EVALUATING MATERIAL TEMPERATURE CONTROL

GUIDELINES

saint clair systems
TEMPERATURE & VISCOSITY CONTROL

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01

Establish Goals

The first step is to answer two questions:

- What you would like to accomplish?
- Is it something that can be helped by material temperature control?

If these two questions cannot be answered clearly, we recommend pausing until they can.

Targets we have established in the past include:

- Labor Savings
- Coating/Material Savings
- Solvent Savings
- Quality Improvement
- Throughput Increase

Regardless of the target, you must establish a consistent and effective method of measurement.

Whether you are using % change, $ change, labor hours or something else that makes sense for your process, it must be measurable.

Finally, make sure that you have a method to correlate the data you are collecting with your overall goals.

02

Establish Baseline Measurement

Before you start looking at making improvements to your process, make sure you know how it is performing today. If you already have a consistent method for measuring and recording process temperatures, that is great. If it is not readily available or easily attainable, we recommend recording, hourly, ambient temperatures, (the room temperature of the environment around the process).

Additionally, make sure you have an effective way to capture data supporting your improvement target. To establish your baseline, review with your team and agree on a reasonable amount of time to collect data. Try to incorporate normal temperature swings from day to night, shift changes, solvent additions, and any other normal events that may cause variation in your data.

If you are already collecting the data described above, it should be sufficient to create your baseline. If not, we recommend collecting the data the way you operate now. Do not change anything about your normal operation while you are collecting the data. The baseline should be a realistic representation of your normal operations.

Once you have the baseline established, make sure your improvement target is something worth attaining. This may include doing a return on investment calculation.

03

Establish System for Correlation

The next step is to make sure you have a system to correlate material temperature fluctuations to your goals.

Sometimes this can be simple. For example, if you are seeing an increase in a specific defect as the temperature changes, that may be enough of a correlation.

Other times it might be a little more complex. Temperature changes are introduced to processes in a variety of ways. You and your team will need to record the times of events that may cause a temperature fluctuation. Those can include adding fresh material, adding solvent, idling the line for a period, making any process adjustments to maintain quality, exposure to an open door or curing oven (anywhere near the material path), etc. We can help supply a comprehensive list of things that we have seen.

Finally, that data needs to be time stamped so you can perform an effective correlation. While simple to do, it can be overlooked.

With the first three things in place, you're ready to install a sensor.

04

Install a Sensor in Process

We consider this an optional step. Often, the correlation between changes in ambient temperature and quality defects is enough to take the next step. For example, if you are using different coating formulations or different robot programs for different seasons, you have already concluded that temperature is a problem.

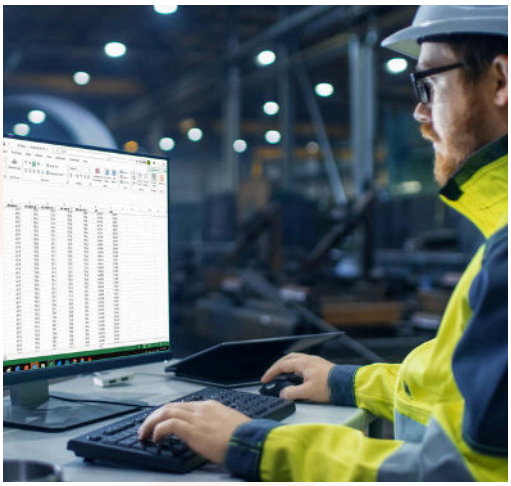
When it does make sense, we propose temporarily installing two sensors. Ideally, these sensors would measure and record both temperature and viscosity. You would install one sensor at the beginning of your material path, and the second sensor as close to the point-of-application as practical. The purpose is for you to identify what is changing between your source, (i.e., mix room), and dispense. This can be especially helpful to demonstrate the ineffectiveness of an existing temperature system like an inline paint heater.

The second step is establishing a system for collecting the data transmitted by the sensor. This can be an existing control system, or an inexpensive process data logger. Anything capable of capturing either a 4-20 mA or RS-485 signal. Capturing raw data in real time is important. Processing the data is simple.

Finally, install the sensors, calibrate, and verify data collection.

Now you are ready to collect data.

05 Collect Data



Collecting the data is the least demanding part of the evaluation. If your team did everything correctly during the installation phase, the data collection will take little effort.

First, agree on the amount of time you will collect the data. We recommend approximating the time and conditions you used for the Establishing the Baseline step. Again, incorporate normal temperature swings from day to night, shift changes, solvent additions, and any other normal events that may cause variation in your data.

Next, establish the time intervals for the automated data collection. Your sensor(s) can log data as frequently as you require to do your analysis. The more data you collect, the more effort it will take to retrieve and process the data. However, not collecting data frequently enough may leave you with inadequate information.

For example, if you decide to collect data every two seconds, you will have over 43,000 data points per day. If you collect data every five minutes, you will have less than 300 data points per day, but you may miss events like replenishing a drum with virgin coating and the impact that it has on the process. Since temperature shifts are typically not rapid, select an interval that is manageable, but still capable of supplying useful data.

Finally, we recommend reviewing the data regularly to make sure that the sensor is providing useful data. While not common, there are circumstances that could cause inaccurate readings. It is an inexpensive way to prevent logging data and finding it unusable.

06

Compare Data to Target

In step three of this guide, we established a system for correlation. This is where we use that system to look at the data we collected and compare it to our improvement targets.

As there is often a lag between the time of the temperature and viscosity measurements and the measuring of the improvement target, make sure you have a system that compares the temperature and viscosity at the time of application to the parts coated at that time.

Does any correlation exist? If you cannot draw a clear line between temperature shifts and your improvement targets, you should consider ending this evaluation. There is some other element of your process that you should address before material temperature control.

The only caveat to this would be that you are systematically addressing key variables in your manufacturing process, and you would like to eliminate or minimize them one by one. If this is the case, you may want to continue the evaluation.

If there is a clear correlation between temperature or viscosity shifts and your improvement targets, continue to the next step of automatically controlling temperature in real time.

07 Control Material Temperature

While there may be a variety of ways to help you evaluate whether material temperature control is a good fit for your application, we believe the most effective way is to try it for yourself. We like to describe it as using your process, on your material, collecting your data.

After training, calibration, and functional validation, you are ready to start controlling your material temperature.

Using the same methodology used in the Collect Data section of this guide, start collecting data. Again, we recommend reviewing the data regularly to make sure that your system is providing useful data.

While not common, there are circumstances that could cause inaccurate readings. It is an inexpensive way to prevent logging data and finding it unusable.

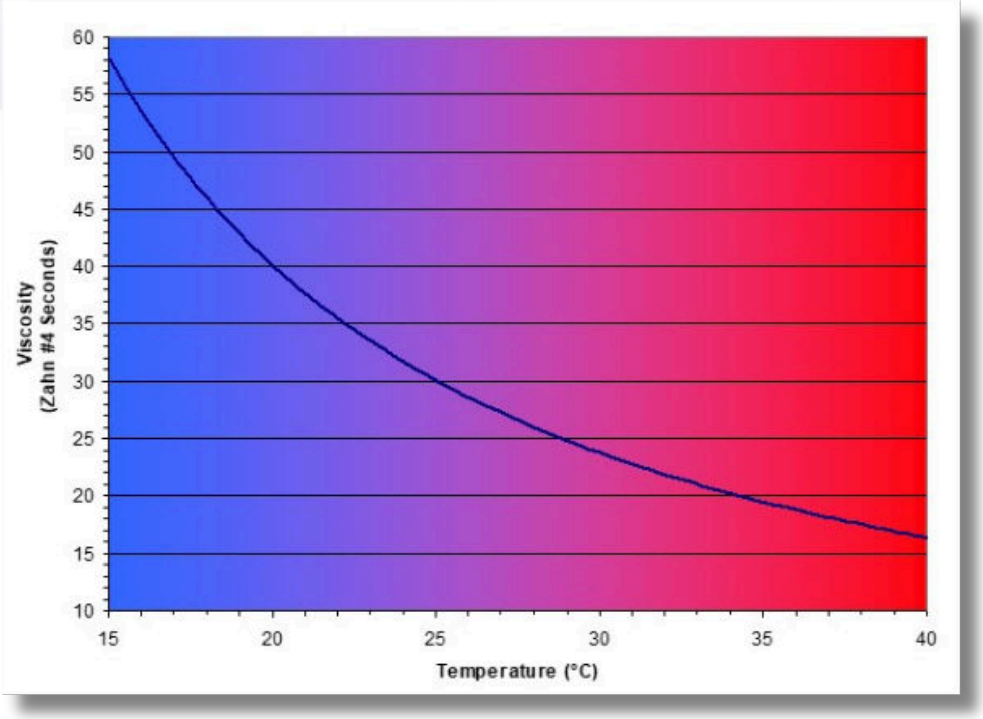
08 Decision

Your decision-making criteria, including budget, were considered before evaluating material temperature control. You have worked with your supplier to ensure that everything was understood up front, and this exercise was supporting your decision to either control your material temperature or not. If this was not understood at the beginning, and you have time to address it, do it now.

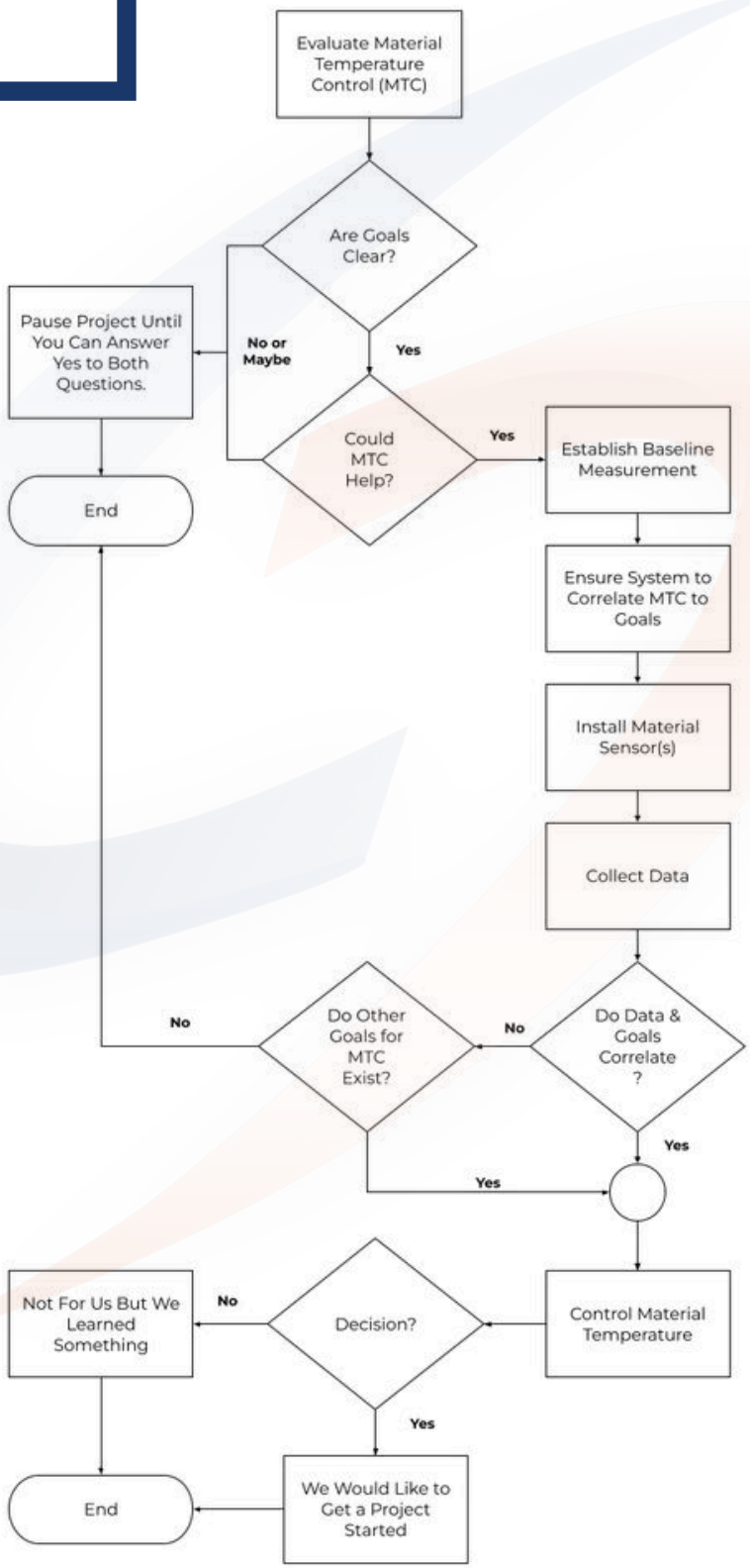
Either material temperature control makes sense for you, or it doesn't. It's that simple.

If it doesn't, hopefully you learned a few things about your process along the way and your organization will be better for it.

If it does make sense for you, great. You have done enough work to minimize the risk of making a bad decision and should look forward to a successful improvement project.



09 Flowchart



10 Summary

01
Be clear about what you are trying to achieve and make sure that your material temperature control partner agrees that it is something they can help with.

02
Make sure you clearly understand how you are currently performing. An unrealistic baseline may lead to a bad decision.

03
Implement a solid system for being able to correlate material temperature changes with your improvement targets.

04
Install your sensor(s) as close to the point-of-application as practical for the most valuable information.

05
Create a system to ensure that your team is consistently collecting usable data. Data should be the key to your decision making.

06
If you cannot draw a clear line between temperature shifts and your improvement targets, you should consider ending the evaluation.

07
After training, calibration, and functional validation, you are ready to start controlling your material temperature.

08
Either material temperature control makes sense for you, or it doesn't. It's that simple.

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