were built in hours, decisions were made on the floor, and progress was measured in shipped units.

In four weeks, a dormant, high-risk facility became a controlled, scalable manufacturing operation operating under extreme heat and schedule pressure. Throughput increased by more than an order of magnitude, material flow was stabilized, and operational credibility was restored. This engagement reflects Implementation Engineers' core belief: when manufacturing performance matters, execution is the strategy—and leadership means taking control and making production run.

Let's Turn Your Vision Into Results

At Implementation Engineers, we don't just execute projects - we transform your vision into operational reality. Our proven 3-phase approach - **Align, Design, Execute** - delivers lasting value, from aligning your team on strategic goals to optimizing operations and driving measurable outcomes. Whether you're aiming to lead your market, boost efficiency, or maximize shareholder value, we're here to make it happen, step-by-step, side-by-side.

Ready to Get Started?

Let's explore how we can bring your vision to life. Contact us today to schedule a conversation. Together, we'll chart the path to your success.

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