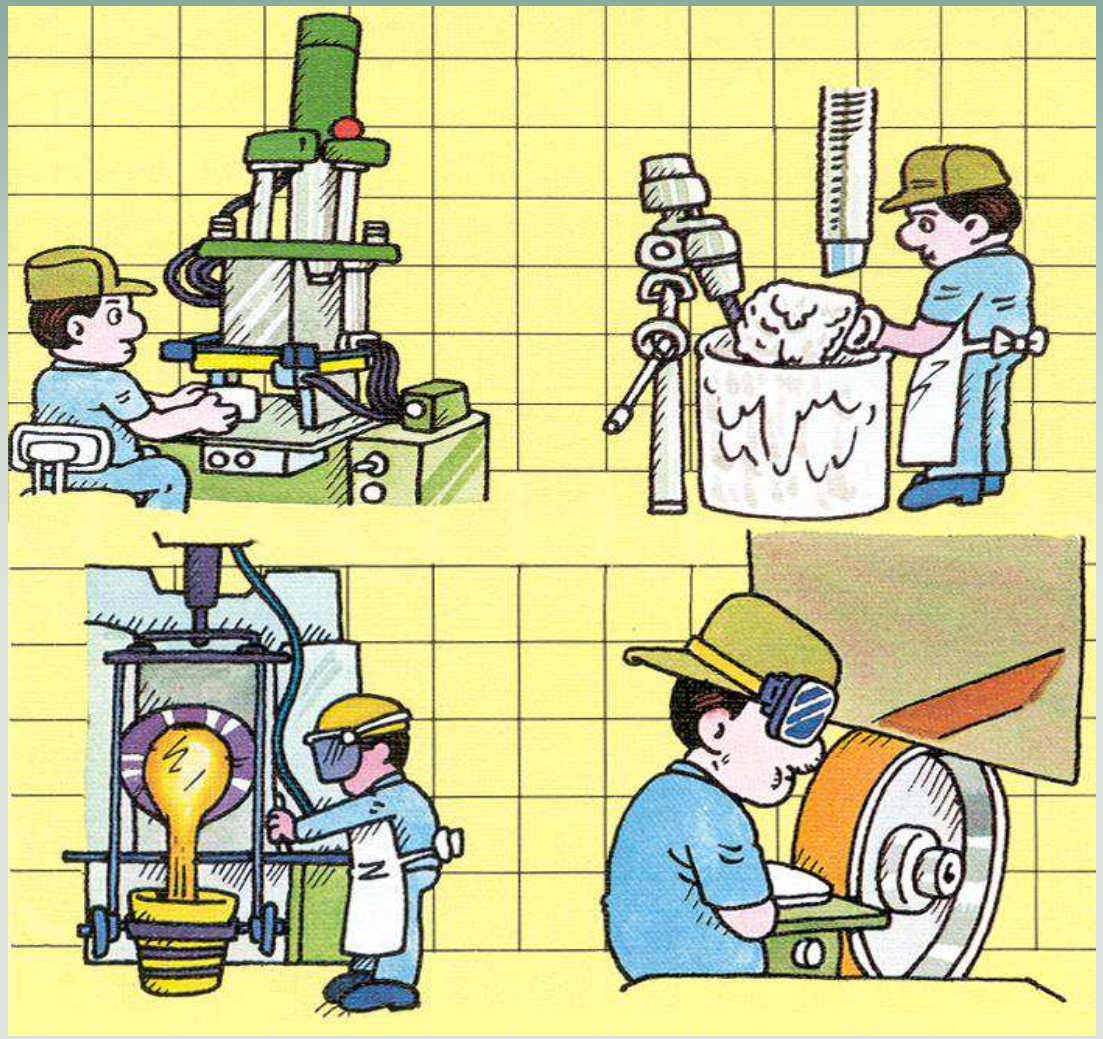
Know your Investment Casting Process

November 2006

Knowing Your Investment Casting Process



Knowing Your Investment Casting Process

In order to remain competitive in the world market you need to continually ask yourself:

What else can I do to stay ahead?

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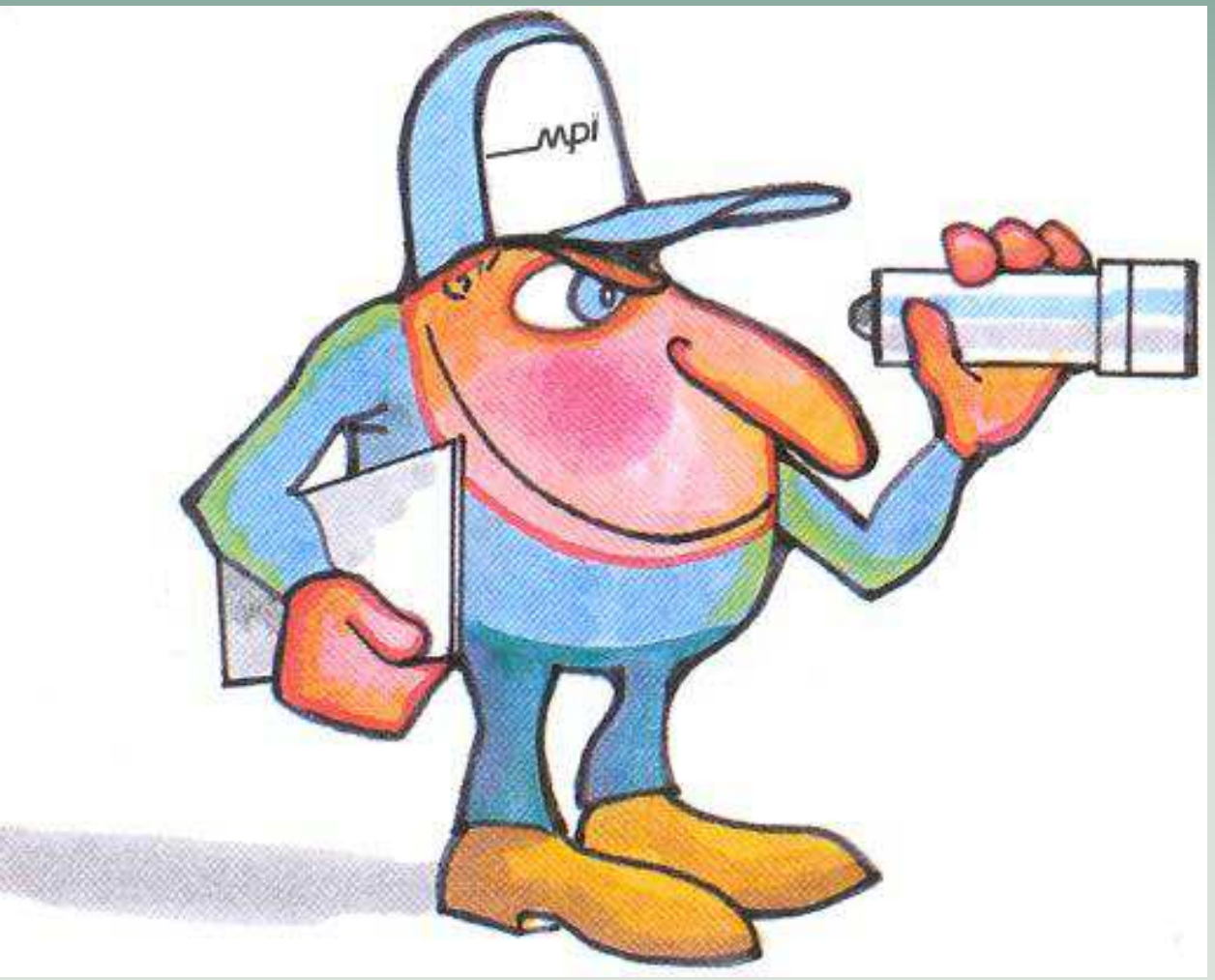

Where else in my process can I make improvements that will result in gains to my bottom line?

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Six years ago, we began developing the MPI Automated Pattern Assembly System, APAS.

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As of today we have installed six operating systems in four major sectors of the industry:

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Fire Arms

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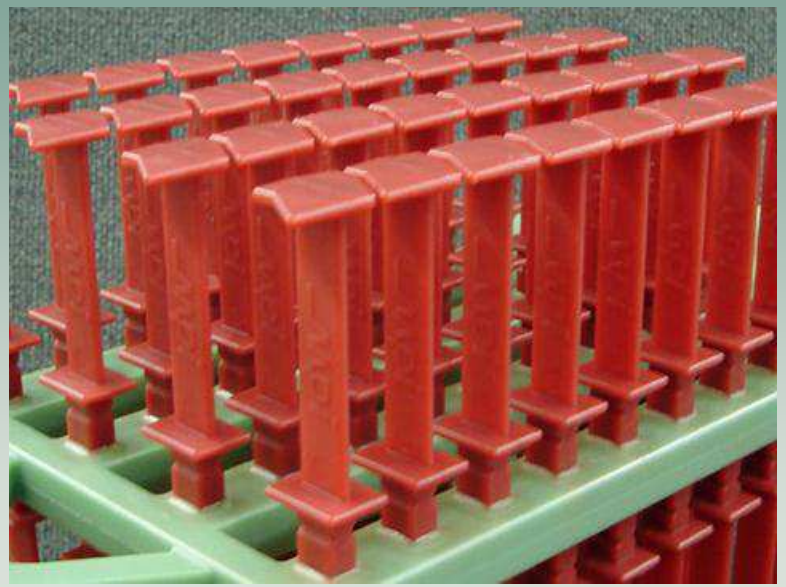
Aerospace



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Golf

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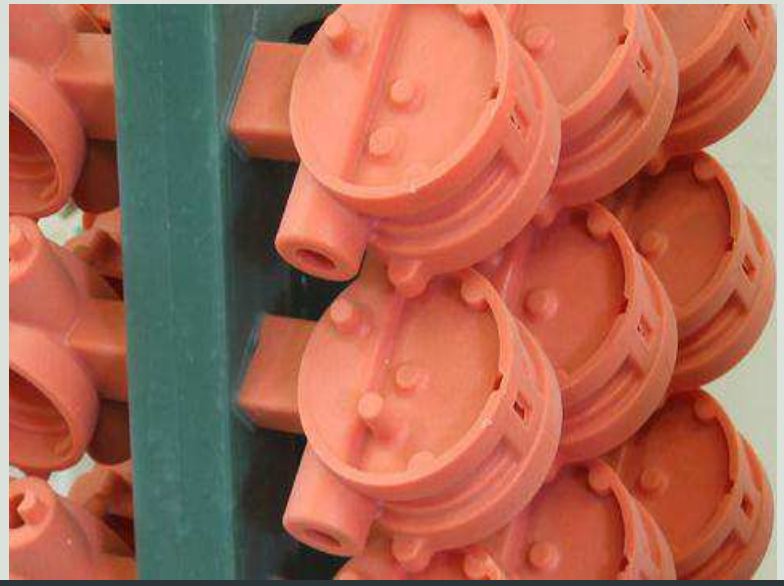
Commercial



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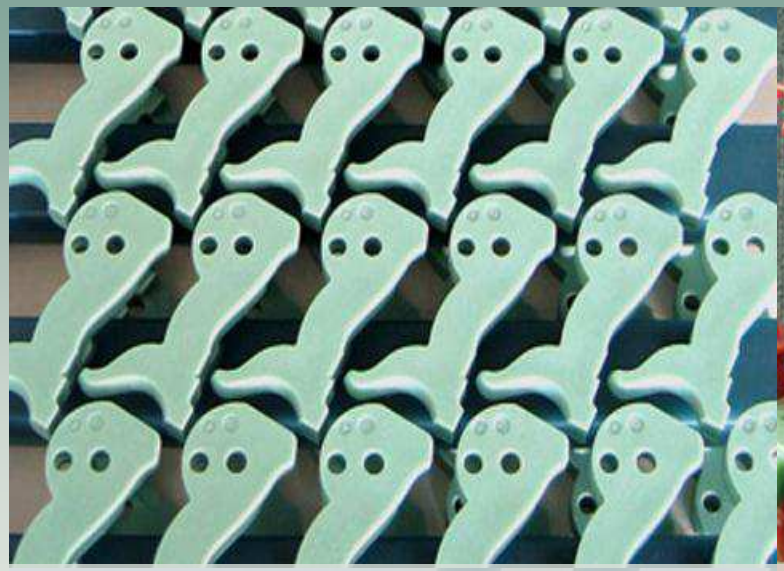

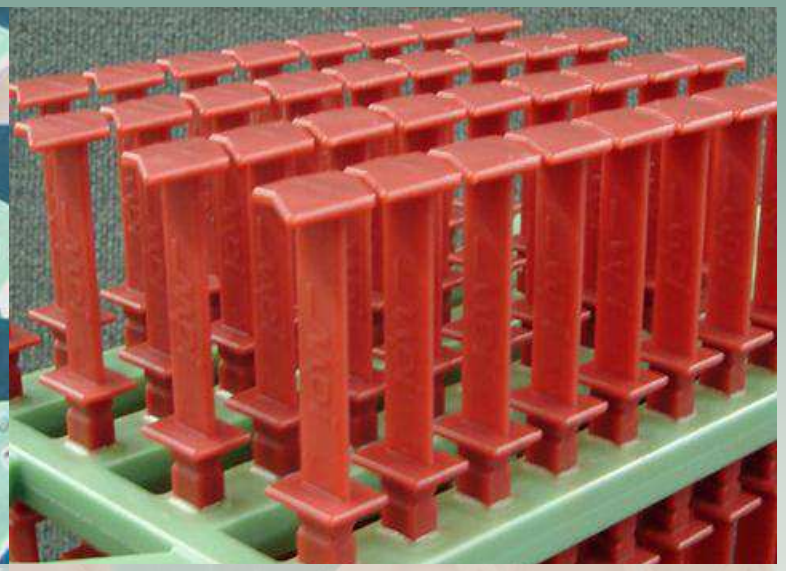

Our customers are finding that they are increasing the number of castings shipped with fewer patterns injected.

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They are experiencing unanticipated down stream savings that are contributing to a better bottom line.

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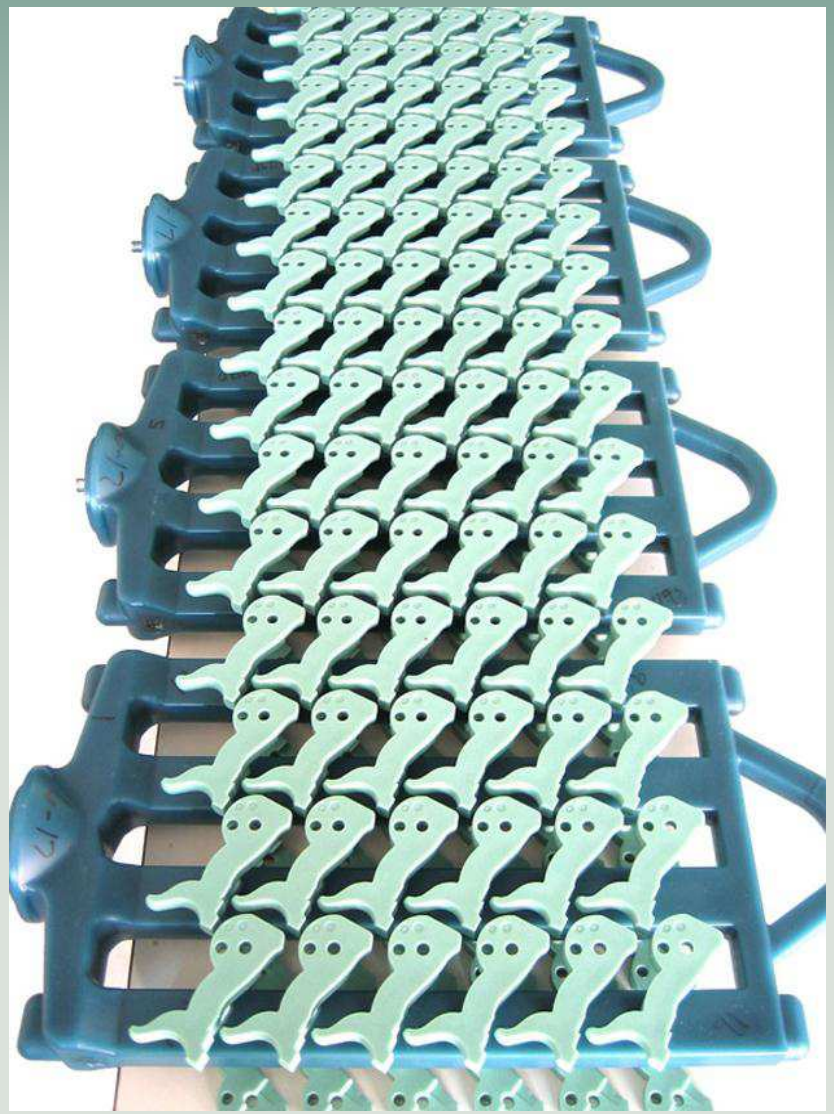

Each assembly is identical to the next.

Because there are no variations in the wax assembly there are fewer variations in the downstream foundry process.

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So every assembly is being produced into a single perfect casting,

not just castings on a runner.

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Working together, our customers and MPI have learned a lot about the impact of each element in the assembly process. The experience has been quite rewarding.

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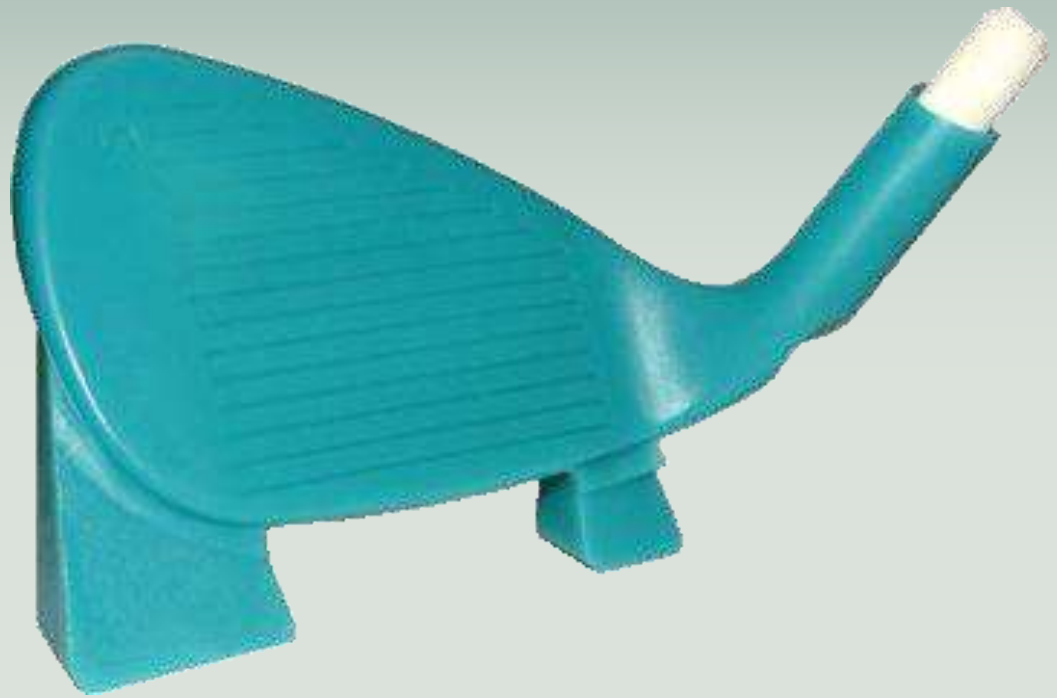
We have learned how the quality of the wax pattern,



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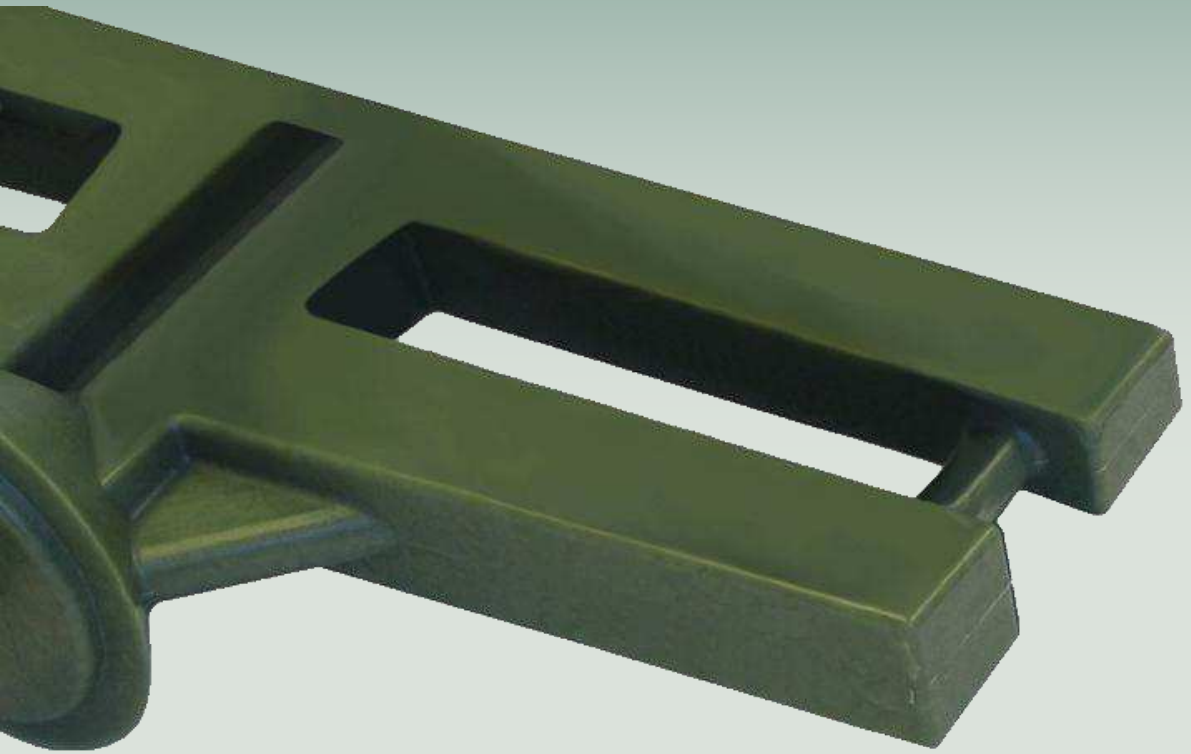
the quality of the wax runner,



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and the quality of their weld all impact the final result.

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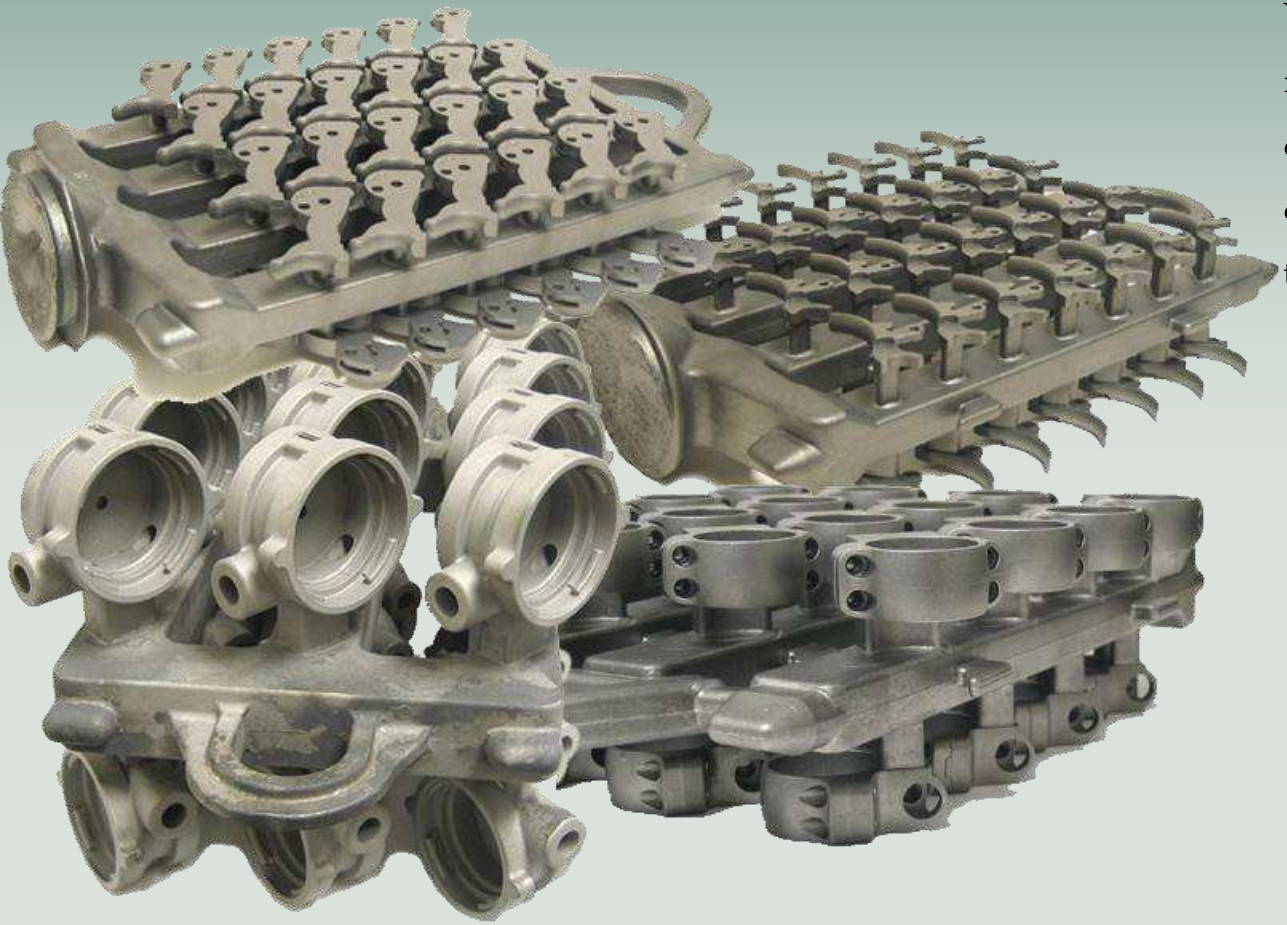

What our APAS customers have recognized and proven, is that consistency at the front end creates higher casting yields and therefore a better bottom line.

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We all know that a quality wax pattern is required to make a quality casting, but is it hard to achieve the pattern quality with injectors that vary.

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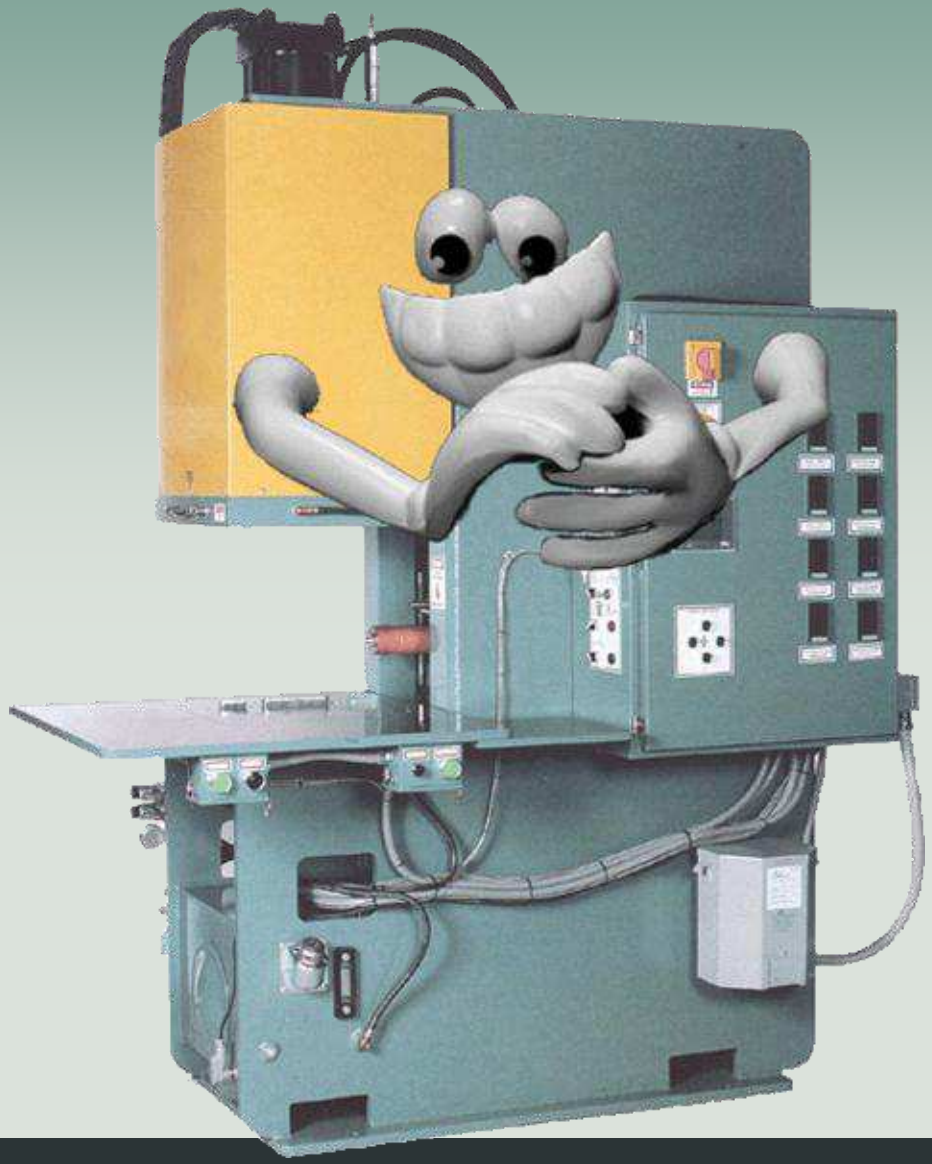

How many of you have wax injection machines with “personalities”?

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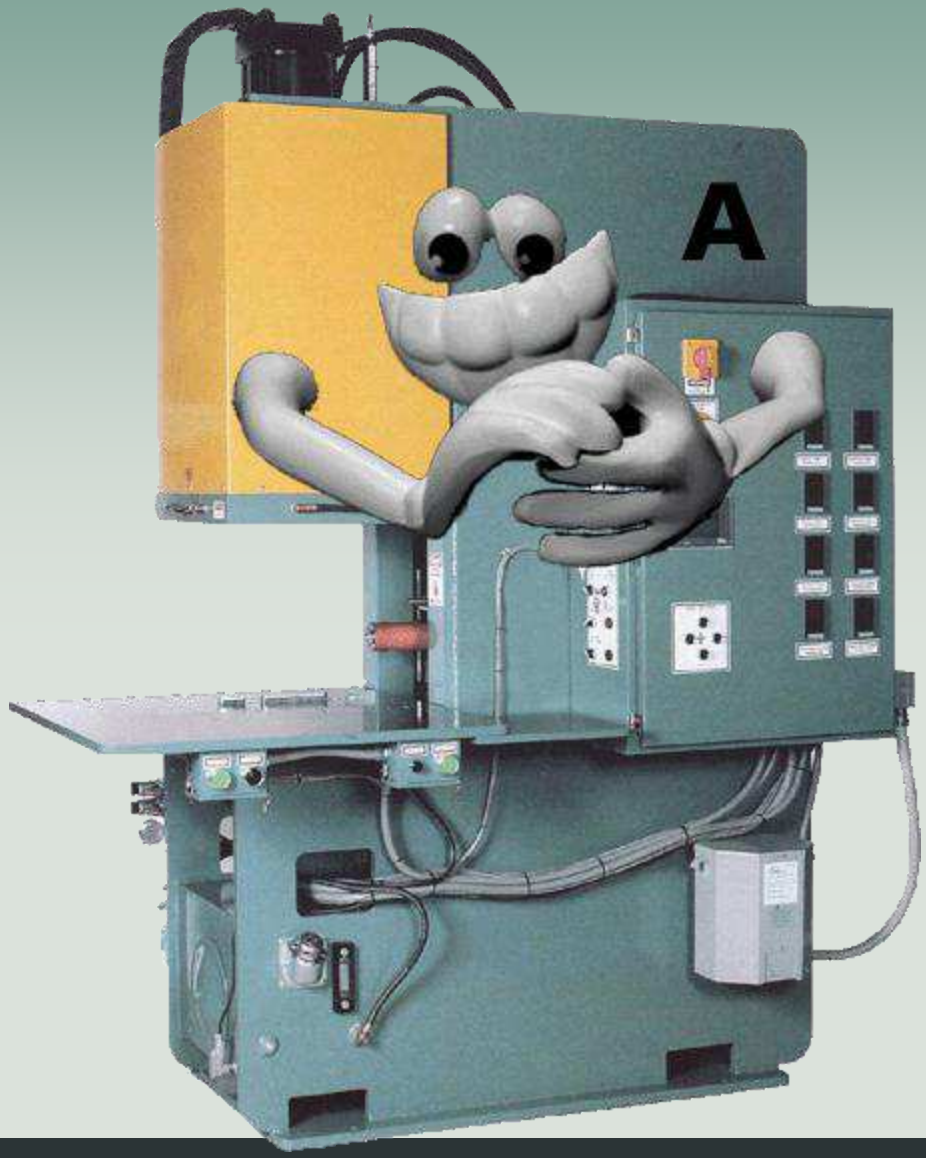

How many of you have wax injection machines with "personalities"?

You have a die that will run well on a particular machine (Machine A), and produce quality patterns.

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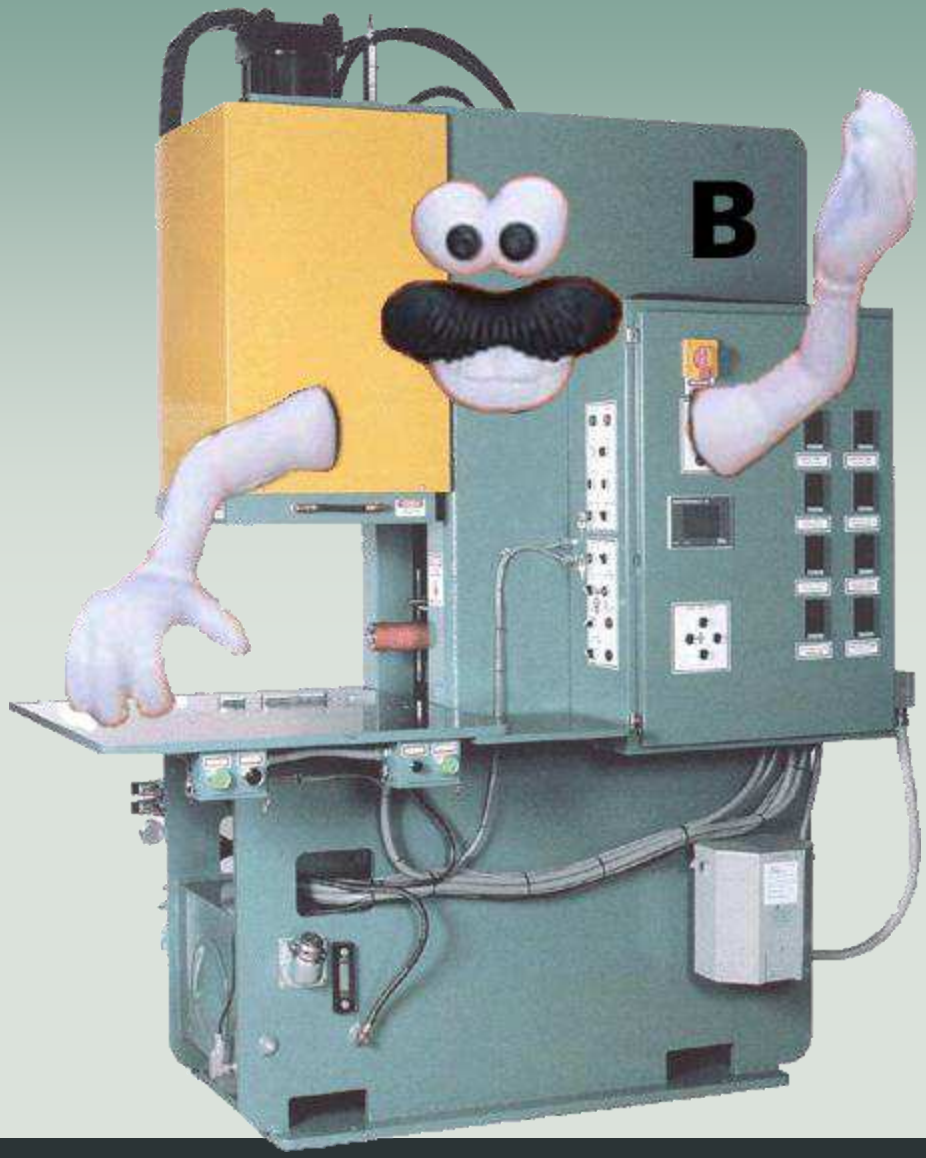

How many of you have wax injection machines with “personalities”?

Then because of production bottlenecks you are forced to run the die on a different machine (Machine B), now you are unable to replicate the same quality pattern.

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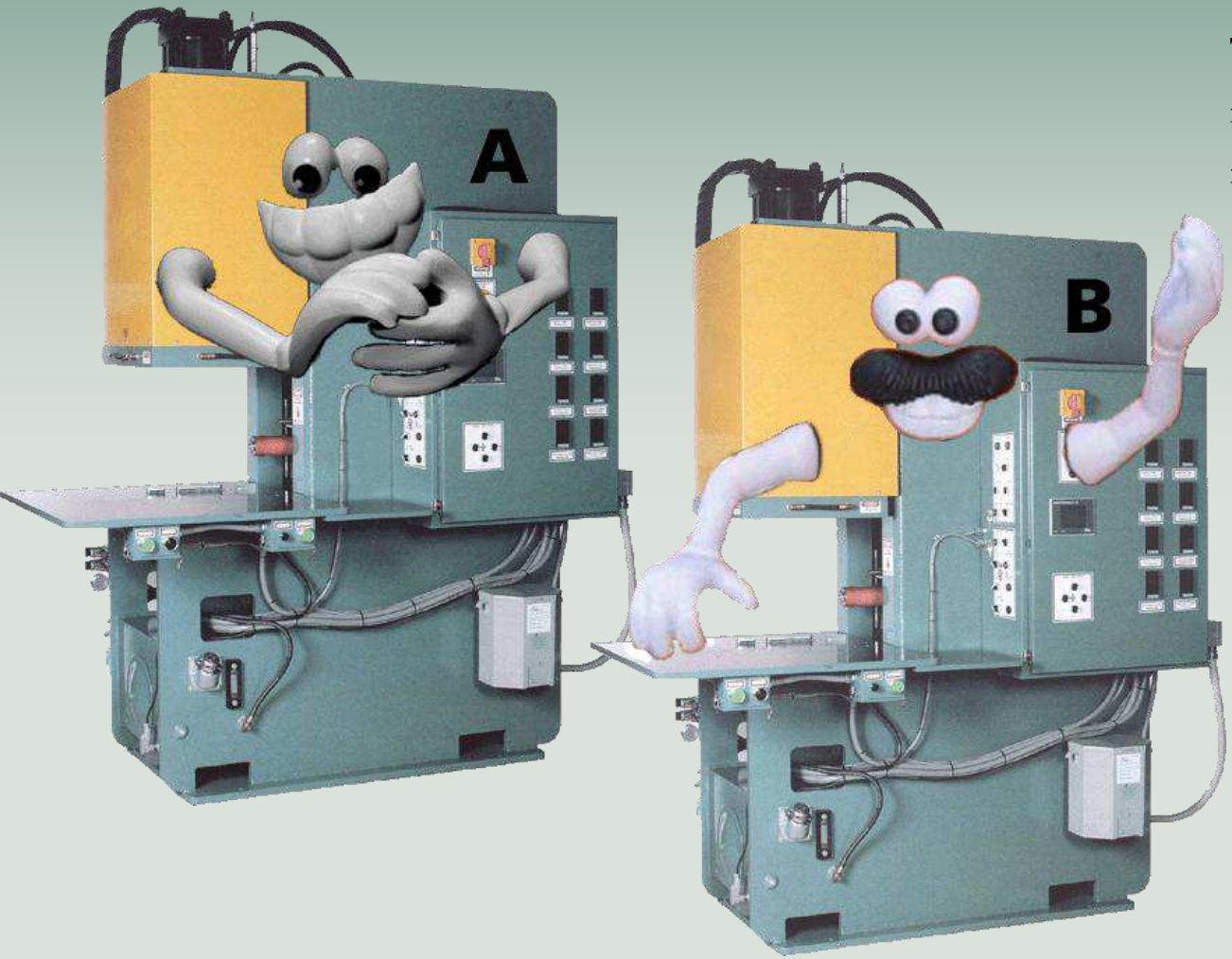

This can happen even when both machines are from the same manufacture.

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Now I can show you how to virtually eliminate defective patterns simply and cost effectively:

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Through process control of your wax injectors.

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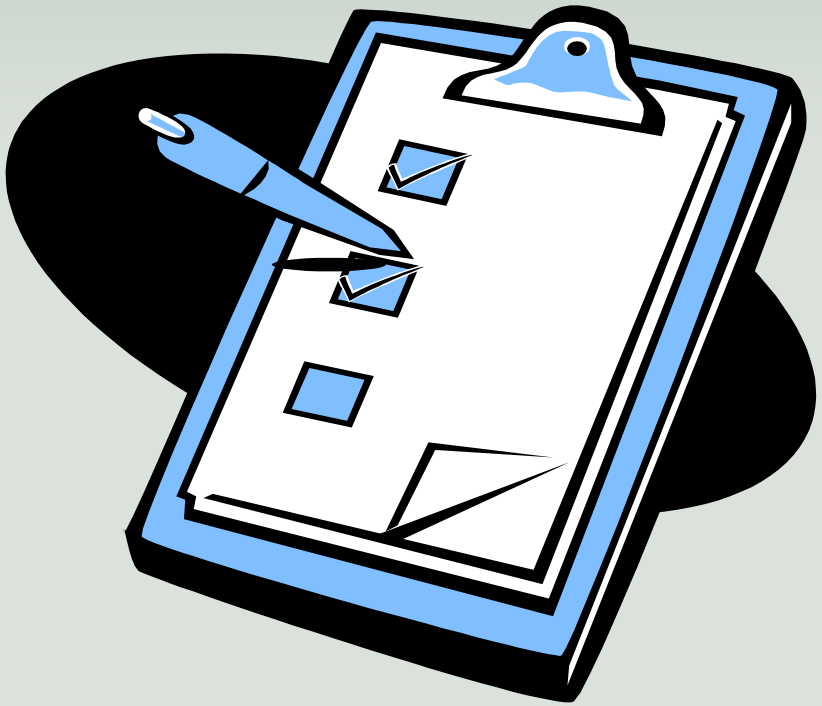
But first here are some simple checks that you can do that will tell you if your wax equipment is out of control:



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1. Do you see your operators purging wax out of the nozzle or throwing patterns away as they purge the machine prior to an injection?

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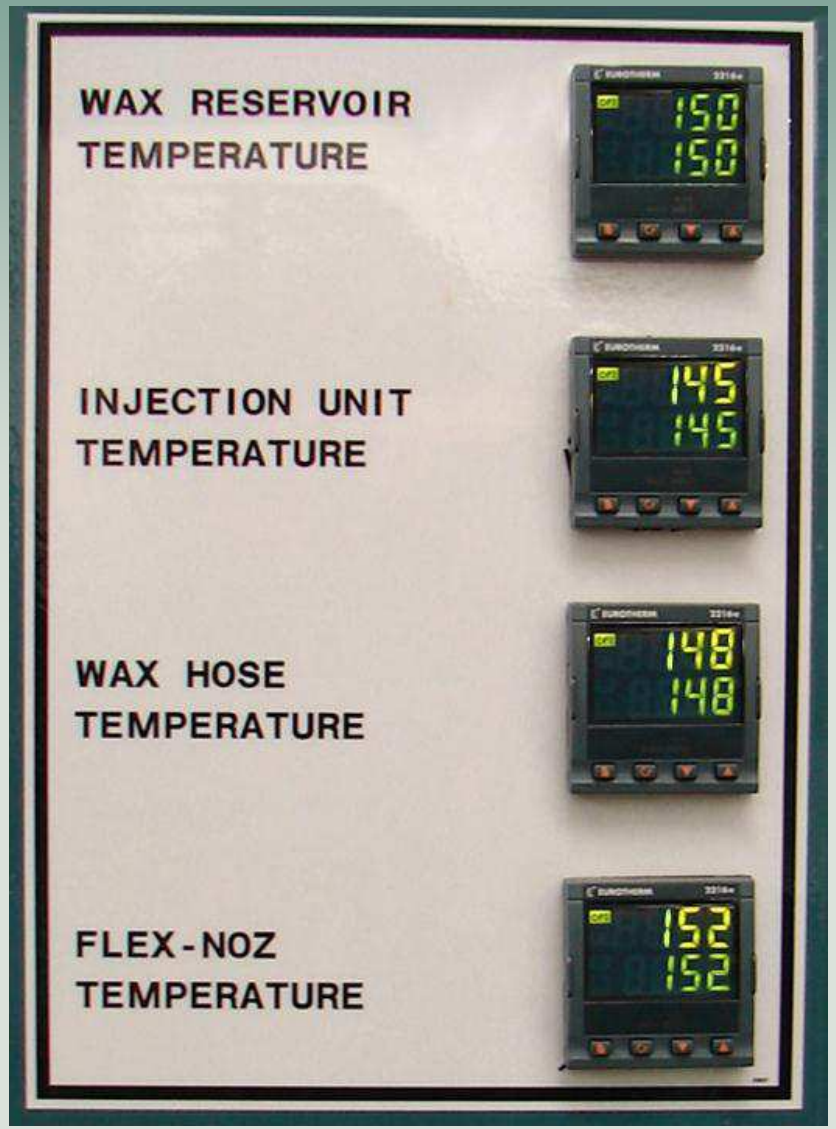

2. Do you see different temperature settings on each of the machines temperature zones?

If you do then the operator believes that there is a temperature variation in the wax injector and the operator is compensating for the temperature difference. The fact is that the operator is generally right, there is a temperature variation.

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These examples demonstrate a fundamental problem in the wax room.

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First, your operator is controlling the injection process, rather than the injection process controlling the operator.

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First, your operator is controlling the injection process, rather than the injection process controlling the operator.

Second, there is often no check to see that your process is in control or out of control. You are not verifying that the wax going into the die is achieving the settings on the machine.

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In order to have consistent patterns from any wax injector we developed our 20/20 “Process Vision” graphing system.

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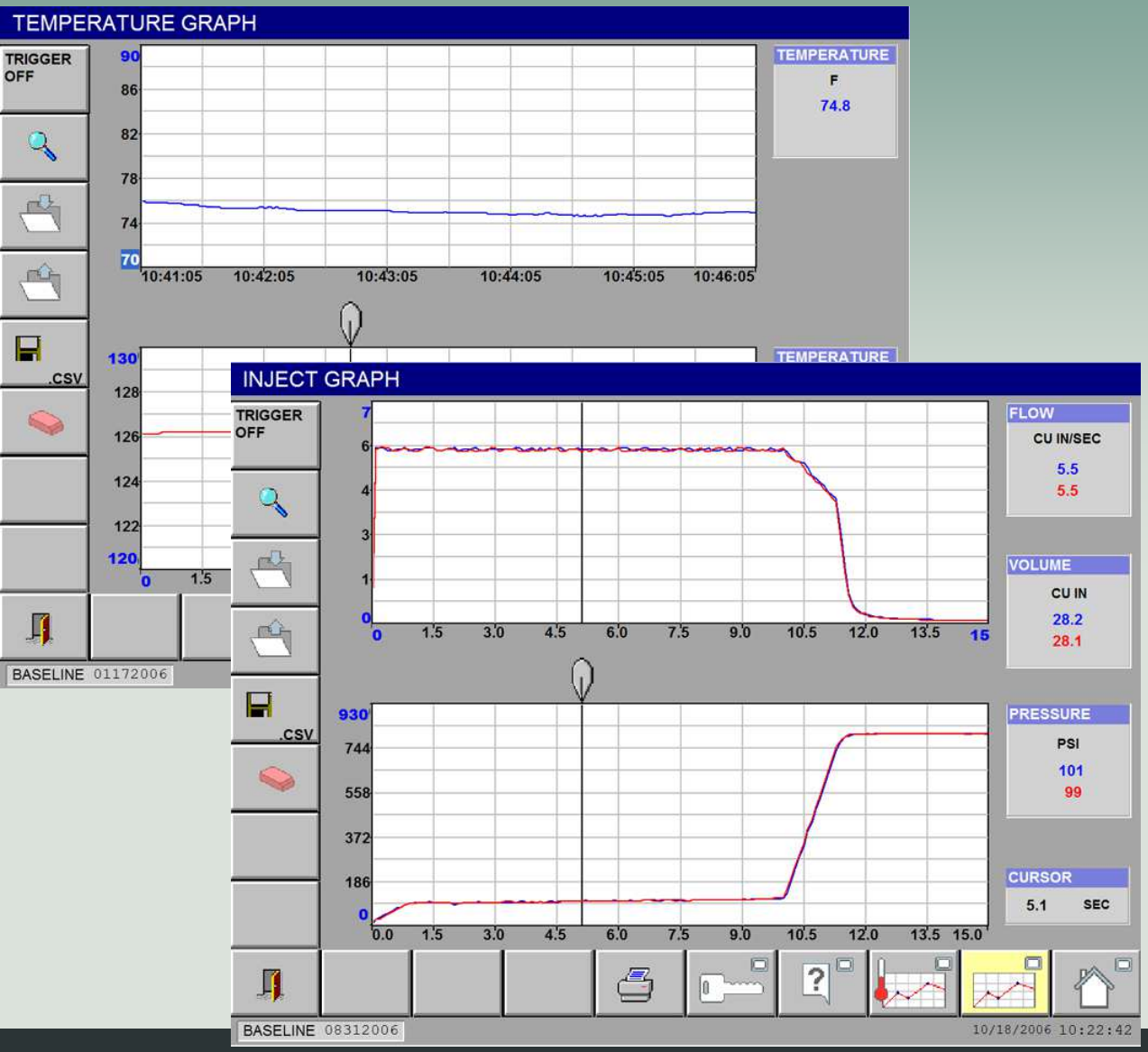

The injection cycle is recorded as a graph of the actual wax temperature, flow and pressure.

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The 20/20 accomplishes this using quick-disconnects to hydraulically connect to a machine's injection cylinder,

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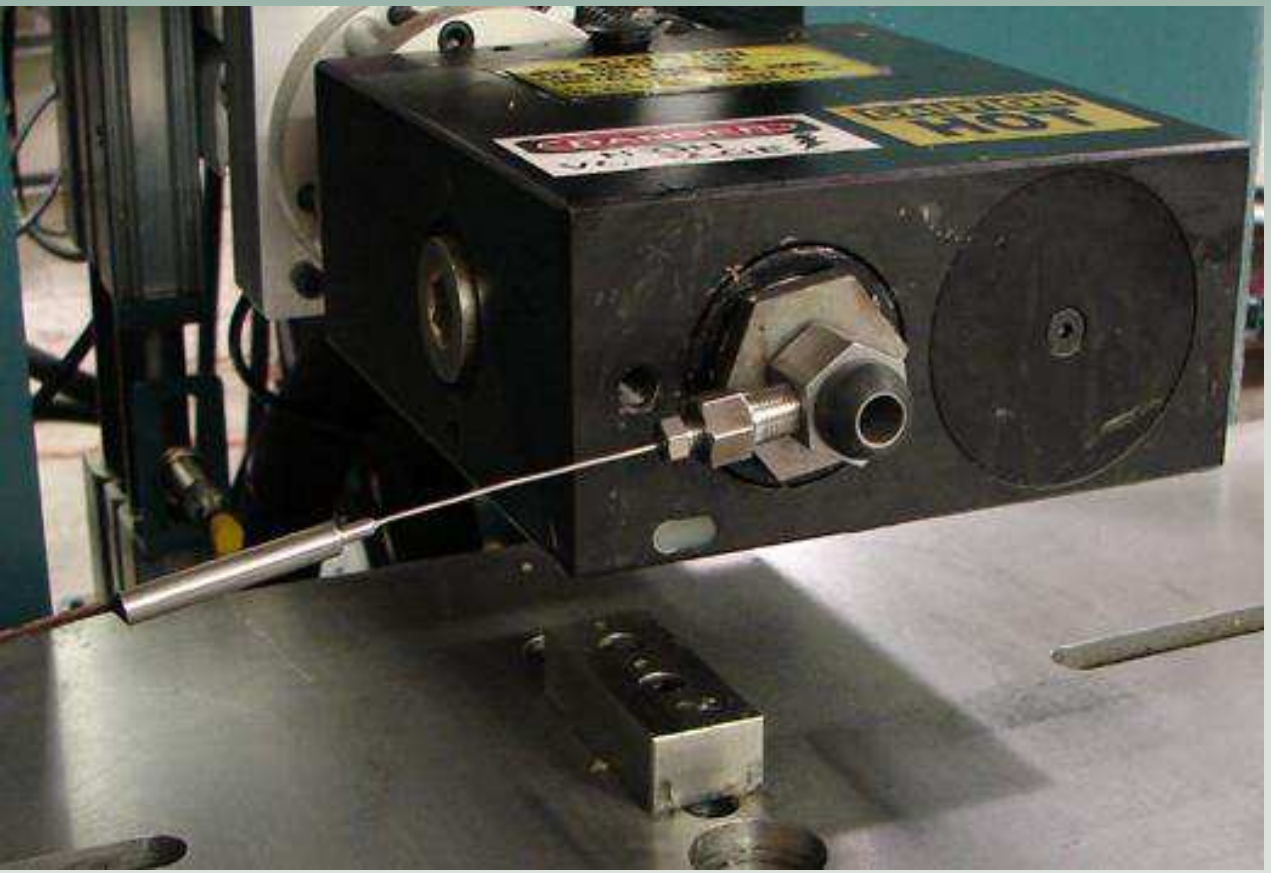

and putting a thermocouple into the wax stream in the injection nozzle.

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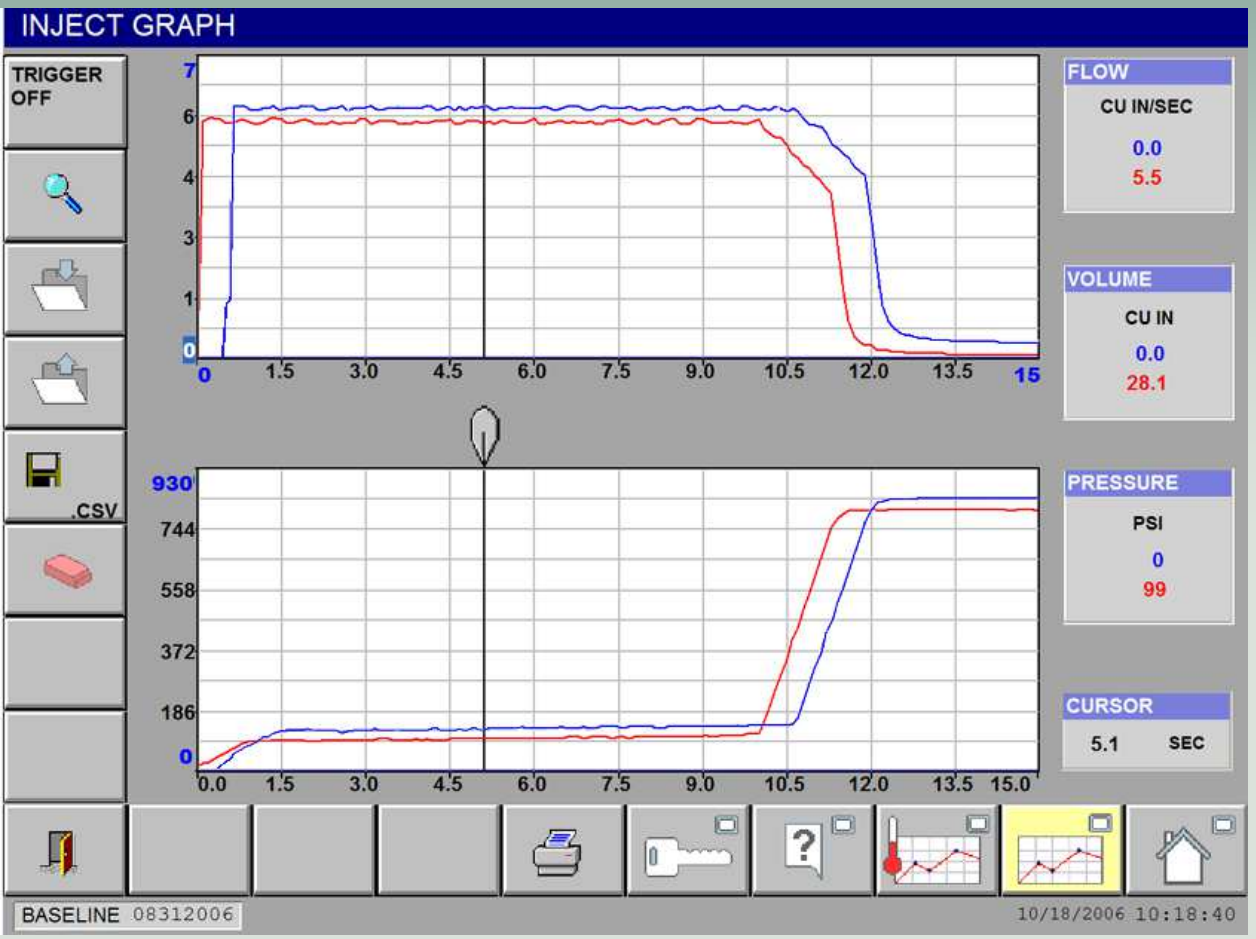

It's that simple; just align the graph of the second machine to match the graph of the first machine which is making a quality pattern.

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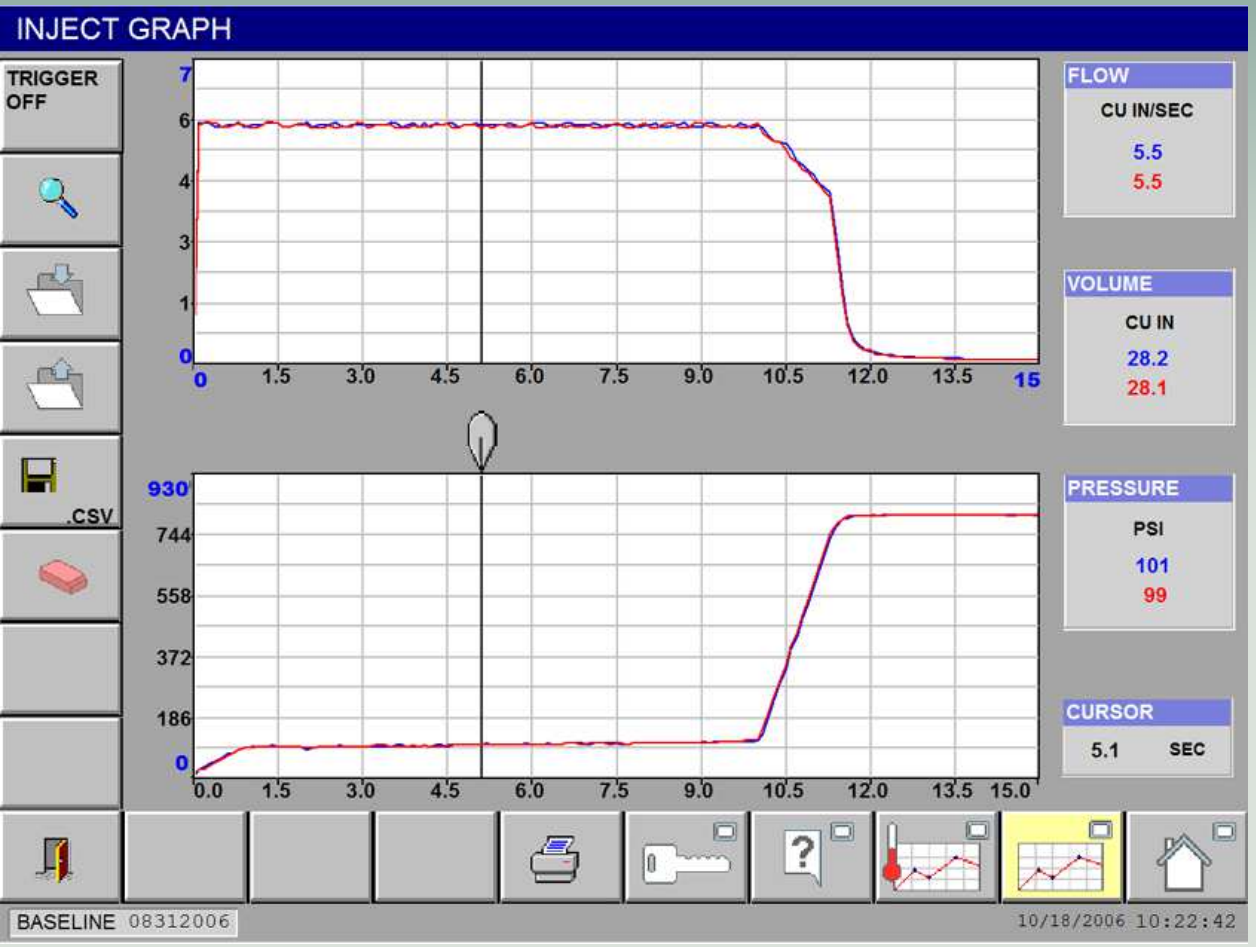

It's that simple; just align the graph of the second machine to match the graph of the first machine which is making a quality pattern.

Once the graphs match, both machines will inject at the same actual injection parameters regardless of the difference in machine settings.

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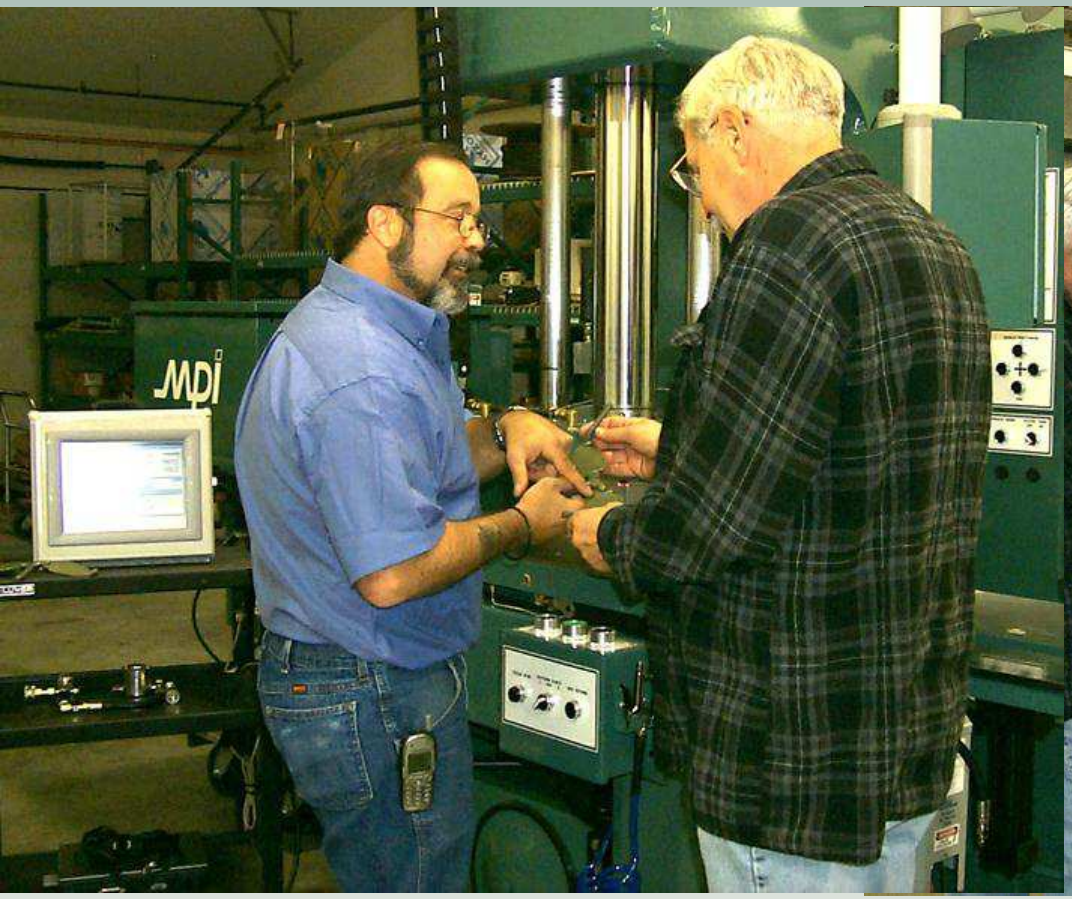
This can also be done effectively from one manufacturer's machine



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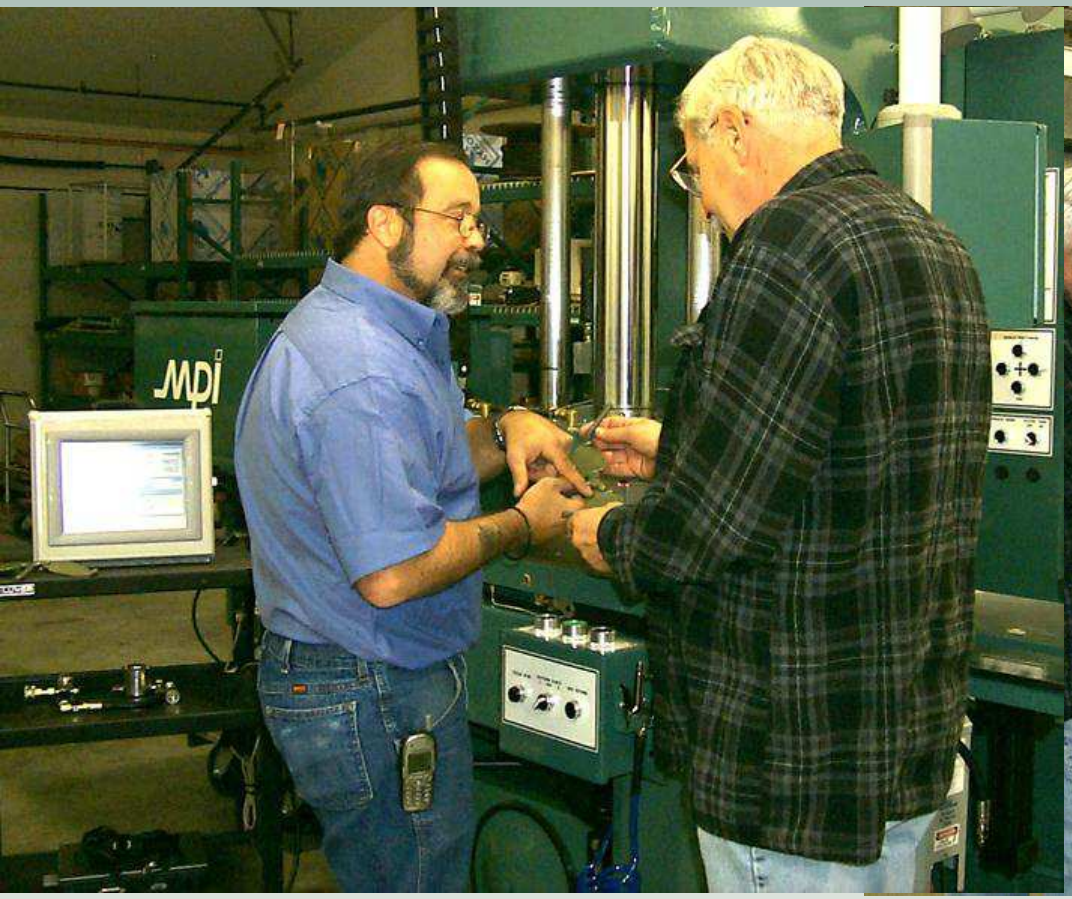
to another manufacturer's machine so long as both machines have the performance capability to run the die.



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The patented technology developed in the Process Vision graphing system is now available on every new MPI wax injection system in our "Smart Line" of wax injection equipment.

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That's right; on all injectors, even our manually adjusted equipment you can visually see and compare the wax flow curve and pressure curve.

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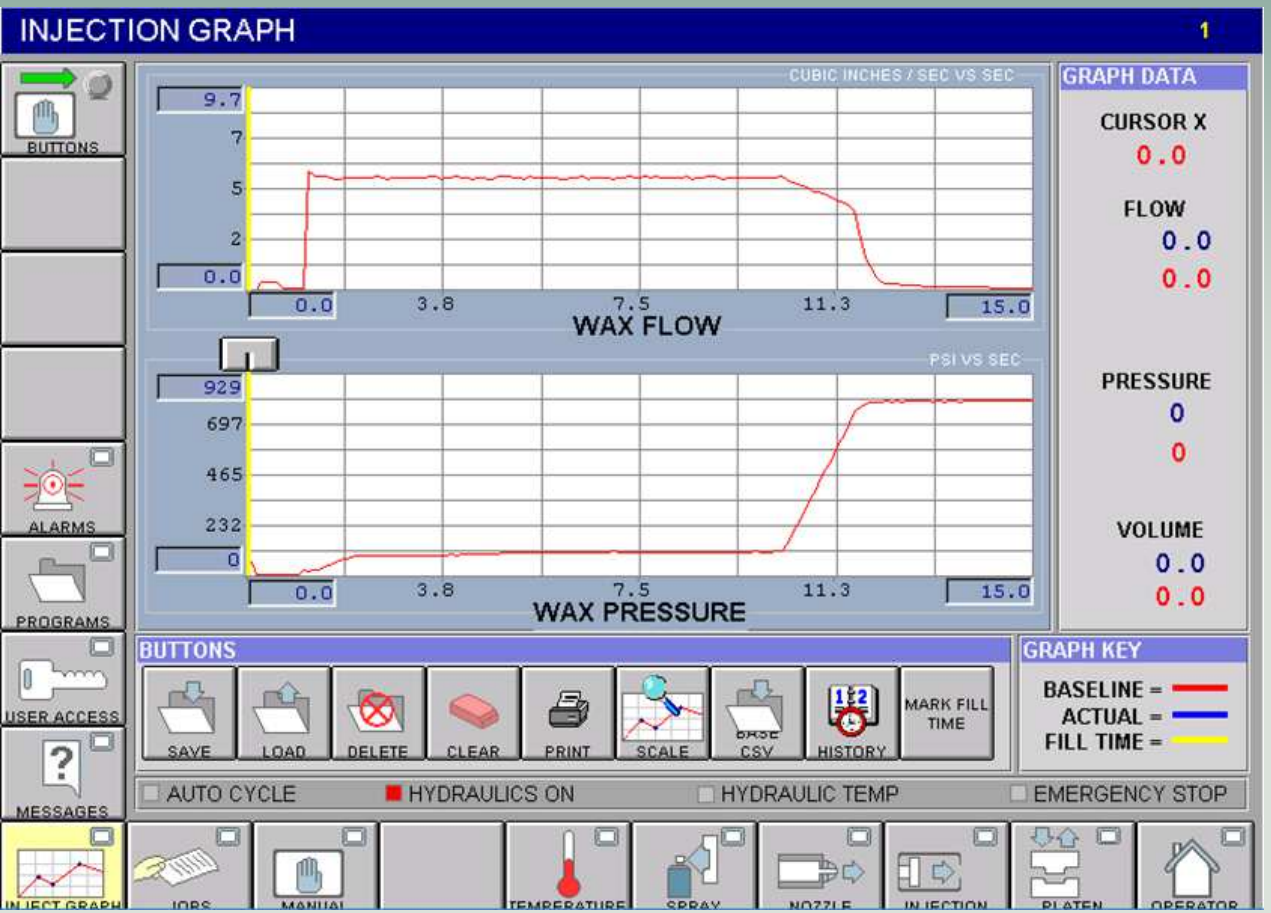

This is an invaluable aid to the set up technician and shows the operator the injection pressure and fill times during each injection cycle.

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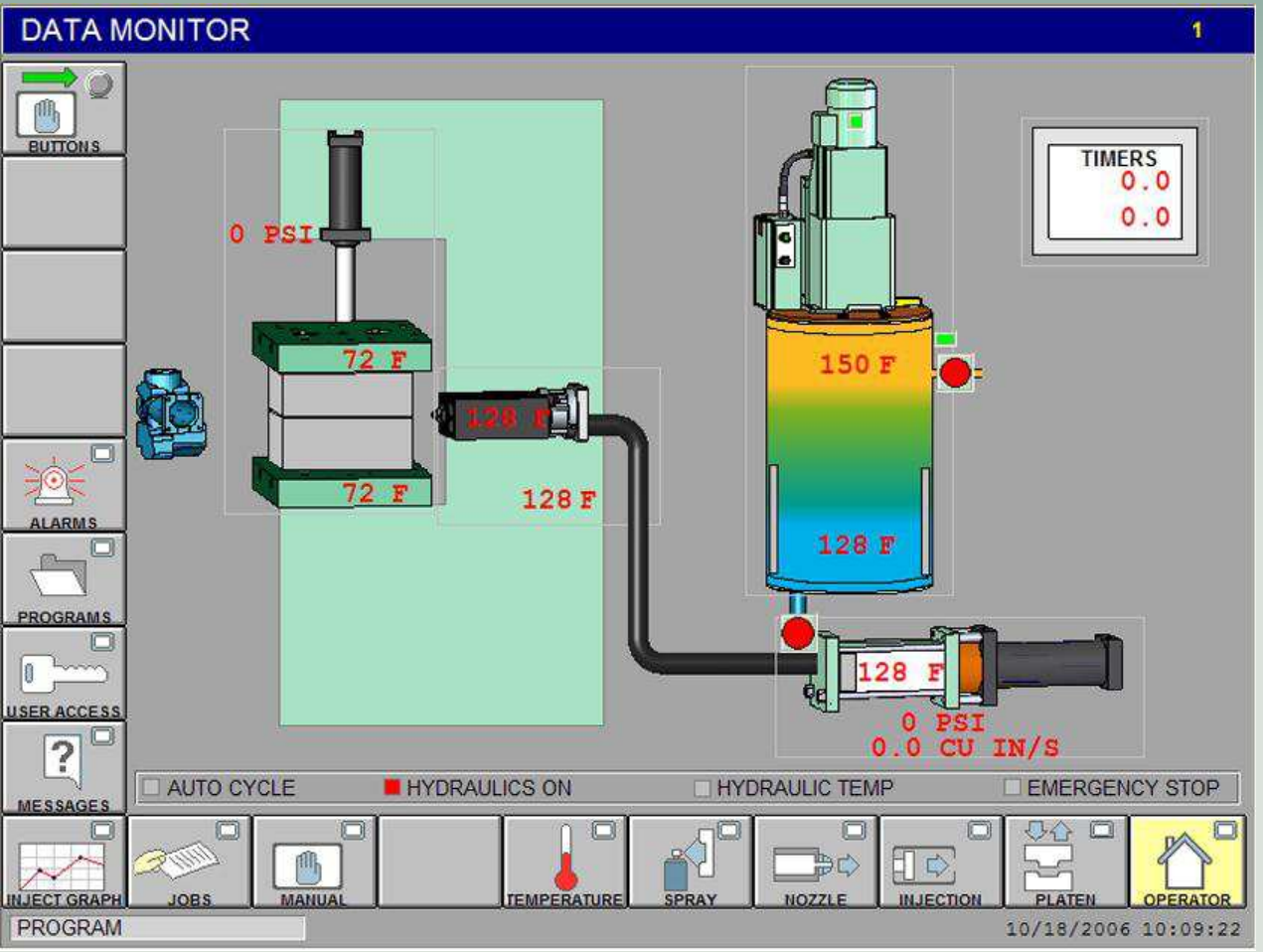

The operator is informed where in the injection cycle the process is, and what if anything has changed.

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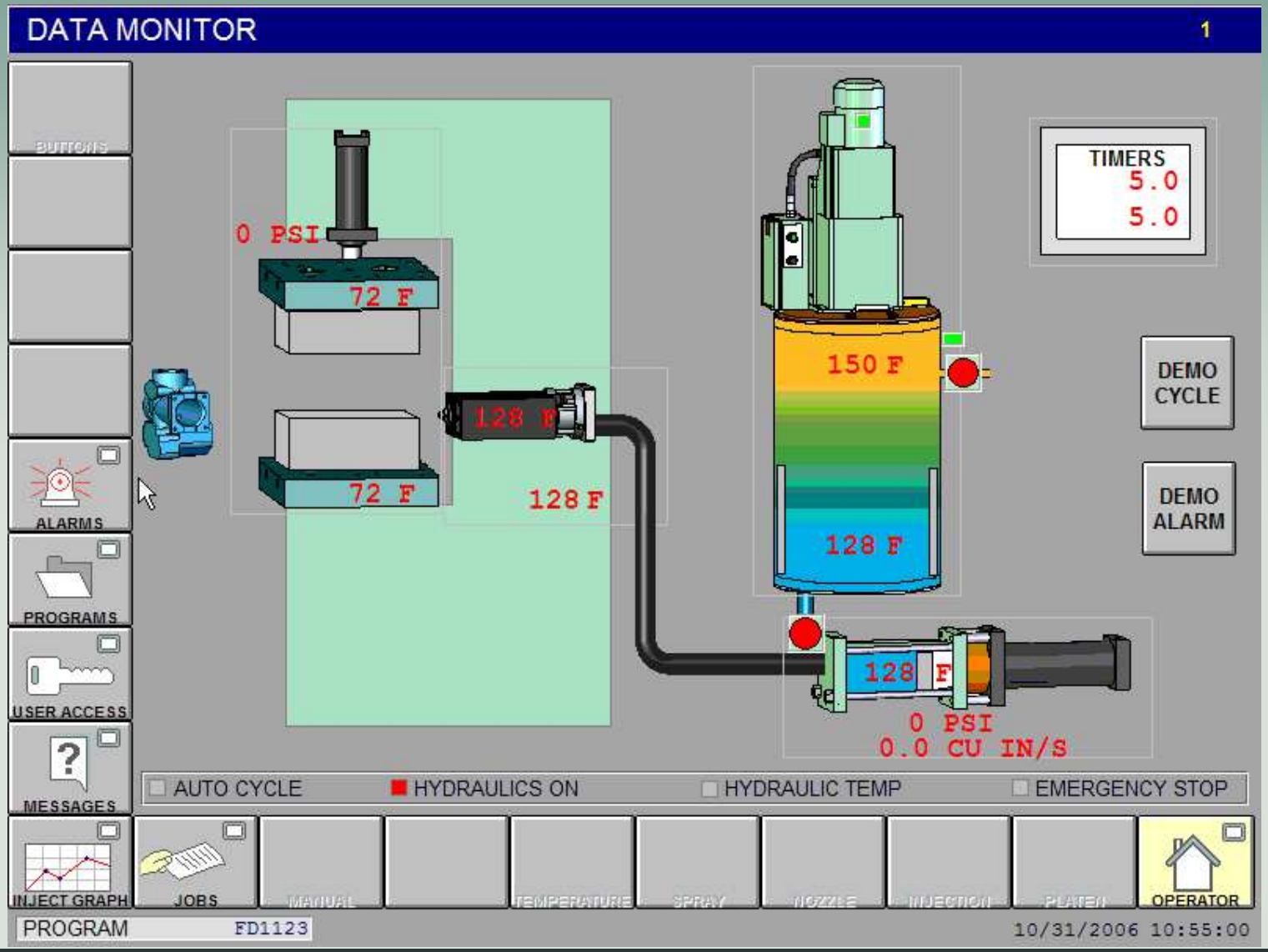

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What makes this a real process control system is its ability to run a die the same way it was run previously even on a different machine.

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Access to the injection controls is set by levels of authority.

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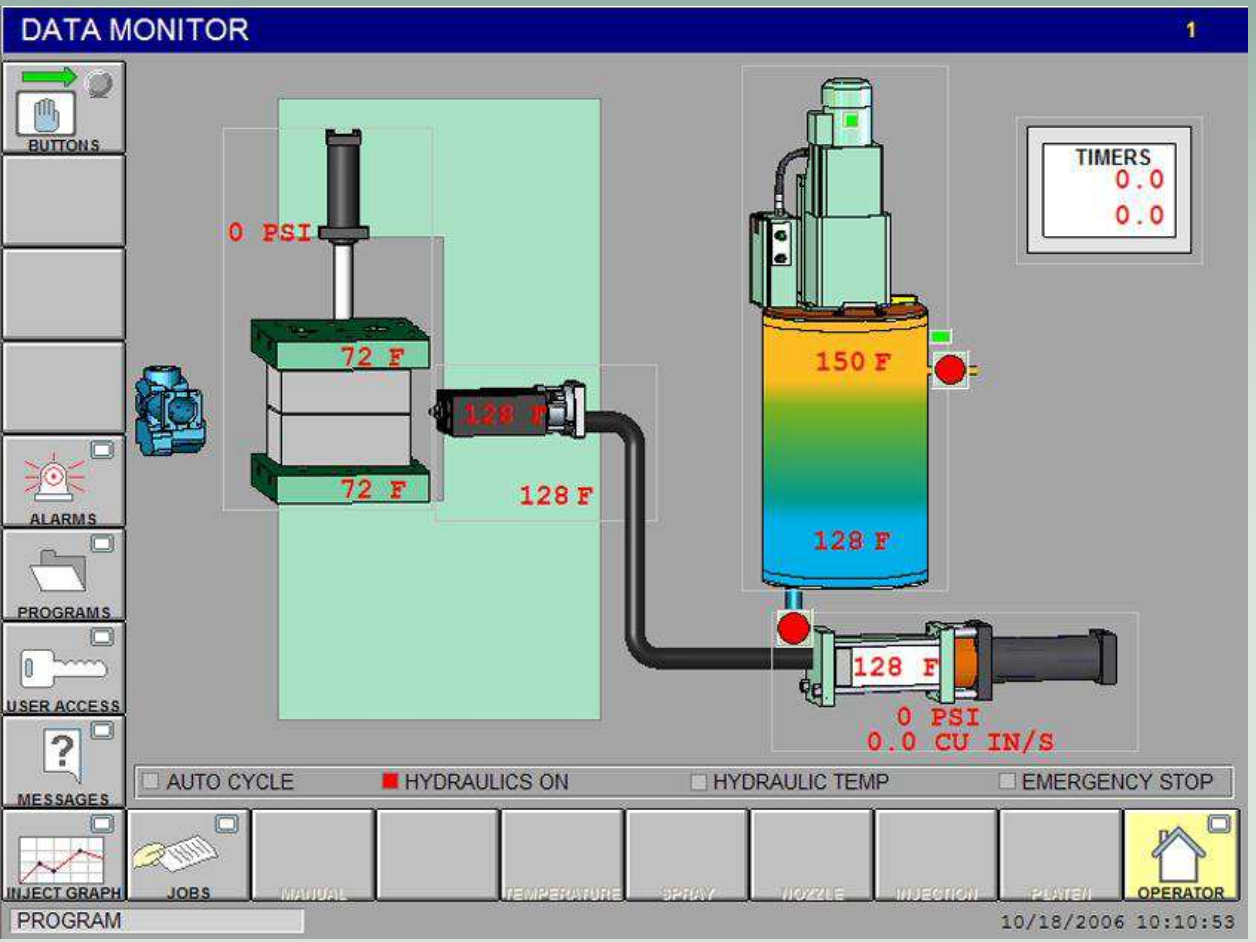

Level 1 for the operator,

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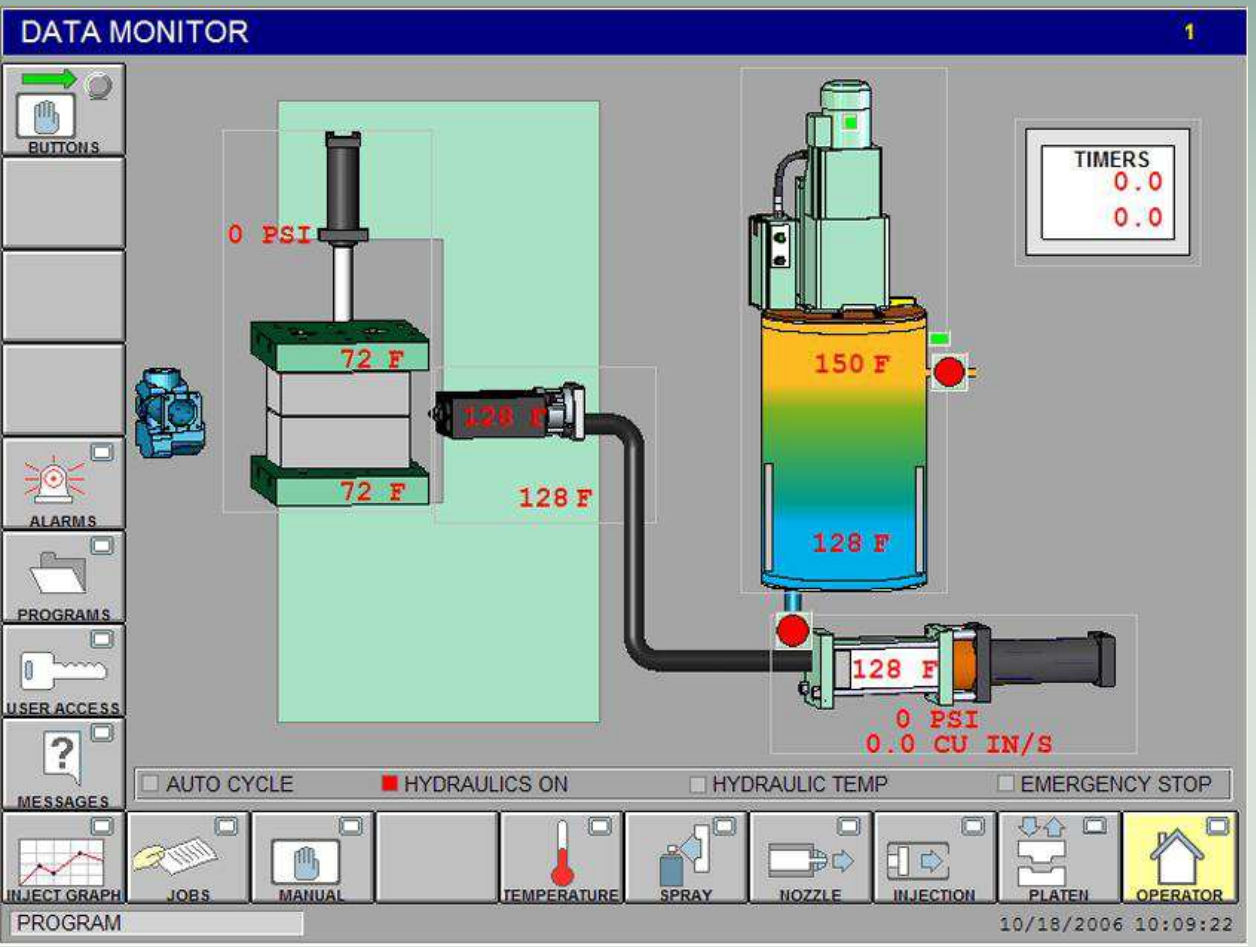

Level 2 for the setup person and so on up to full access by a qualified person in the maintenance or engineering department.

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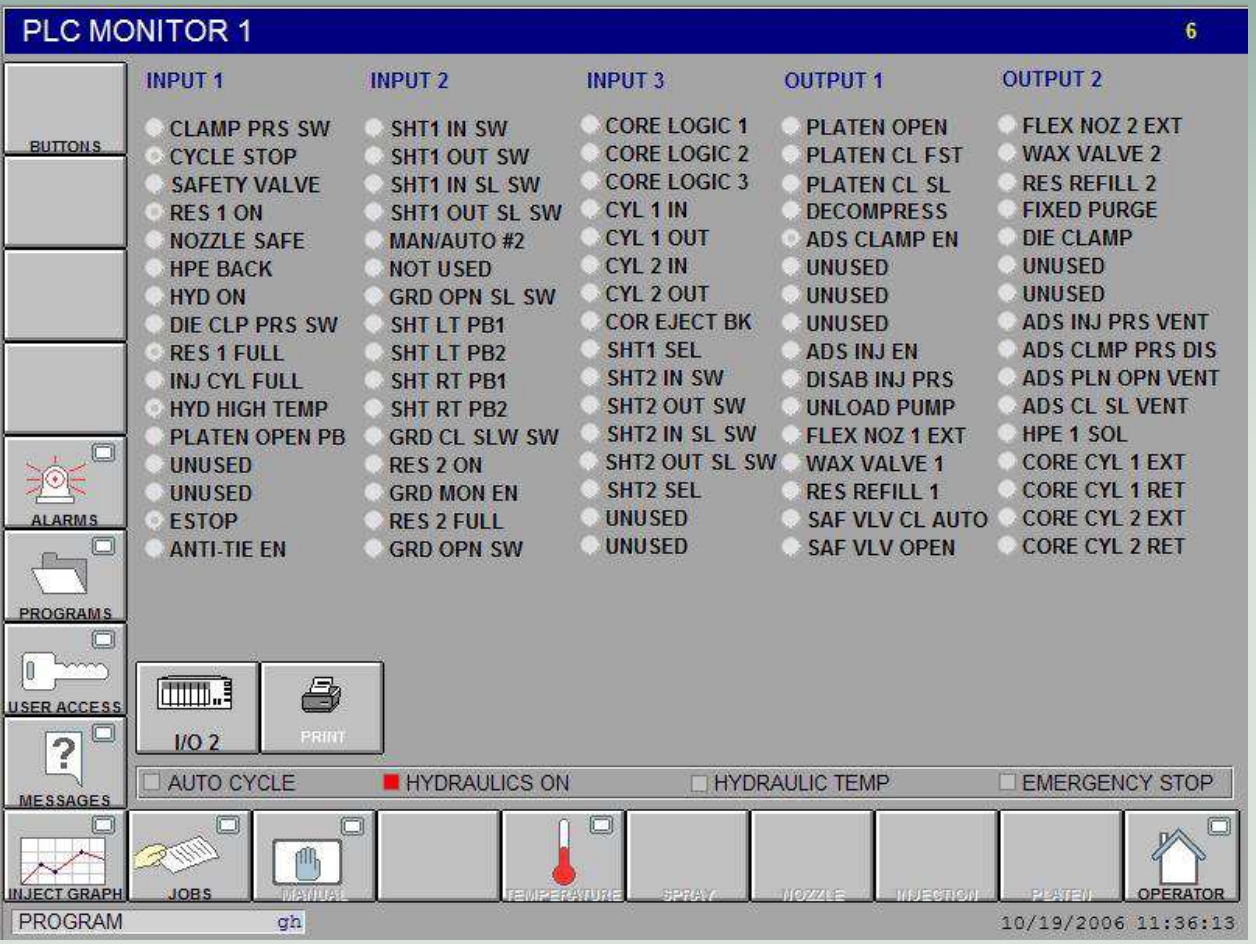

From the maintenance standpoint, all of the PLC inputs and outputs are displayed and labeled on the touch screen. This allows the technician to pinpoint an interruption in the machine cycle and quickly diagnose the cause of the interruption.

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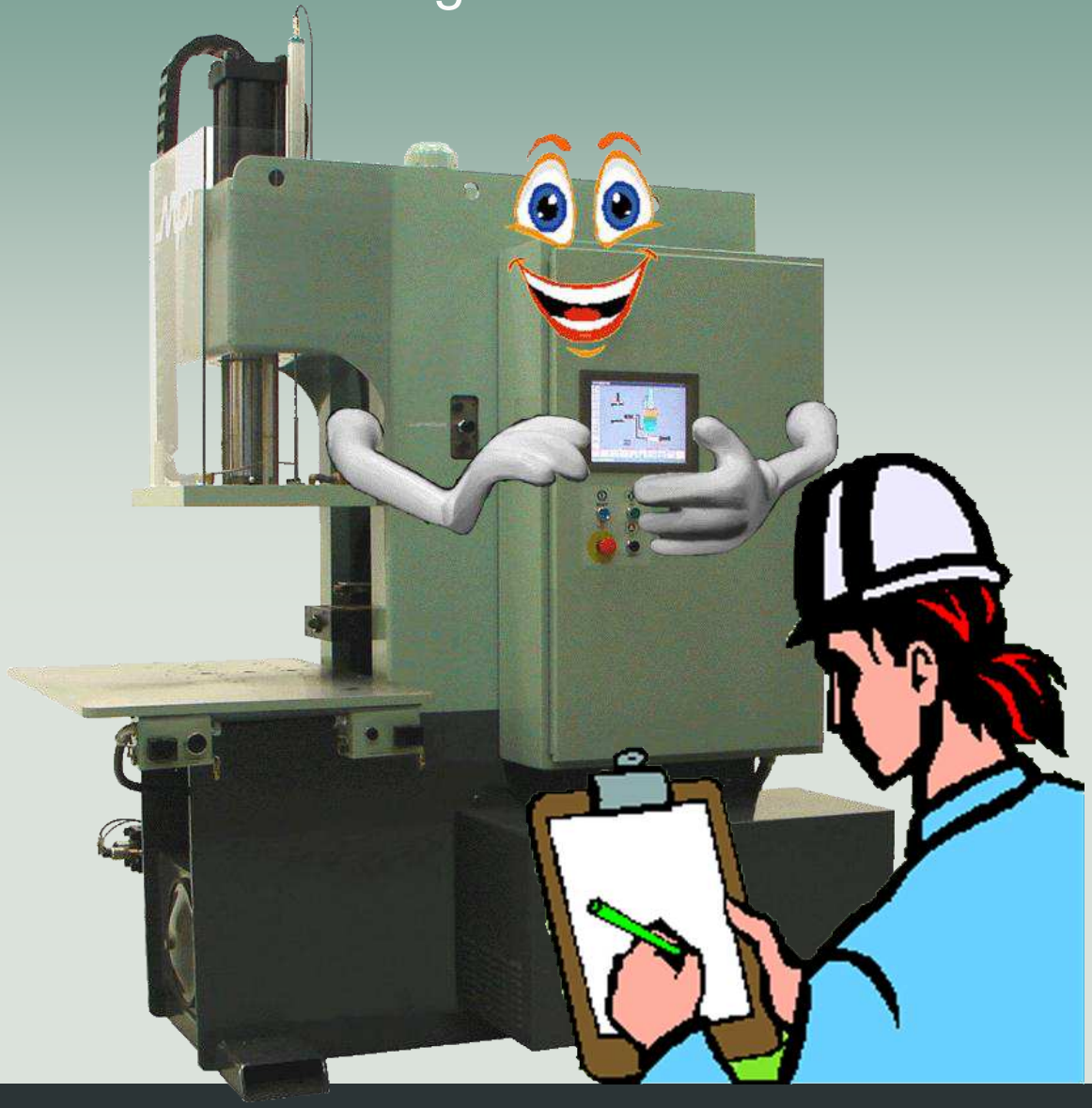

Preventative maintenance can now be preformed based on the machine letting the service departments know when it's ready for a PM based on the cycles run and operating conditions of the equipment.

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I have told you about how we have integrated the vision graphing technology into our Smart Line of injectors, but lets not forget the reason for the vision graphing.

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It was developed to bring process control to your existing wax injectors so that you can run any die on any wax injector.

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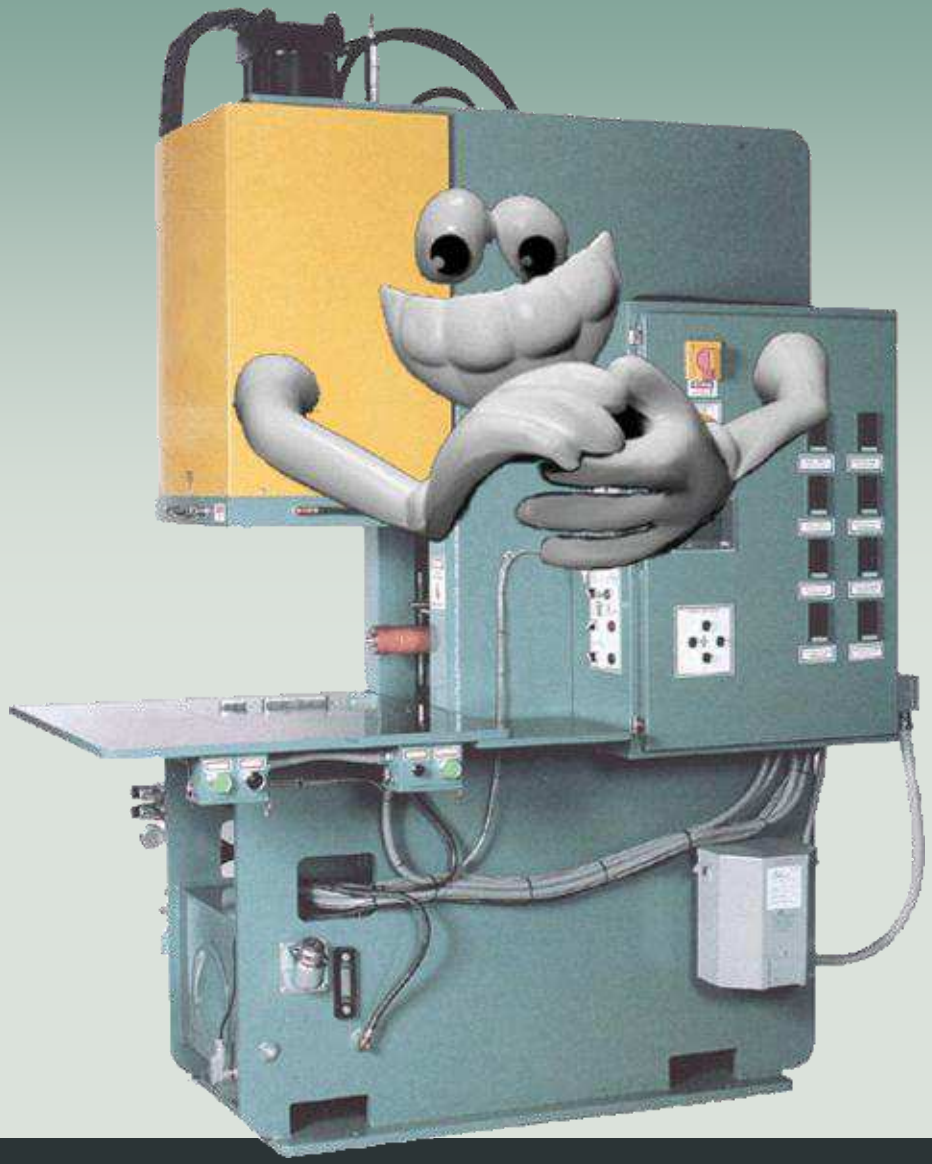

Regardless of the machines personality.

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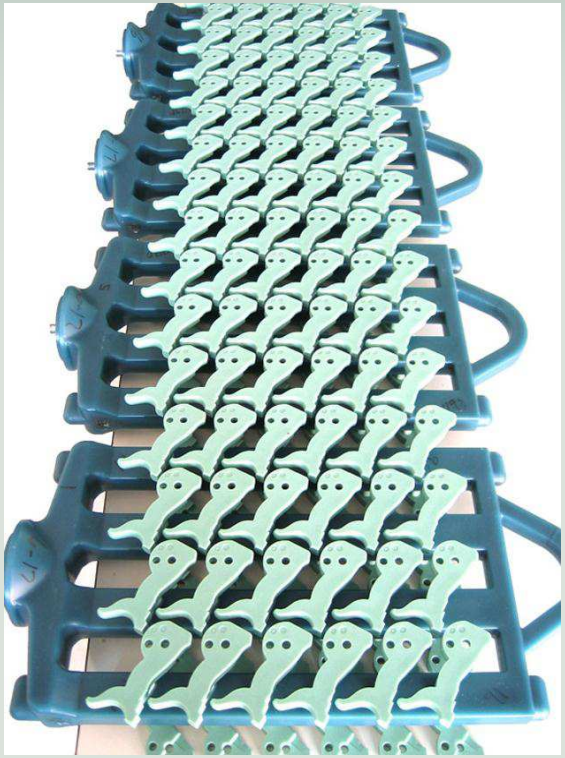
When your process is in control all your wax patterns are the same.



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When your process is in control all your wax patterns are the same.

You now have confidence that sound castings can be made with each and every wax pattern produced.

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When your process is in control all your wax patterns are the same.

What does that mean to you?

It means your foundry is more competitive and has a better bottom line.

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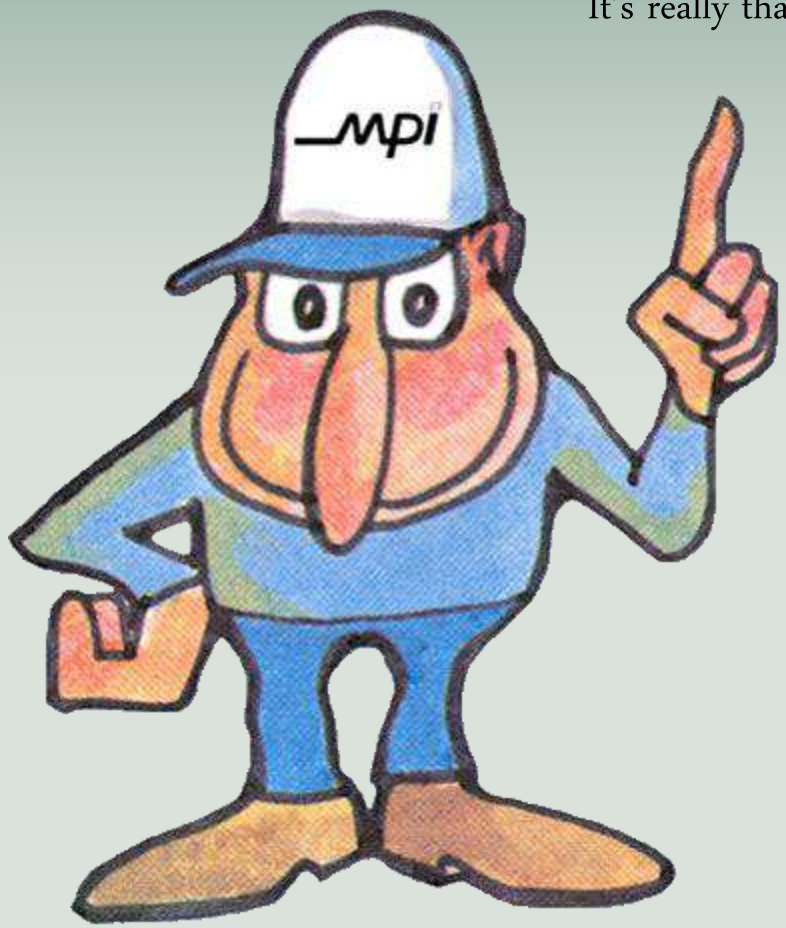
It's really that SIMPLE.



Thank You