Having Fun with SPC Using JMP® Scripting Language

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Introduction

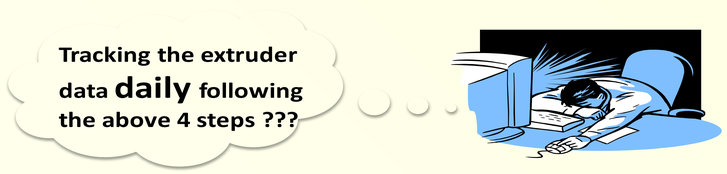
- Statistical Process Control (SPC) is widely used at The Dow Chemical Company to investigate the process stability.
- JMP scripts are utilized to automate the statistical monitoring process.
- JMP scripts significantly reduce the data analysis time.

Example 1 Tracking Extruder Data

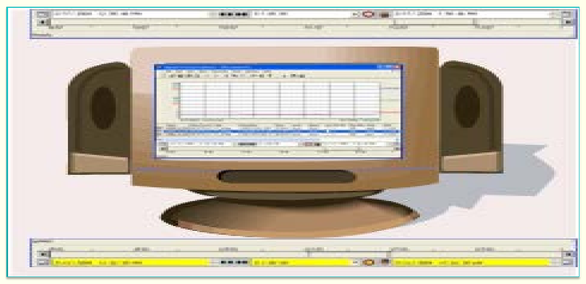
Background

- Aspen InforPlus. 21 ® (IP.21) was used to collect and store extrusion process data in a manufacturing plant at The Dow Chemical Company.
- The process data was tracked daily because the product quality is strongly dependent on the deformation during extrusion.

IP.21 Database → **Import Data into JMP** → **Data Management** → **Data Visualization**

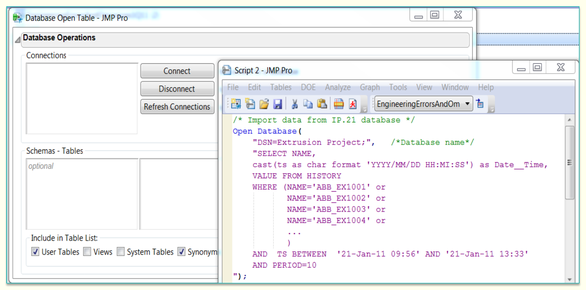


JMP Script Workflow



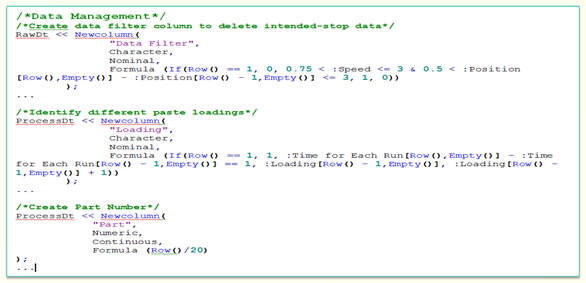
Step 1 : InfoPlus.21 Data Base

- **Collect and store process data**
- **IP.21 tags used as data base storage references**



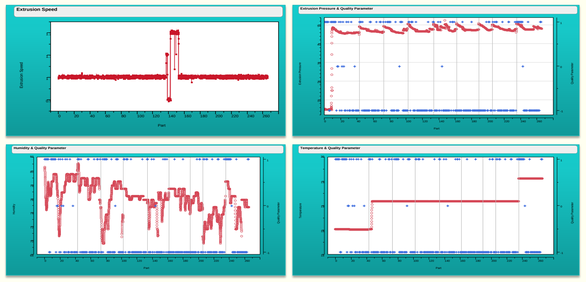
Step 2: Import Data into JMP

- **Connect to IP.21 database**
- **Select key process variables**
- **Directly import data into JMP**



Step 3: Data Management

- **Filter out intended-stop data**
- **Identify different batch loadings**
- **Create part numbers**



Step 4: Data Visualization

- **Monitor extrusion speed w/ run charts**
- **Investigate correlations by overlay plots**

The JMP script developed significantly reduced the analysis time from 2 hours to 15 minutes daily.

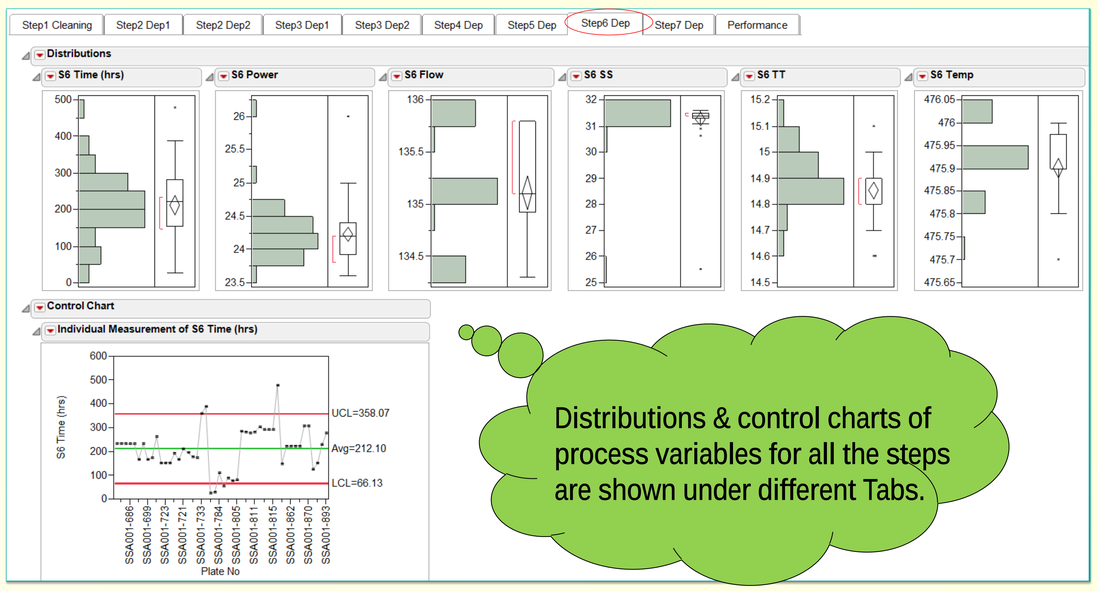
Example 2 Monitor Multi-Step Process Using Tab Box

Background

- A complex manufacturing process at The Dow Chemical Company includes seven steps with at least 10 process variables in each step.
- The process needs to be frequently monitored to ensure control.

Multi-Step Process

Advantage of Tab Box



The Tab Box scripting logic allows for simultaneous viewing of over a hundred variables for quick identification of a sudden change or problem anywhere in the multi-step process.

Conclusion

- Monitoring manufacturing processes is often long-term, on-going and requires repeated work.
- JMP Scripting Language is used to automate the SPC process, thus significantly reducing the analysis time.
- Statistical graphics provide a better understanding of variation in the process.