



UV Measurement and Process Control Instruments

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Subject: Why Measure UV?

*"Anything that you can measure, you have a better chance of controlling.
Things that you do not measure become the cause of mysterious problems"*
Larry Goldberg-Beta Industries

Measuring UV gives you a better chance of controlling and preventing it from becoming a mysterious problem. Mysterious problems cost **Money** and **Time**.

With UV control:

Money savings are realized in:

- Confirmation of UV conditions prior to starting a production run. This leads to less waste during set up
- Increased throughput and reduced scrap during production runs
- Bulb/LED life is based on actual UV output and not an hour meter. Use the same bulb if it performing as needed and/or replace a bulb if it prematurely fails

Time savings are realized in:

- Reduce the time during set up or first article inspection
- Schedule preventive maintenance as conditions change versus when it breaks
- Effective targeted maintenance approach versus a trial and error shotgun approach
- Reduced communication time both internally and between your suppliers

UV measurements fall into two categories:

Laboratory Measurements

Used to establish and optimize the needed UV exposure (Process Window). The work done here allows the duplication of the appropriate UV exposure required for "cure" in production

Production Monitoring

Used to verify that the needed UV exposure is maintained within predetermined limits (Process Window)

For Process Control

- A UV radiometer is an important part of maintaining the process window
- Using a radiometer to make UV measurements without an established process window will not lead to process control
- Waiting for your coating supplier to take a reading with their UV radiometer every two-three months or having one sit in a locked cabinet in the production manager's office will not establish process control.
- Waiting until you have a curing problem instead of trying to establish control when things are working is not process control

- Understand what the radiometer 'numbers' along with several other variables mean to your individual system and process
- There are several variables that you need to monitor, maintain and document in addition to 'watts' and 'joules'
- Some of the variables have 'numbers' that can be attached to their values
- Others require confirmation that they have not changed over time for a particular set-up
- Evaluate which variables need to be monitored in your process and system
- Decide who and how you will track the readings

When should I start measuring UV?

In an ideal world, measuring would start when the process is established as it takes work and time. The process is an investment and establishes a solid foundation that will pay you back down the road when things are not working. Operator training and procedure documentation should work to help you maintain your process window.

In the real world, measuring should start as soon as possible.

How often should I measure the UV?

By the job? Hour? Shift? Day? There is no set or easy answer.

- Evaluate the factors below to determine how frequent you should measure:
 - The type of product being produced and the liability if it is not cured properly?
 - Are you curing a cardiac catheter or a yard sign?
 - The value and process speed of the material that you are running through your process
 - What is your dollar exposure if an entire shift of product needs to be scrapped?
 - Are you running in feet per minute or hundreds of feet per minute?
- How well do you know your process?
- How well do you know your equipment? How stable is it?
- Evaluate the manufacturing environment. Is your application in a medical grade clean room with operators in gowns or do you use UV for wood flooring with sanding operations?
- How well is your staff trained?
- What documentation requirements do you have from your customers?
- Let the answers to the questions above and the information that you collect about your process dictate the frequency of readings.
- It is much easier to collect more readings at first to establish a baseline with the idea that you can always back off later in the frequency of readings after you look for trends in the data.