Case study

The 12.12.12 pilot line

How Alta Devices recovered an eight-month projected schedule miss and brought the world's most efficient solar cell to manufacturing.

Case study series.

Alta Devices, Sunnyvale, CA. Q4 2011 – December 2012. Pilot manufacturing start-up. 5,000-activity integrated schedule. Eight-month schedule recovery.

Prepared by

lateralworks
FTTM methodology

Engagement window

Q4 2011 – Q4 2012
Eleven-month planning horizon

Online

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Schedule acceleration series

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The 12.12.12 pilot line

Core thesis. A pilot line on a hard deadline cannot be recovered by the departments running its four work streams in parallel. Recovery requires one integrated schedule, one weekly cadence, and the full management team – including the C-suite – in the room. On the Alta Devices program, that combination closed an eight-month projected gap inside an eleven-month planning window.

Overview

Abstract

In late 2011 Alta Devices held the world record for solar-cell efficiency and a checkbook from a top-tier investor list, and was on the path to running out of money. The company had to start its first pilot manufacturing line by the end of 2012 to release the next funding tranche, and in January of that year the integrated schedule was forecasting a finish date eight months past target. The company brought lateralworks in to recover the date.

The hard part was not technical genius. Alta had that. The hard part was that a startup with a fraction of the resources was attempting what an established semiconductor manufacturer would task to a thousand-person organization: simultaneously mature a complex GaAs process, design and build proprietary tools, install and qualify a pilot line, and define the first product and its target markets. Departmental silos were managing each piece of that work in isolation. The integrated picture nobody owned was where every gating problem lived.

lateralworks rebuilt the program as a single 5,000-activity integrated schedule, restructured the team around lateral deliverables instead of functional groups, and put the entire management team on a weekly cadence of plan, pull-in, and accountability. The team used the integrated picture to find gating problems weeks before they would block work. They called the discipline “pulling the pain forward.”

On December 12, 2012 the line produced its first qualified material. The eight-month gap closed. The next funding round opened. Chris Norris, the CEO, later described the engagement as “the single most transformational event in how we do business since the company was started.”

01

The challenge

Pilot line as funding gate

Alta Devices was founded by Harry Atwater of Caltech and Eli Yablonovitch of UC Berkeley to commercialize a flexible, ultra-thin gallium-arsenide solar cell – at the time of the engagement, the most efficient cell ever produced. The investor list included Kleiner Perkins (Bill Joy and Wen Hsieh), August Capital (Andy Rappaport), NEA (Forest Baskett), and strategic capital from GE and Dow. Chris Norris, a veteran semiconductor executive, ran the company. He had raised roughly $100 million and the team had set world records for both cell and module efficiency.

The next round was conditioned on a single demonstration: that the technology could be manufactured. Specifically, that Alta could start its Oakmead pilot line by the end of 2012 and produce qualified material from it. Without that proof, no investor would underwrite the multi-hundred-million-dollar production scale-up the technology required. With it, the company moved forward. There was no third option and no extension to the deadline.

The challenge, continued

Four programs, one calendar

Inside the company, four programs were running at the same time and competing for the same people. The GaAs process technology was still maturing. Several of the manufacturing tools did not exist commercially and had to be specified, built with vendors, and brought up. The pilot line itself – a building, a clean room, infrastructure, and the qualified tools inside it – had to be procured, installed, and qualified end-to-end. And the company had not yet decided which product the line would build first or which markets it would serve. Each of those programs had a department running it.

In January 2012, with eleven months of planning window left, the integrated forecast for the pilot line's first qualified material called for August 2013. The team was eight months behind a deadline that would not move.

02

The approach

One integrated program

The first move was structural. lateralworks dissolved the departmental schedules and stitched them into a single 5,000-activity integrated plan. Every dependency that had been managed through email between two department heads now lived in one network where the critical path was visible. Process development, tool development, line install and qualification, and product definition stopped being four programs and started being one program with four contributing streams.

Around that integrated plan we redesigned how the team worked. Teams were re-formed around lateral deliverables – the things that had to be ready together for a milestone to land – rather than around functional reporting lines. The C-suite engagement worked in parallel: redefining the corporate mission, the first product's functionality, and the target market it would serve. A pilot line cannot be qualified against a product that has not been chosen.

The approach, continued

Weekly cadence and early warning

The execution cadence ran weekly. The full management team – not delegates, not summaries – sat together to refresh the integrated schedule, examine the critical path, and pull in dates wherever the analysis allowed. The quality of that meeting set the pace of the program. When a department head started reporting status without owning the numbers, the meeting paused until the numbers were owned. The discipline required to run a 5,000-activity weekly pull-in with the management team in the room is the discipline the program needed everywhere else.

Behind the cadence sat a single working idea: early warning is the asset that recovers a critical-path program. A schedule that surfaces a gating problem six weeks ahead gives the team six weeks to design around it; the same problem found when work is blocked costs months. The team named the practice “pulling the pain forward.” On the Alta program, gating tasks identified in advance through the planning system were almost always solvable; the same problems hitting the team unannounced typically were not.

The fourth piece of the engagement was knowledge transfer. The methods had to live inside Alta after we left so the next generation of technology could be accelerated the same way. We trained the internal team to run the integrated planning system without us.

Client

Chris Norris, CEO

The single most transformational event in how we do business since the company was started.

Chris Norris

CEO, Alta Devices

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The result

First material out on 12.12.12

The pilot line started up on schedule. On December 12, 2012, the integrated team – including process, tools, line operations, product, and the C-suite that had been involved every week – gathered at Oakmead while Norm Armour, VP of Global Manufacturing, held the first qualified material out of the line.

First material out

12.12.12 at Oakmead

Figure 1. The Alta Devices team at Oakmead on December 12, 2012, the day the pilot line produced its first qualified material.

Schedule trace

The wigglechart

The wigglechart told the underlying story. Each dot on the chart is an estimated finish date for “first material out,” forecast at a single point in time from the rolling 5,000-activity critical-path schedule. The shape of the line is the program’s history. In January 2012 the curve sat at August 2013, eight months past the December 12 target. By the spring it had collapsed to within weeks of the target. In the fall it drifted up briefly as new gating tasks surfaced. In December the team pulled it back down, hard, to land on the date.

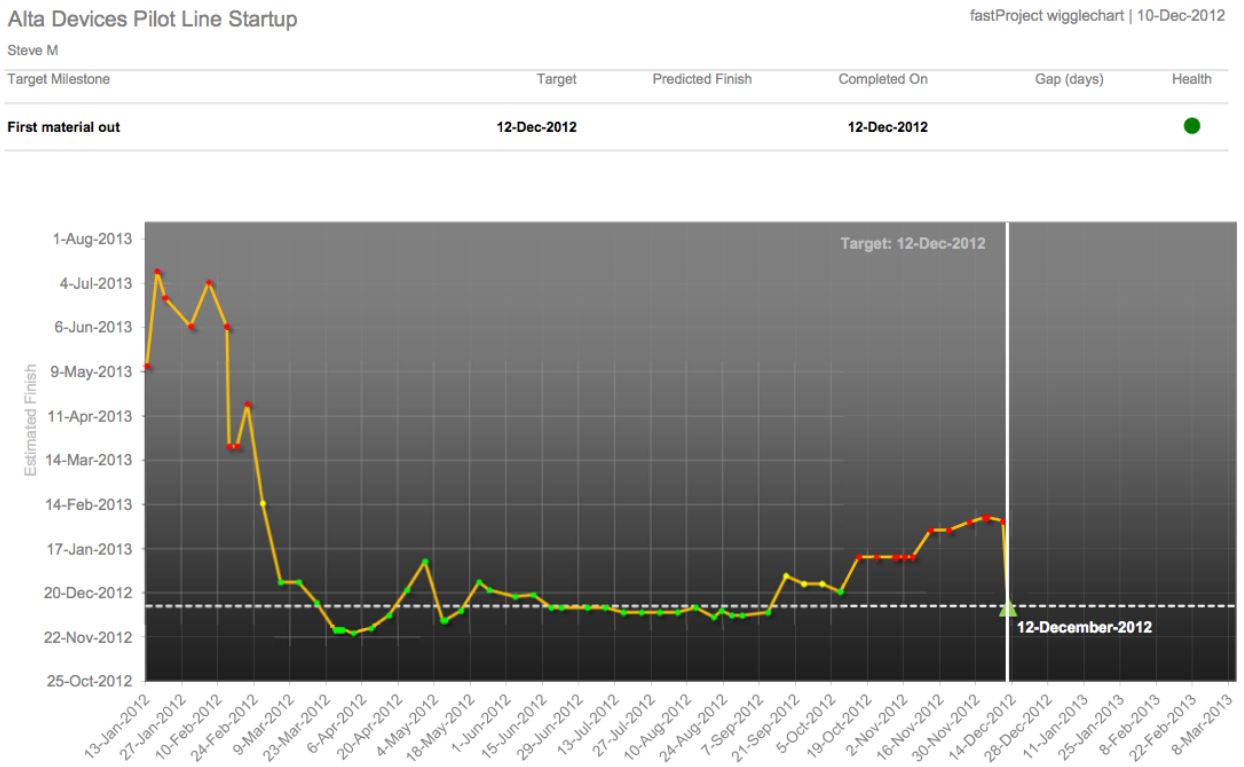

Figure 2. Alta Devices pilot line startup wigglechart, fastProject output, December 10, 2012. Each marker is a forecast finish date for first material out from the rolling critical-path schedule.

Outcomes

Beyond the milestone

Four things drove the downward trend on the wigglechart: technical innovation, better workflow inside the integrated team, early warning of gating tasks, and obsessive focus on the critical path. None of those was unique. The combination, run weekly with the full management team in the room, was.

Figure 3. Norm Armour, VP of Global Manufacturing, holding the first qualified material out of the Oakmead pilot line, December 12, 2012.

Beyond the milestone itself: pilot line operational, with significant cash-burn reduction relative to the original baseline. Initial target markets defined, and the go-to-market strategy redefined to match. Customer contracts in place that consumed the entire first year of pilot-line output. The internal team trained on the planning method and able to run it without lateralworks for the next-generation program.

Public confirmation of the technology's commercial trajectory followed in the months after start-up – military solar charging products, automotive applications, and recognition in technology and energy press.

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What this teaches

Recovering a critical-path program

Recovering an Alta-scale program is an integration problem before it is a technical one. The departments running the four work streams are each capable of executing their piece. The schedule that brought Alta home was the schedule that saw the four pieces together.

Three patterns from the engagement generalize.

Pattern one

Departmental schedules hide the gating tasks

A departmental schedule cannot recover an eight-month miss. It is slower to plan, but the deeper problem is that it hides the gating tasks: each department reports only what is inside its boundary, and the program's gating tasks live in the handoffs between departments, where no department owns them. Building one integrated schedule is the first time certain critical-path problems become visible at all.

Pattern two

Pulling the pain forward

Pulling the pain forward turns technical surprise into solved problems. In a state-of-the-art technology program, surprises are unavoidable. Late discovery of those surprises is not. Early warning gives the team a workaround instead of a delay, and the mechanism that produces early warning is the integrated weekly pull-in run by the full management team.

Pattern three

The host system in the room

Mission, target markets, and product definition are gating tasks for a pilot line. When those decisions stay in a separate forum and the program-level meeting cannot reach them, they become the critical path nobody is tracking. The C-suite is part of the system being accelerated, not an audience for its status.

For Alta, getting this right meant a funded company shipping qualified material from a pilot line on a date the industry would have called impossible eleven months earlier. The work was done by Alta's own people. Our job was to give them a system in which the work they were already capable of doing could land on the date they needed.

A

Sources
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