



CASE STUDY

FLASHFIRE DEWAX SYSTEM

Size: 5" x 6" x 1.5" | Alloy: Low alloy steel (4140)

*Notes: This investment cast component replaces a 12-piece assembly.

Flashfire Dewax

The implementation of flashfire dewax is the most recent addition to a multi-year effort to reduce scrap, improve throughput and productivity, and upgrade equipment at Texas Precision Metalcraft (TPM). After three years, owner Jerry Connor has given the company's core team the support to make changes and accept some minor setbacks that go with major improvement.

Among the major process changes implemented are environmental controls, wax process adjustments and a new shell system. The most recent change was converting from autoclave to flashfire dewax. The team closely studied dewax/burnout options and how they would relate to the process steps before and after dewax. The steam autoclave unit functioned well, but there was no



other good way to remove wax if the autoclave failed. Another challenge was scheduling in the foundry due to burnout capacity and timing.

There were several potential benefits in going with flashfire versus autoclave and some potential issues. The biggest issue was that no one at TPM had ever used a flashfire and they were not all that common with other foundries. Other issues were the uncertainty of how shells would react. There was also the unknown of dealing with the nitrogen, and lastly, a new flashfire unit is a substantial investment.



CASE STUDY

FLASHFIRE DEWAX SYSTEM CONT.

Some of the expected benefits were: more reliable and simpler dewax operation, with both dewax and burnout occurring in one 20-25 minute cycle, and a reduction in use of the current aging burnout ovens from an average of three hours of burnout per shell. Because of this reduced oven time, scheduling of the foundry area was expected to be easier.

Several from TPM visited another investment foundry, Buddy Furnace, and observed their flashfire in action. Thanks to the cooperation of Lois Greil and the team there, TPM was able to dewax some of its own shells. After reviewing options and looking at all other potential areas for capital improvement, TPM purchased a Pacific Kiln standard Flashfire Dewax System with a load area that is 42" W x 48" D x 36" H and provisions for nine trees per load. TPM has realized many benefits since installing its flashfire unit. As with any new process, the company learned a few lessons along the way.

The original nitrogen generator was about half the size needed, so TPM used cylinders of liquid nitrogen. This turned out to be an effective back-

up plan.

There is no single best flashfire temperature for all foundries. TPM started at 1500°F and experimented with temperatures from 1400°F to 1800°F on many different tree setups and load sizes. Plant Manager Jeff Crape ran trials to determine a best time and temperature. His goal was to find one happy medium versus having varying temperatures by part number.

Load timing is critical. Operators must be trained to understand the importance of getting trees on the table and getting the flashfire door closed. Experience has shown that staying under one minute from setting the first tree to pushing the table is its optimal timing.

Unload timing is also important, again for obvious reasons. The flashfire has a timer but TPM is still considering a more visual alarm, such as a flashing light.

Probably the biggest lesson learned was that any parts broken during dip or during pre-flashfire handling **must** be patched before flashfire. By design, the wax from the tree flows down a funnel/ring device into the inert atmosphere chamber. If a tree with a broken part is flashfired, the wax literally squirts out of the part, runs across the table, and catches on fire.



CASE STUDY

FLASHFIRE DEWAX SYSTEM CONT.

There were some expected and unexpected flashfire advantages.

TPM's dewax cycle is 20-25 minutes (this is total time including load and unload), which translates to almost three loads per hour.

Burnout time (now called pre-heat time) was reduced from three hours to one hour. This has reduced the number of ovens used in a given day, and operating fewer ovens helps lower the gas bill.

Because TPM's burnout ovens do not have afterburners and the flashfire does, there is no longer any smoke in the foundry or out the stack, which means a "greener" operation.

The flashfire is so efficient, it can go from room temperature to 1800°F in well under 45 minutes. A lot more wax is being recovered with flashfire as opposed to autoclave. Plus the wax is cleaner and has no water. Since there is no more shipping of water weight for the wax reclaim process, reclamation is easier for the supplier.

Under the old system, burnout had been a bottleneck. With the new system, capacity has

increased and throughput times have been reduced. Thirty minutes of autoclave plus three hours of burnout have been replaced by 20 minutes of flashfire and one hour of preheat.

Additionally, the new flashfire dewax system has allowed a reduction of one dip of the shell process for an entire class of trees. Meanwhile, work continues to reduce dip on more items on a part-by-part basis. There was little or no shell cracking before the flashfire and there is still little or no shell cracking with flashfire.

While flashfire has exceeded expectations, TPM has retained its autoclave as a backup/ redundant option.

At the beginning of the year, the company placed an order for a new standard burnout oven from Pacific Kiln. And with a new oven that heats up in well under an hour, expected gain efficiencies in gas savings is expected to ease foundry scheduling even more.