



TOV viscometer system focus

TOV System and Lab Correlation (CP Application)

“I calibrated the TOV to match the Lab results, but now the TOV has “drifted” and isn’t matching the Lab result. There must be a problem with the TOV.”

The TOV Probe does not “drift”. Drift is a perceived problem that this Focus sheet will address what it really is and how to solve it.

Viscosity results will change over time in the process. In the above statement, the customer believes that the viscosity has not changed in the process, yet the TOV has changed. In these cases, this is a symptom of another issue whether in the process itself, other process equipment, TOV Electronics, the Lab, or in the correlation of the TOV to the Lab results.

Lab and TOV Correlation

The most common problem is in the Lab:

- Inconsistent results due to human error.
- Variations in the dilute solutions.
- Poor and inconsistent mixing of the product.
- The time lag between the TOV reading and the Lab must be accounted for during the correlation.

In the lab, error is unavoidable. The procedures, evaluations and abilities will be different from one technician to another. However, mistakes made in the lab are, it is still a very important measurement. Results can be improved by using multi-sample techniques, but there is always some error in Lab results.

Typically, the TOV is correlated to match the lab results. To do this:

1. Temperature Compensation must be set
2. Pressure Compensation must be set
3. Coarse Zero must be set.

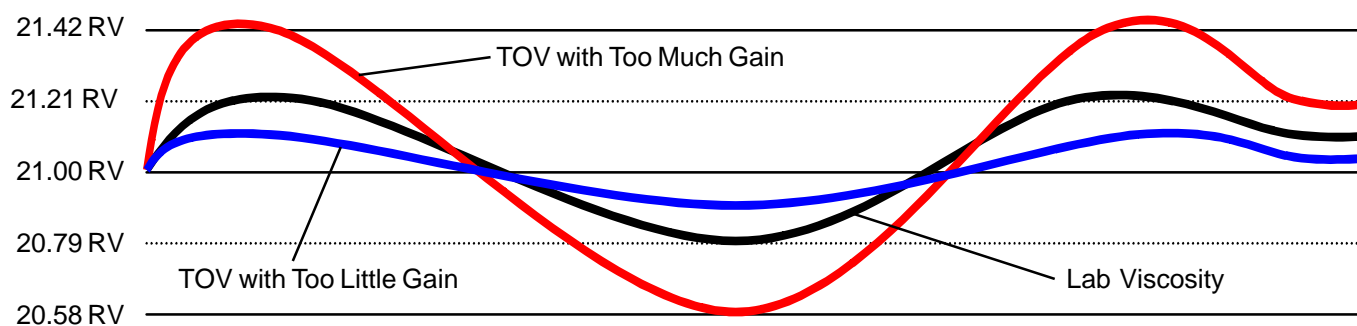


Coarse Zero Changes
Charting Level Only



Gain changes
the rate of
change of the
TOV signal

4. The Gain must be CORRECTLY set.



- Lab Viscosity
- TOV Viscosity on the DCS with Too Much Gain, the TOV result is too high compared to the Lab Viscosity
- TOV Viscosity on the DCS with Too little Gain, the TOV result is too low compared to the Lab Viscosity

- If there is too much GAIN set on the TOV, over time the TOV will change too much compared to the Lab results. When a sample is taken later, the TOV results will not match the lab result even though the viscosity may not have changed. This is not “drift”....it is poor correlation.

- If there is too little GAIN set on the TOV, over time the TOV will change too little compared to the Lab results. When a sample is taken later, the TOV results will not match the lab result even though the viscosity may not have changed. This is not “drift”....it is poor correlation.

The Electronics

Over time, electronic parts can lose reliability. Many Transducers have been in operation for 10, 15, 20, or more years. With age comes more susceptibility to:

- Board Component failure.
- Power Supply degradation.
- Old and worn wiring.
- Poor grounding.
- Improper wiring.

TOVM UPGRADE features:

Ø New In-line Probe Tests:

- T ½ (probe's functionality)
- Frequency
- Count (probe's reliability)

Ø New Built-in Simulator feature

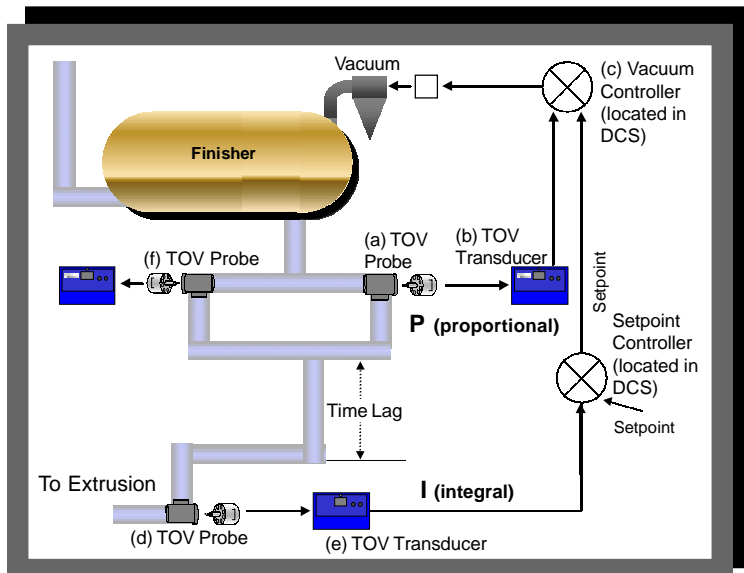
Ø New Microprocessor features.

Ø New Push Button Automatic Compensating Temperature Balance

Ø Updated Power Supplies with better reliability

Ø New 15-V Power Supply Board (in J14 Slot)

Ø Upgraded components providing even more reliability and accuracy



This process illustration is a sample portion of a typical continuous polycondensation process (CP) from the final stages of polymerization to just before extrusion.

The Process

Sometimes the change is a real process viscosity change. The TOV is very sensitive to viscosity changes... even more sensitive than lab results. How is this so?

Lab results are often inaccurate... human interaction is needed. The TOV is an instrument... little human interaction is needed and once set, the TOV operates on its own. Sometimes the process viscosity may change, but the lab will not be sensitive enough to show this change while the TOV is sensitive enough to measure this change. The result... the TOV will not match the incorrect lab results.

As process lines age, equipment may also begin to fail. The TOV is sensitive enough to detect these failures. The Probe has even been used to diagnose problems with gears, pumps, pipeline vibrations, and other failures of process equipment. Sometimes these failures appear in TOV readings, making the TOV a valuable troubleshooting tool in the process.

Solution: Maintaining all process equipment will aid TOV results. By reducing failures of gears, pumps, etc... the TOV will operate without having to be used as a diagnosis tool.

Possible Sources

1. Correlation/Calibration
2. Process Equipment
3. TOV Electronics
4. Wiring
5. Lab
6. Actual Process

Possible Solutions

1. Correlating the TOV and Lab correctly
2. Upgrade TOV Electronics
3. Replace Old Wiring
4. Improve Lab Procedures
5. Maintain Process Equipment

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