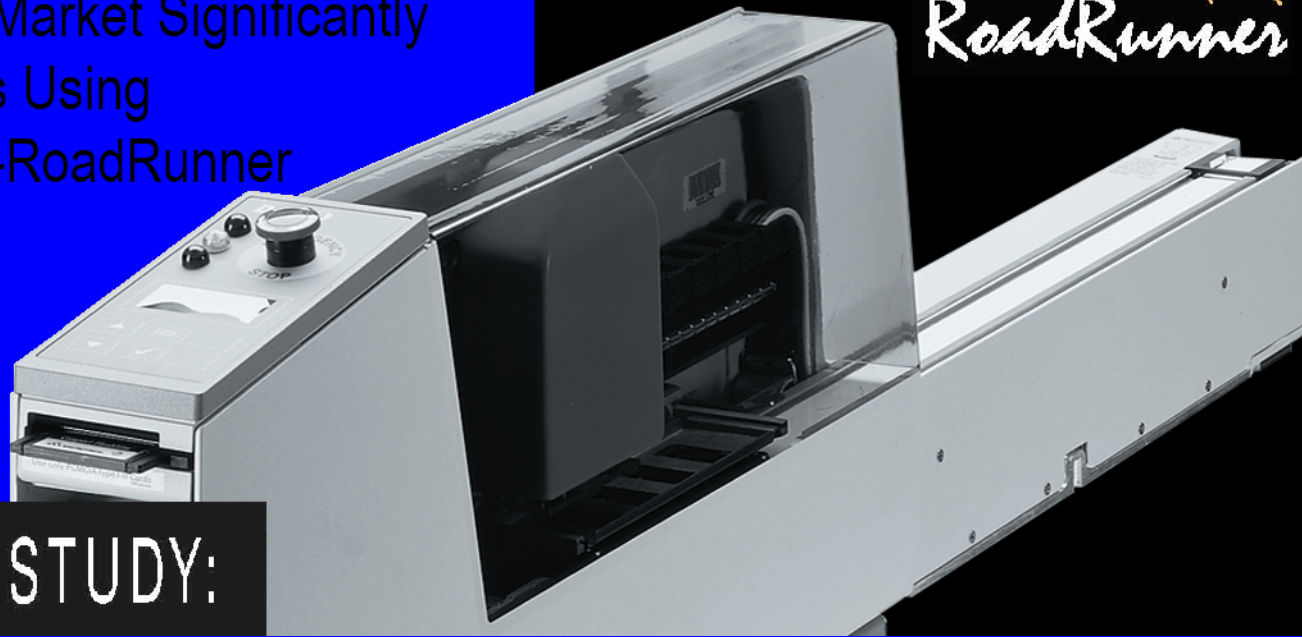


Manufacturer's Profitability & Time-to-Market Significantly Improves Using ProLINE-RoadRunner

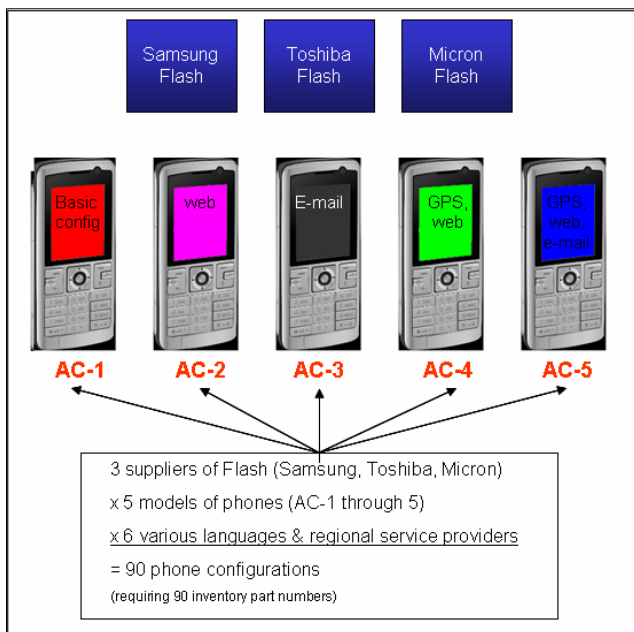


CASE STUDY:

INLINE PROGRAMMING VS. OUTSOURCING AT ACME CELLULAR

The Problem

As a result of inaccurate forecasting, Acme Cellular's worldwide market share of cellular phone sales was declining. Our product portfolio included five different models of cellular phones (AC-1 through AC-5). Each model is available in 6 different configurations for various languages and service providers. We also have three suppliers for Flash memory devices: Samsung, Toshiba, and Micron. Inventory control, for both unprogrammed (blank) and pre-programmed Flash memories, is critical, as more than 90 different part numbers must be generated and managed. Compounding these forecasting problems were shipping delays due to last-minute code changes.



Company: Acme Cellular	
Business: Communications	
Product: The Acme Cellular (AC-1)	
Number of production lines	10
Cycle Time	12 seconds (1 phone every 12 sec.)
Production Capacity	3 Shifts @ 7.5 hrs ea. (0.5 hours maint.)
Flash Memory Density	2048 Mbit
Line Uptime (Daily Hrs)	22.5 Hrs
Phones per line, per day	(300 phones/hr x 22.5 hrs)
Total daily output (10 lines)	67,500 phones per day
Monthly Output	2.025 million phones per month

The \$51 Million Cost of One Code Change

We received a large order from a new service provider who would be selling our model AC-1 phones as part of a promotion. In anticipation, we placed an order for 500K Flash devices with the provider's custom menus. Once production began, a fatal bug was discovered that required a code change. We now had 175K pre-programmed devices in inventory that needed rework, with another 50K devices in route to us. Meanwhile, the programming center already had 30K devices in rework. It took four days to have all these devices reprogrammed. We had to delay all other orders as well, because the programming center wasn't staffed to handle any excess workload. Since we missed the first week of their promotion, the provider used our competitor's phones, costing us an estimated \$51 million in sales.

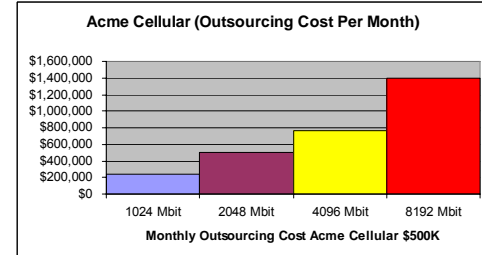


The High Cost of Outsourcing at Acme Cellular

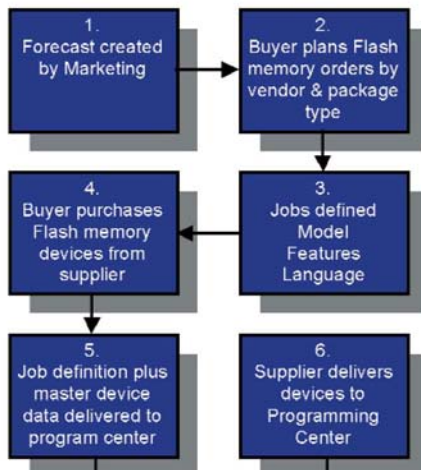
The average time to rework a job is typically one-two weeks, as reworked devices must be de-taped, de-labeled, erased, programmed, and remarked. We paid the programming center an expedite fee of \$127,500, or 50 cents per programmed part, to

rework 255K devices in four days. Programming two million, 2048 Mbit Flash memory devices was costing us \$500K per month in outsourcing fees, at 25 cents per programmed part. As our Flash densities increased, so did our cost per programmed part. The average WIP (work in process) was five days from purchase order to receivable, and another

three-five days internally.



OUTSOURCING PROCESS (DEVICE PROGRAMMING)



Up-front Process Planning (Acme Cellular)

Marketing created a forecast to ensure accurate Flash allocations were assigned to specific Kits being delivered to the programming center.

Setting up an internal inventory control system was critical to our success. Part numbers were created to track over 90 variations of pre-programmed inventories.

We had to ensure that datafiles (codes) sent to the programming center, were tied to the appropriate Job.

Flash memory devices were shipped directly from the supplier to the programming center.

Programming Center Process Time (5 days)

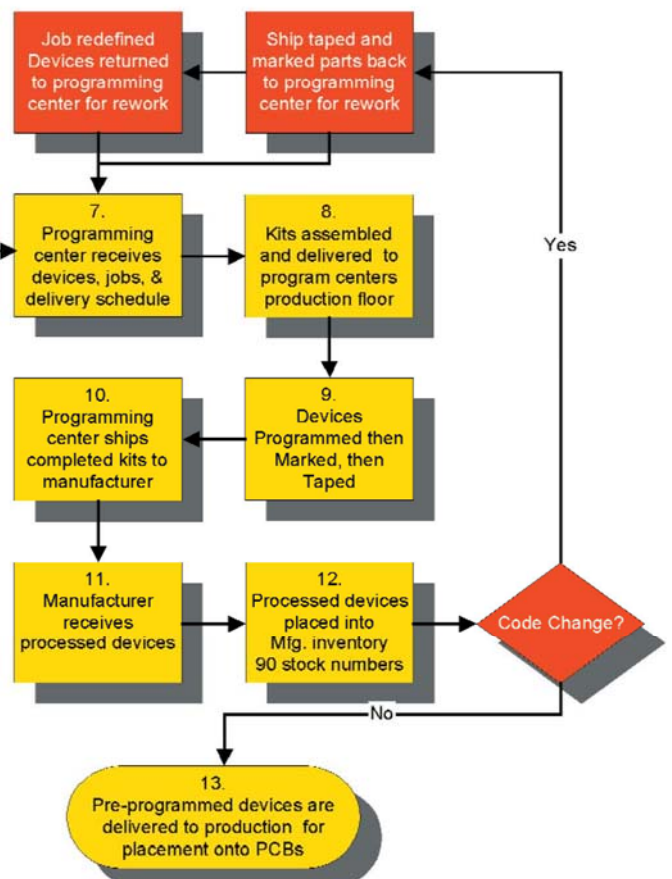
Once all materials are received at the programming center, Kits are delivered to the production floor for processing (program, mark, and tape).

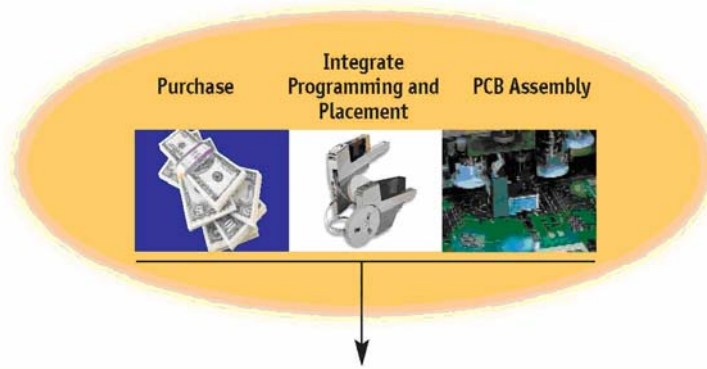
Pre-programmed devices are returned to Acme Cellular and logged into our inventory control system. We allocated these devices to the production line for placement onto PCBs (printed circuit boards).

Code changes at Acme Cellular occur on all products:

- 2 mature models (code changes quarterly)
- 2 newer models (codes changes weekly)
- 1 brand new model (code changes daily)

Codes changes occur for many reasons including software bugs and feature enhancements. It typically takes one-two weeks for the return of reprocessed (reworked) programmable inventories from the programming center.



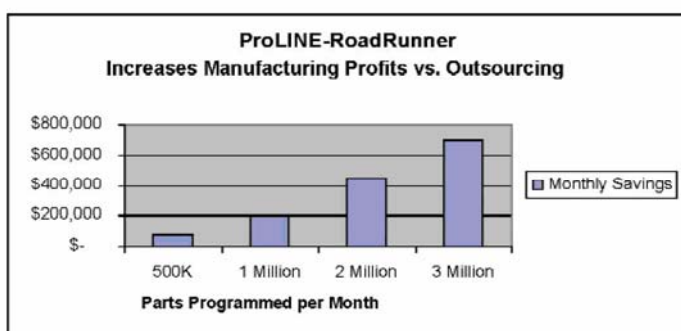
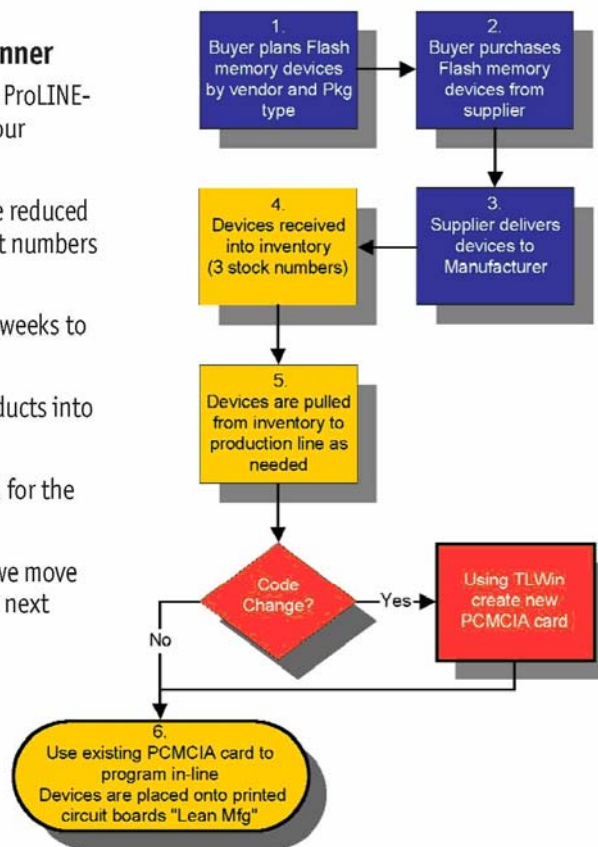


IN-LINE PROCESS STEPS

Acme Cellular's Time-to-Market Significantly improves using ProLINE-RoadRunner

We studied the in-line programming process using the ProLINE-RoadRunner from Data I/O. It dramatically simplified our inventory process for handling Flash memory devices.

- Efficiencies rippled through our supply chain as we reduced our inventory management from more than 90 part numbers to just three.
- Response time for code changes was reduced from weeks to just minutes.
- The just-in-time programming process got our products into production five days earlier.
- No additional floor-space requirements are needed for the ProLINE-RoadRunner
- No additional capital equipment is required when we move from 2048 Mbit to 4096 Mbit Flash memory for our next generation of phones.



Acme Cellular ships only current products

Time to Market improvements using ProLINE-RoadRunner assure us that only the latest Acme Cellular phones enter into the market.

About the only thing that INCREASES using the ProLINE-RoadRunner is PROFIT.

We saw a monthly return of more than \$400K dollars using ProLINE-RoadRunner on 10 production lines, compared to monthly outsourcing expenses of \$500K dollars.

Outsourcing Delays Reduce Manufacturing Profits

Acme Cellular has adopted best practices to limit code changes that impact production. Despite this, software bugs inevitably occur on occasion, even on our most mature products. When it does happen, the potential negative impacts on quarterly earnings ripple through the organization. We immediately put the programming center into a reactive mode, asking them to drop what they're doing to rework our pre-programmed inventories. Production lines shut down waiting for reworked Flash inventories to return from the programming center. The cost per programmed part doubles when the programming center must delay other jobs to meet our last-minute demands.

Inventory Risks Associated with Outsourcing

Managing our internal inventory of pre-programmed inventories required more than 90 part numbers. Forecasting and inventory management are critical to ensure that the programming center uses the correct data file for the specified job. Failing to do so could result in the entire kit of pre-programmed parts being returned to the programming center for rework. In the worst case, incorrectly programmed parts are placed onto the PCB, causing entire circuit boards to be scrapped. To help prevent this from happening, Acme Cellular requires the programming center to mark all programmable devices with labels or laser etching.

Annual Outsourcing Costs

It was costing Acme Cellular in excess of six million dollars per year in outsourcing expenses, not including additional rework costs due to code changes. More importantly, line downtime associated with code changes cost more than \$60,000 per hour in lost revenue.

Lean Manufacturing Increases Profits

Using ProLINE-RoadRunner, reaction time to code changes is almost instantaneous. Simply create a new programming Job using TaskLink Software, then transfer it to the ProLINE-RoadRunner on the production line. Reaction time to code changes is just minutes and requires no additional rework. The Just-in-Time programming process supports Lean Manufacturing by pulling unprogrammed Flash memory directly from inventory on an as-needed basis.

ProLINE-RoadRunner Reduces Inventory Costs

The first impact of using ProLINE-RoadRunner was reducing inventory tracking of more than 90 part numbers to just three. Part numbers were generated for each of our Flash memory suppliers (Samsung, Toshiba, and Micron). Much of the overhead expense associated with managing inventories for the programming center was eliminated. Our standard lead-time plummeted from five days at the programming center to just minutes.

Annual Returns using ProLINE-RoadRunner

We now have an annual return of more than five million dollars using the ProLINE-RoadRunner. Reaction time to a code change is instantaneous.



- Inventory simplified
- Less material handling
- Just-in-Time programming
- Supply chain efficiencies
- Lean Manufacturing
- Improved time-to-market
- Immediate response time
- Higher profits

Inventory control and asset management are vital to increased cost efficiencies and profits.

"The real money is from asset management, or buying from component suppliers at the right time at the right price. The cost of carrying inventory is huge, usually more than 25 percent per year and is an added concern for companies seeking greater profits."

"Improving your uptime is the most important thing you can do to increase profits and be more efficient."

Product throughput has the most stunning effect on profit.

"This being the case, it makes little sense to scrimp on equipment costs, if better equipment will increase throughput even slightly."

--Ron Lasky

Ron Lasky is a consulting director and author of SPACE (Surface Mount Process Assembly Cost Estimator), a real time cost estimating tool which he has updated with useful metrics and profit-gaining scenarios.

Source: EP&P article "Pinpointing Efficiencies Can Raise Profitability"