

letter from Jaffrey, New Hampshire

in the short run. Management had considerable discretion to either broaden the exceptions processing job or leave the previous job design intact. Some banks have kept jobs in exceptions processing specialized by function, even after introducing check imaging. Not enough time has elapsed to judge whether the different ways of organizing work in exceptions processing reflect equally productive ways of organizing the tasks, or whether competition will reveal that one way is more efficient than others. But we suspect that Cabot Bank's choice effectively takes advantage of the interdependencies among exceptions-processing tasks and will be rewarded by the market in the long run.

CONCLUSION

So why did things at Cabot turn out one way downstairs and another way upstairs? Research by Professor Assar Lindbeck of Stockholm University and Dennis Snower of the University of London suggests that managers combine tasks into broader jobs when the tasks are complementary and create single-task jobs that take advantage of specialization when they are not—for example, in Adam Smith's pin factory. It seems likely that the reason new technology resulted in narrower job definitions in the Deposit Processing Department downstairs at Cabot Bank is that there was little complementarity among the tasks. Once imaging reduced the cost of moving check information from one worker to another, it made sense to exploit economies of specialization. On the other hand, complementarity among tasks in the Exceptions Processing Department upstairs made task integration attractive.

This appears not to have been the only consideration, however. Upstairs managers also seemed to have the explicit goals of making jobs more interesting and in involving the workers in the redesign. MIT Professor Paul Osterman has pointed out that where managers care about the quality of customer service and the well-being of employees, we tend to see integrated job designs. *

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Business is kabooming

By Jane Harrigan § Begin with a glittering silver chrysanthemum, 1,000 feet wide, exploding over the Washington Monument on the Fourth of July. Proceed to Boston, where, with each cymbal crash of the "American Symphony," the pistils of giant red flowers strobe 1,000 feet above the Charles River. Take your pick of 700 other fireworks displays from Miami to Minnesota to Montreal. If you could follow a string of colored stars from all these productions back to their source, the trail would end at a tan, brick, and metal building on a rural road in southwestern New Hampshire. Here, behind a door guarded by jade lions, the 22 employees of Atlas PyroVision Productions choreograph the displays that illuminate the nation.

Here in Jaffrey, population 5,500, handmade shells designed to Atlas's specifications arrive from Spain and Japan and China and accumulate in three concrete-walled magazines holding 60,000 pounds of explosives each. Here, the latest computer equipment calibrates the precision firing of a crude product that has changed little since the Chinese invented gunpowder over 1,000 years ago. Here, Stephen Pelkey,

A photograph of a man standing in a warehouse. He is wearing a light-colored, long-sleeved button-down shirt and dark pants. He has his arms crossed and is looking towards the camera. The warehouse is filled with tall stacks of cardboard boxes on pallets. The boxes are yellow and have red diamond-shaped hazard symbols. In the foreground, two boxes are visible with the text "AAAST-1 LIVE FREE OR DIE 4/1 MADE IN CHINA". The lighting is dramatic, with strong highlights and deep shadows.

A hometown boy makes good with a bang by setting fireworks to music

Stephen Pelkey, of
Atlas PyroVision
Productions



Computers calibrate the precision firing of a product little changed since the Ch

the hometown boy who made good with a bang, surveys a decade of 800 percent growth and distills a simple lesson: In life, as in fireworks, timing is everything.

When Pelkey took over the fireworks company from his father-in-law in 1986, it was a typical mom-and-pop operation. Pelkey does not pretend to have foreseen the combination of circumstances that took Atlas from the \$500,000 business to the nearly \$5 million in annual sales it does today. He didn't predict them, but he's happy to list them: Computer technology took off. The economy boomed. Corporations started sponsoring municipal displays as advertising. First Night celebrations and ski resort shows extended the fireworks season year-round; concerts, ice shows, and sports events brought pyrotechnics indoors. All Atlas had to do, Pelkey says, was

hire people with imagination and take advantage of the technology.

In its early days, Atlas manufactured shells and sold them to volunteer fire departments that shot small-town displays. Pelkey and his wife, Dee, immediately began dreaming of something more. They drove to Montreal for the international fireworks competition, taking notes on technology and artistry as the icons of the pyrotechnic world fired off displays set to music. The couple made the trip eight times, but it had taken only one night for Pelkey to read the writing in the sky: "After seeing that first show, I knew this was exactly what I wanted to do." He invested in a basic computer firing system and began to practice coordinating fireworks with music.

More than 400 companies in the United States shoot fireworks, but only about a dozen

can put together the equivalent of a Pyrotechnic Symphony, a name Atlas has trademarked. By feeding individual pieces of music and reams of statistics about all kinds of shells into a complex computer database, the choreographer of a display can ensure, for example, that a five-inch shell with a lift time (time to achieve altitude) of 3.75 seconds will be shot into the air exactly 3.75 seconds before the moment at which it must burst to complement the music. The shells don't just explode in time to the beat, Pelkey says. They illustrate the music, rising and falling in intensity or tracing piano key strokes across the sky.

Achieving that level of sophistication took practice. "If you're proposing a full-scale production for D.C. or Boston or Disney, they ask, 'Have you done this before?'" Pelkey

Although timing is important, quantity counts, too. In the display over the Washington Mall, Atlas sets off 6,500 separate ignitions. The typical town display uses only about 1,200.

says. “So we created our own venue.” In 1990, Atlas inaugurated the Jaffrey Festival of Fireworks as a way to build confidence through success—and to learn from failure. A frayed clump of wires on Pelkey’s desk, which the staff jokingly mounted in Plexiglas, attests to a 1993 incident in which an experimental harness failed and more than 800 shells exploded in 35 seconds. The audience loved it. Pelkey now cringes if one of his computerized creations fires a hundredth of a second early.

Today, the Jaffrey Festival is the largest show on the East Coast. The typical town fireworks display involves about 1,200 “cues,” or separate ignitions. Boston’s Fourth of July display has about 5,000 cues; the Washington Mall show has 6,500. The Jaffrey Festival bombards its audience with as many as 8,000 ignitions, including a grand finale that Pelkey calls “absolute sky saturation.” Last year on the third weekend in August, 32,000 people paid \$6 each, or \$30 per carload, to come to



COURTESY OF ATLAS PYROTECHNICS

inventory to pull it off?” Even now that growth has slowed, such questions linger. Each year, Atlas does 80 percent of its business in two weeks. (When things calm down in mid-July, Pelkey falls into what he calls “post-pyro depression.”) The compressed timing means the company must supplement its full-time employees with 900 part-time technicians, each of whom must be trained every year in the latest firing techniques and regulations. It also means that although 96 percent of the shows Atlas shoots do not use computerized firing, the company needs six \$80,000 field controller computers, or “pyro-digital firing systems,” for the 4 percent that do, because many of those shows happen at the same time.

Not only is the schedule compressed, but creation is a one-shot deal. Fireworks choreographers spend months planning a show that they never get to rehearse; the first time they see it is when the audience does. “You have only one chance to make it work,” says Matt Shea, Atlas’s director of marketing. “If things are going badly, we can’t tell the customer, ‘We didn’t quite get it done. Could you wait until July fifth?’” *

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inese invented gunpowder

town and have their socks knocked off.

Emboldened by its success in Jaffrey, Atlas entered the North American Pyrotechnics Competition in 1994—and won. The next year, the company came in fourth in the international competition in Montreal, the same contest that had inspired Steve and Dee Pelkey nine years before. The big contracts started rolling in: The Major League Baseball All-Star Game. The World Wrestling Federation. The New England Patriots. The New Year’s Eve fireworks in Boston. The nationally televised Fourth of July shows in Boston and Washington.

Kaboom! Like the best fireworks displays, the company’s explosive growth was both terrific and terrifying. “It’s easy to say ‘yes’ to whoever calls,” Pelkey says. “But will you have the trained technicians, equipment, and

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