Using AVEVA™ PI Vision™ to display a profile view of a sheet

Presented by: Marc Côté & Dominique St-Pierre Boucher
Kruger used AVEVA™ PI Vision™ to display the profile view of a sheet

**Challenge**

- Create a real-time profile view where limits adjust automatically with the current product
- Use out of the box AVEVA™ PI System™ functionalities we had (AVEVA PI Vision and AVEVA PI Server asset framework)
- Highlight zones of the sheet with out-of-spec properties
- Link limits to our master system. **No duplication.**

**Solution**

- AVEVA PI Vision to display the profile with color coding for challenging zones
- AVEVA PI Server asset framework to order the data and to link limits from our master system on grade changes
- AVEVA PI System Builder to deploy new profiles
• Introduction
• Business challenge
• What is a profile
• Implementation
  o Connection to an external database for limits
  o Setup AVEVA PI Server asset framework
  o Create the profile in PI Vision
• Final result
• Conclusion
• Questions
Introduction

Kruger: We turn renewable resources into sustainable, high-quality essentials made for everyday life

Sectors related to this presentation

- Private holding
- 10 Sectors
- 19 manufacturing and production operations
- 5000 employees
- +115 years of history
- 42 Renewable energy power plants

Tissue Products

We make best-selling brands for consumers and businesses across Canada and the U.S.A.

Containerboard

Kruger manufactures 100% recycled linerboard and innovative containerboard products.

Publication Papers

Kruger is a leading manufacturer of newsprint, coated paper and a variety of specialty grades.

Specialty Papers

Kruger is constantly developing various grades of eco-friendly specialty papers such as OGR, C1S and.
Business challenge

• Multiple solutions are used to display/analyze a sheet profile
• Solution must be secure and accessible remotely
• No client must be installed
• No or low investment
• Limits must follow the grade changes
• Limits are coming from an external system (no data entry duplication)
• Profile problems must be highlighted
What is a profile

• A profile is an analysis of a property of a sheet transversely
• As the sheet is produced, a scanner takes measures on the width of sheet resulting in an array of measures.
• A scanner can measure multiple properties like caliper, humidity, dry weight, thickness, etc.
• Profile displays give a visual real-time representation of the health of the running product.
• PI-Profile is a retired AVEVA tool we used to display profiles
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Implementation

Connection to an external database for limits

• Create the query to retrieve the limits per grade
  o At least 3 columns are required
    ▪ Grade: product grade or ID
    ▪ Lo: The lowest value before considering a value as out of specs
    ▪ Hi: The highest value before considering a value as out of specs
    ▪ (Optional) Profile: The name of the profile. We created 1 query per profile.

• In AVEVA PI Server asset framework
  o Create a table connection to your limits
  o Create a table to query your limits
Implementation

Connection to an external database for limits
Implementation

Setup AVEVA PI Server asset framework

• Create an object to store all the series of values of your profile’s positions

• Create a series of attribute to hold the grade at every 5 min for the last 60 min.
  o Each grade must set the child attributes Minimum, Maximum, Lo and Hi limits

• Create multiple series of attributes to hold the profile values
  o 1 series per 5 minutes for the last 60 minutes
  o The current values series only must set the limits Minimum, Maximum, Lo and Hi limits for each value of the series.
Implementation

Setup AVEVA PI Server asset framework (Next)

- Create multiple series of attributes to hold the profile qualities
  - 1 series per 5 minutes for the last 60 minutes
  - 0 = bad, 1 = good = value is between Lo and Hi values
- Lo and Hi values are coming from the table created previously
- Minimum values are set to 10% of the span Hi-Lo below Lo.
- Maximum values are set to 10% of the span Hi-Lo over Hi.

Note: Minimum and Maximum are used to automatically define the profile display range of values.

Note 2: 10% fits our needs and ease the development of the display. You can change it with minor modifications.
Implementation

Setup AVEVA PI Server asset framework (Trick)

- Use attribute names that can be ordered for your Quality and Value attributes (Ex. Profile Pos 001, Profile Pos 002, etc.)
- Create the first attributes of each series then use PI Builder in Excel to create/configure all the other attributes using formulas.
- Series of attributes are categorized to group them together

Note: Once your profile asset is good, create a template from it. Use PI Builder to configure your new asset.
Implementation

Setup AEVA PI Server asset framework
Implementation

Setup AVEVA PI Server asset framework
Implementation

Setup AVEVA PI Server asset framework

\[ H = Hi; L = Lo; [L - ((H-L) \times 0.1)] \]
Implementation

Setup AVEVA PI Server asset framework
Implementation

Create the profile in AVEVA PI Vision

- Press the “New Display” button.
Implementation

Create the profile in AVEVA PI Vision

• Activate the “snap to grid” feature and adjust your size to the minimum
Implementation

Create the profile in AVEVA PI Vision

- Zoom your canvas by pressing twice the button.
Implementation

Create the profile in AVEVA PI Vision
• The height of the main profile needs to be a multiple of 12. Create a box that is 12 units high and repeat it 5 times.
Implementation

Create the profile in AVEVA PI Vision

- Search for profile’s current value category and add it to the screen has a Bar Chart. Resize it to the height of your boxes created previously. Delete the boxes.
Implementation

Create the profile in AVEVA PI Vision
- Show the properties of the Bar Chart. Change the grid style to “Bands” and uncheck all the visibility boxes.
Implementation

Create the profile in AVEVA PI Vision

- Place horizontal lines at 1/12 of the top and 1/12 of the bottom of the Bar Chart. Select a color, a line weight and a dash style.
Implementation

Create the profile in AVEVA PI Vision

- Browse to the “Current Grade” attribute. Place its Hi and Lo child attributes at the end of the horizontal lines. Set the label and uncheck “Units” and “Timestamp”.

[Diagram showing steps 1 to 4 for implementing the profile]
Create the profile in AVEVA PI Vision

- Browse to the “Profile Quality Position 001” attribute and add it to the screen has a Bar Chart below the main Bar Chart. Resize it to the same width as the main Bar Chart but only 2 units high. Place a label displaying “*” to a left of the Bar Chart.
Implementation

Create the profile in AVEVA PI Vision

- Open the Bar Chart settings. Set the foreground color to the color of the display’s background. Uncheck all the visibility boxes and change the scale to 0 to -1.
Implementation

Create the profile in AVEVA PI Vision

- Open the Bar Chart Multi-State settings. Remove all entries. Set “Bad Data” to Green and the range between 0 and -1 to Red.
Implementation

Create the profile in AVEVA PI Vision

- Copy the label and the Bar Chart so you get a total of 13. Change the labels to display the 5 minutes steps between each Bar Chart.
Implementation

Create the profile in AVEVA PI Vision

- For each 13 Bar Chart, drag the corresponding Quality category on the symbol and open the setting to remove the first attribute which is the one selected prior the copy.
Final Result
Future improvement
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**Solution**
- AVEVA PI Vision to display the profile with color coding for challenging zones.
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- PI Builder to deploy new profiles.

**Results**
- We can keep a central version of our limits – Less maintenance, less errors.
- Real-time health of our production – more uniform quality, less rejects.
- Color coding helps to easily isolate the issues – quicker response from the operators.
- We can easily go back in time for deeper analysis – process improvement.
Conclusion

Pros

• Displays are more accessible and from anywhere
• People reacts more quickly to visual problems – gain in quality
• Great tool for real-time troubleshooting
• Add new profile within 15 minutes (using an Excel tool with PI Builder 😊)
• Minimal investments were required (time)

Cons

• A bit slow on start (~10 sec) – better server hardware will improve it
• A recent version of AVEVA PI Vision Server is required. (Tested on 3.7.1)
• Not all capabilities of AVEVA PI-Profile are present – Key functions are there
Marc Côté
Data Acquisition Architect
• Kruger inc.
• marc.cote4@kruger.com

Dominique St-Pierre Boucher
Senior Director, Corporate Sector & OT-IT
• Kruger inc.
• dominique.st-pierreboucher@kruger.com
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