



AI in Chemical Manufacturing

Building Data Foundations for Faster Decisions

Charles Ng, Business Development Support Manager, dataPARC

dataPARC

1980

Development of historians and plant information systems



1997

Founded by a group of chemical engineers with decades of plant operations experience



Today

Global presence across industries.



Teams across the globe rely on dataPARC



Headquarters in Washington State, USA



Part of the Voith Group



Focus on Real-Time Visualization, Analytics & Monitoring

AI is Here. Now What?

The gap between consumer AI & AI in chemical manufacturing

AI has exploded into daily life

- Over the past two years, AI tools have been integrated into our daily lives.
- ChatGPT, Claude, Copilot, even Googling results in an AI answer.
- Writing emails, answer questions, suggesting the best restaurant.

It's natural that manufacturers are asking:

“How do we use this in our plant?”



AI Mode ▾ All Images Videos News More ▾



best places to eat near dusit thani pattaya

The best places to eat near the [Dusit Thani Pattaya](#) include top-tier resort dining rooms, lively beachfront grills, and panoramic rooftop bars. [D Dusit Hotels & Resorts](#)

Top In-Resort Dining

You do not have to leave the property to experience some of the best food in the area: [D Dusit Hotels & Resorts](#)

- **The Bay:** An elegant Mediterranean restaurant offering a romantic, open-air setting right by the Gulf of Thailand. It is highly praised for its sunset views and authentic, freshly made wood-fired pizzas.
- **The Cascade Restaurant:** Located right by the main reception, this vibrant eatery overlooks a lush atrium garden and an indoor waterfall. It serves a vast international menu alongside regional Thai specialties, including a highly recommended weekend [Seafood & Carvery Night Buffet](#). [P](#)

Vibrant Beachfront & Rooftop Spots (Walking Distance)

- [The Collective Pattaya](#): A stylish beachfront smokehouse and BBQ joint just a short walk down Beach Road. It is famous for its tender smoked beef brisket, pork ribs, craft pizza, and Bangkok's popular *Guss Damn Good* ice cream.
- [Skybar Summer Club](#): Perched atop the nearby Siam@Siam Design Hotel, this is one of the highest rooftop destinations in central Pattaya. It provides a music-driven, social atmosphere (ages 16+) with incredible 360-degree sunset views, creative cocktails, and solid bistro bites.
- **Indiagate Restaurant Pattaya Beach Road:** A highly rated coastal spot that has been serving authentic North Indian cuisine, aromatic curries, and comforting street chaat

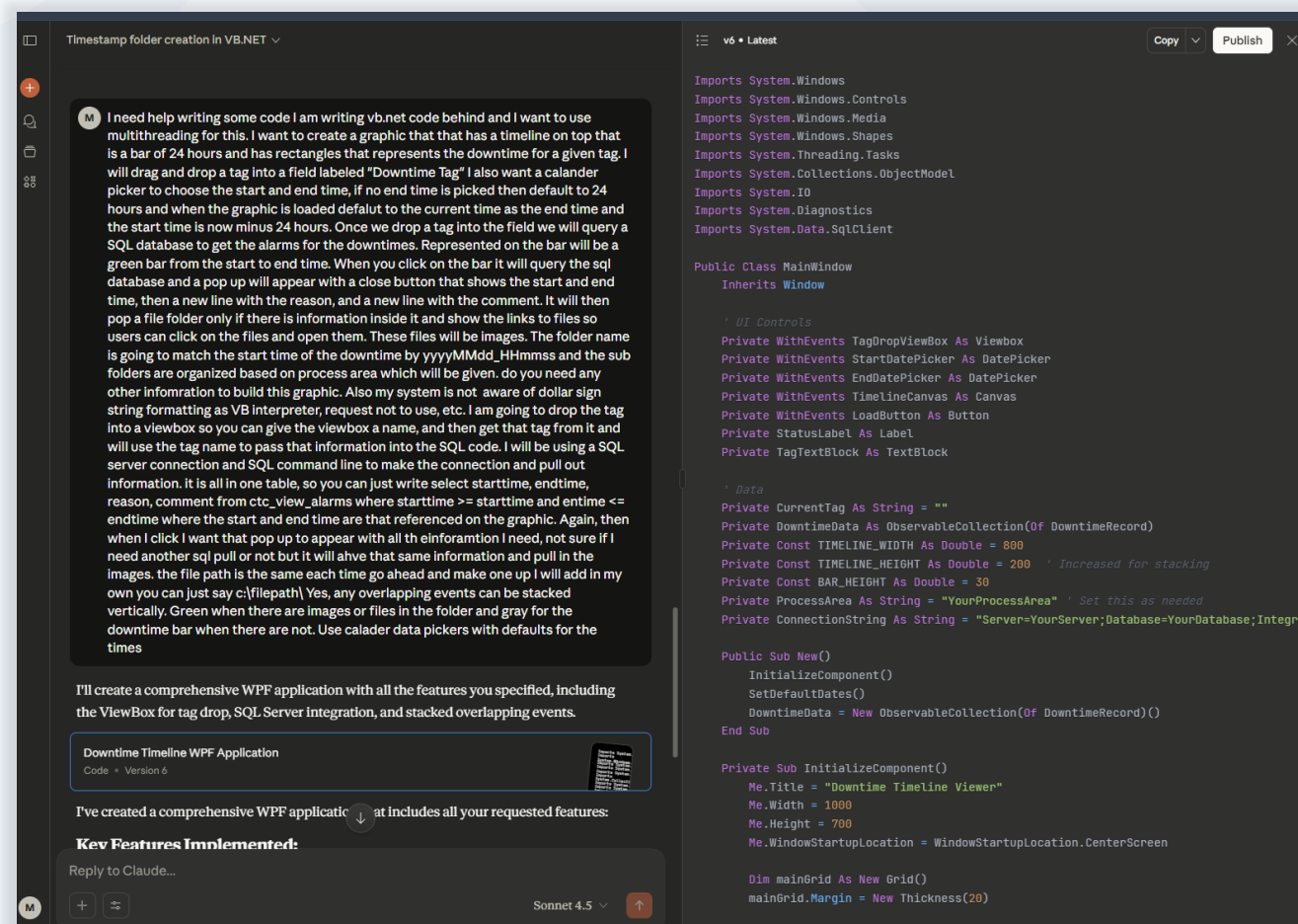
Ask anything



Some of You Already Have Begun!

Engineers are already using general-purpose AI tools sped up for their workflows:

- Copying and pasting into Chats
- Going beyond just writing emails or suggesting software
 - Writing code for calculations
 - Creating Excel formulas
 - Creating custom displays





Timestamp folder creation in VB.NET ▾



M

I need help writing some code I am writing vb.net code behind and I want to use multithreading for this. I want to create a graphic that has a timeline on top that is a bar of 24 hours and has rectangles that represent the downtime for a given tag. I will drag and drop a tag into a field labeled "Downtime Tag" I also want a calendar picker to choose the start and end time, if no end time is picked then default to 24 hours and when the graphic is loaded default to the current time as the end time and the start time is now minus 24 hours. Once we drop a tag into the field we will query a SQL database to get the alarms for the downtimes. Represented on the bar will be a green bar from the start to end time. When you click on the bar it will query the SQL database and a pop up will appear with a close button that shows the start and end time, then a new line with the reason, and a new line with the comment. It will then pop a file folder only if there is information inside it and show the links to files so users can click on the files and open them. These files will be images. The folder name is going to match the start time of the downtime by yyyyMMdd_HH:mm:ss and the sub folders are organized based on process area which will be given. do you need any other information to build this graphic. Also my system is not aware of dollar sign string formatting as VB interpreter, request not to use, etc. I am going to drop the tag into a viewbox so you can give the viewbox a name, and then get that tag from it and will use the tag name to pass that information into the SQL code. I will be using a SQL server connection and SQL command line to make the connection and pull out information. it is all in one table, so you can just write select starttime, endtime, reason, comment from ctc_view_alarms where starttime >= starttime and endtime <= endtime where the start and end time are that referenced on the graphic. Again, then when I click I want that pop up to appear with all the information I need, not sure if I need another SQL pull or not but it will have that same information and pull in the images. the file path is the same each time go ahead and make one up I will add in my own you can just say c:\filepath\ Yes, any overlapping events can be stacked vertically. Green when there are images or files in the folder and gray for the downtime bar when there are not. Use calendar data pickers with defaults for the times

I'll create a comprehensive WPF application with all the features you specified, including the ViewBox for tag drop, SQL Server integration, and stacked overlapping events.

Downtime Timeline WPF Application

Code • Version 6



I've created a comprehensive WPF application that includes all your requested features:

Key Features Implemented:

Reply to Claude...

M



Sonnet 4.5 ▾



v6 • Latest

Copy ▾

Publish



```
Imports System.Windows
Imports System.Windows.Controls
Imports System.Windows.Media
Imports System.Windows.Shapes
Imports System.Threading.Tasks
Imports System.Collections.ObjectModel
Imports System.IO
Imports System.Diagnostics
Imports System.Data.SqlClient
```

```
Public Class MainWindow
    Inherits Window
```

```
    ' UI Controls
```

```
    Private WithEvents TagDropViewBox As Viewbox
    Private WithEvents StartDatePicker As DatePicker
    Private WithEvents EndDatePicker As DatePicker
    Private WithEvents TimelineCanvas As Canvas
    Private WithEvents LoadButton As Button
    Private StatusLabel As Label
    Private TagTextBlock As TextBlock
```

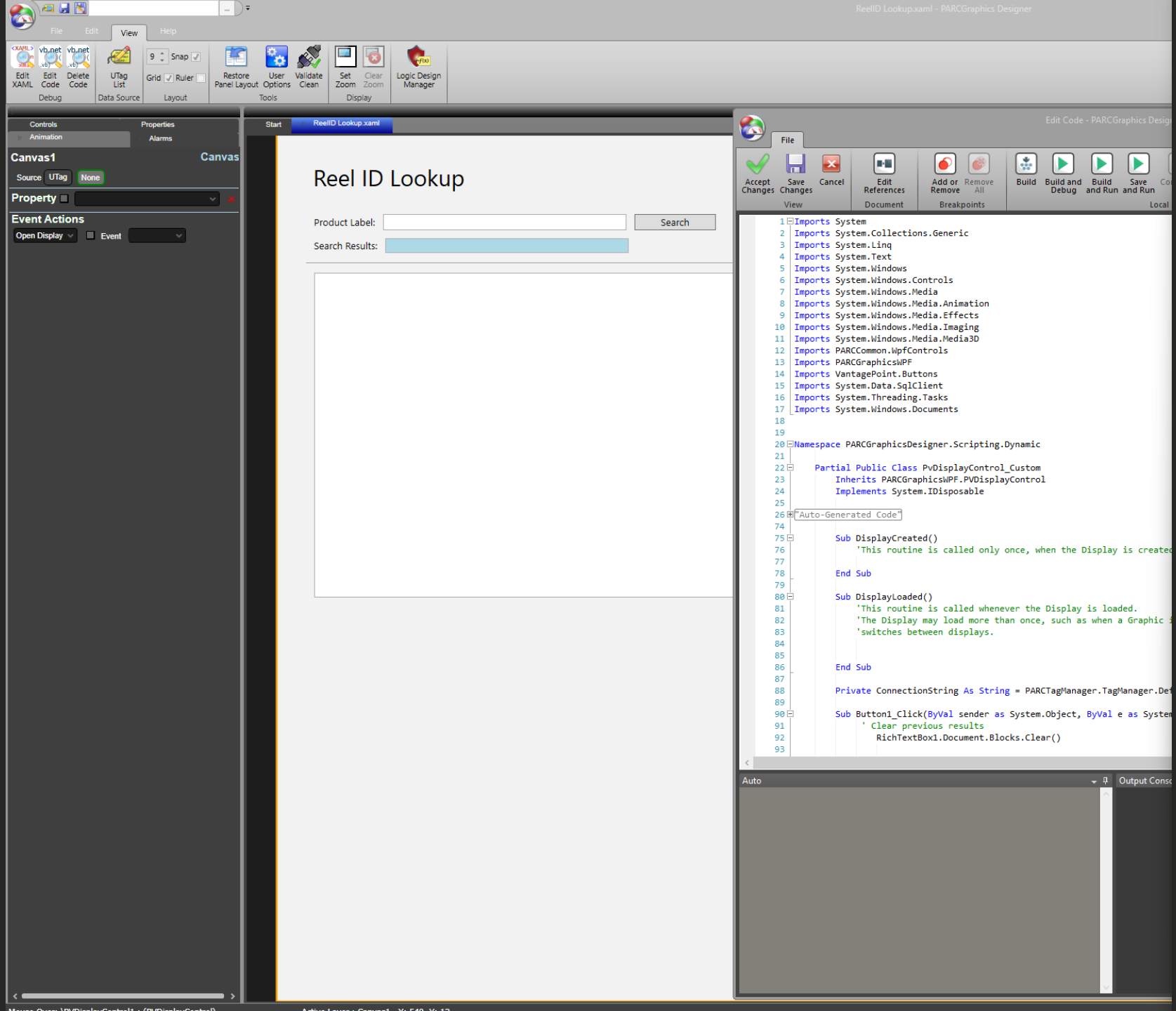
```
    ' Data
```

```
    Private CurrentTag As String = ""
    Private DowntimeData As ObservableCollection(Of DowntimeRecord)
    Private Const TIMELINE_WIDTH As Double = 800
    Private Const TIMELINE_HEIGHT As Double = 200 ' Increased for stacking
    Private Const BAR_HEIGHT As Double = 30
    Private ProcessArea As String = "YourProcessArea" ' Set this as needed
    Private ConnectionString As String = "Server=YourServer;Database=YourDatabase;Integra
```

```
Public Sub New()
    InitializeComponent()
    SetDefaultDates()
    DowntimeData = New ObservableCollection(Of DowntimeRecord)()
End Sub
```

```
Private Sub InitializeComponent()
    Me.Title = "Downtime Timeline Viewer"
    Me.Width = 1000
    Me.Height = 700
    Me.WindowStartupLocation = WindowStartupLocation.CenterScreen
```

```
Dim mainGrid As New Grid()
mainGrid.Margin = New Thickness(20)
```

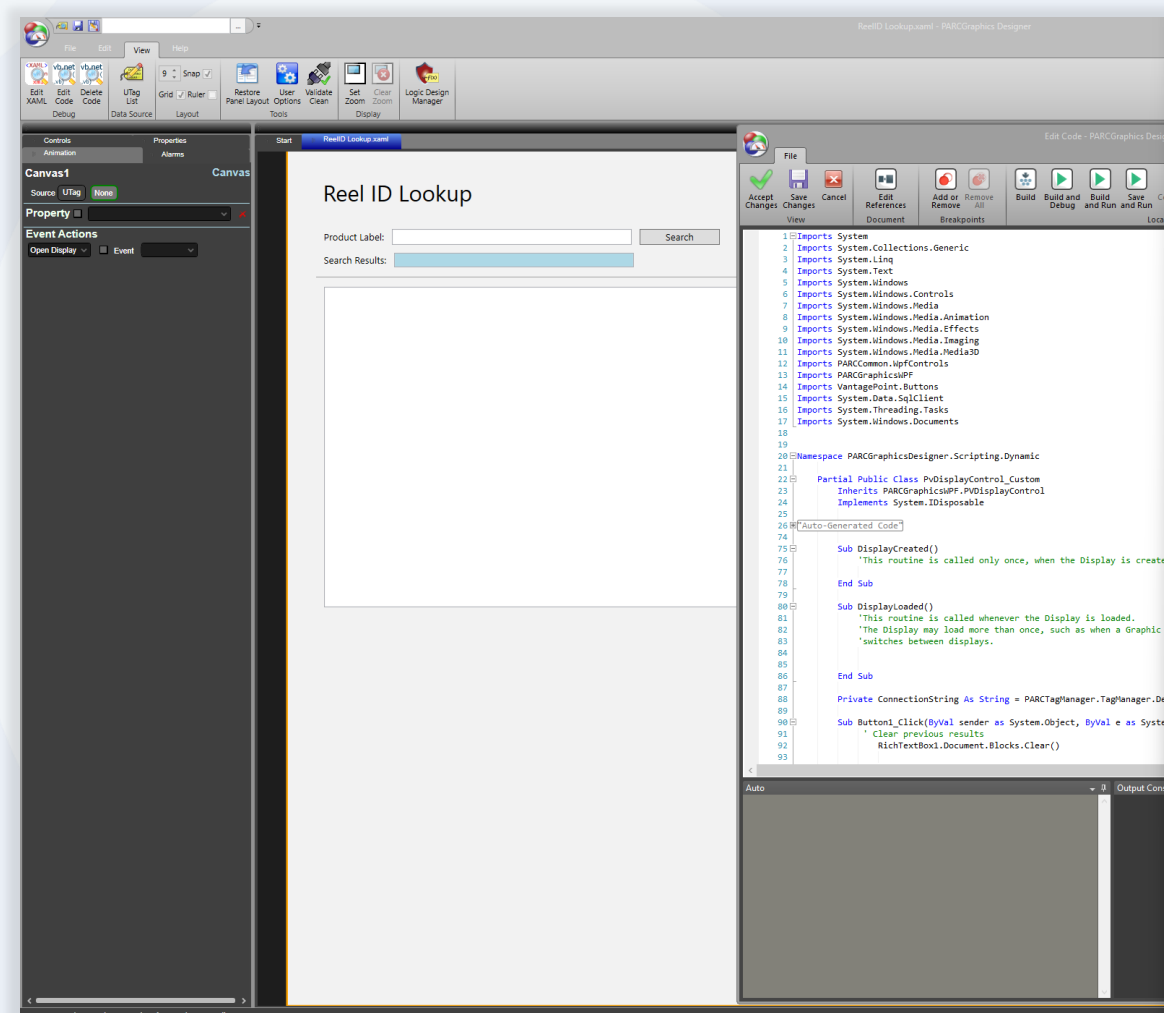


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So, what's missing?...



Results from AI, Graphic Created via Copy/Paste

AI Tools: From General to Purpose-Built

Available Now: General Purpose AI

- Work with exported plant data using tools like ChatGPT and Claude
- Write code, build visualizations, pull from APIs, analyze trends
- Low barrier to entry — if your data is accessible, you can start today
- ✗ No plant context — you re-explain your process every time
- ✗ No live data connection — always working from a stale export
- ✗ No guardrails, no citations, no audit trail
- ✗ Data you provide may be used for training new models

AI Tools: From General to Purpose-Built

The Next Step: Purpose-Built Industrial AI

- AI that understands your historian, your tags, your KPIs, your documentation
- Connected to your live data — no exporting, no copy-pasting
- Cites sources, references real data, verifiable answers
- Guardrails designed for industrial use — no hallucinated numbers on an operator's screen
- Your data stays yours

This is where the industry has been heading.

AI that understands the environment you work in every day.

What does AI Readiness Look Like?

The Readiness Gap

You can't just plug AI into a control system and expect magic.

AI needs a data foundation to work from – and most plants don't have one that's ready.

Common Reality

- ✗ Data trapped in siloed systems
- ✗ Tags with no context or naming standards
- ✗ Tribal knowledge in people's heads
- ✗ Manual troubleshooting workflows

AI-Ready State

- Centralized, unified data sources
- Contextualized, well-named tags
- KPIs and calculated tags in use daily
- Dashboards and tools people rely on

5 Pillars of an AI-Ready Data Foundation



Reliable Historian

High-performance data collection with no gaps



Centralized Data

Unified sources — SCADA, lab, MES, ERP



Contextualized Tags

Naming standards, metadata, asset hierarchy



Governance & Access

Role-based access, audit trails, traceability



Integration Ready

Open protocols — OPC UA, REST API, SQL

Each of these is something you should be building through normal operations – not a separate AI initiative.

Purpose-Built Industrial AI Examples

AI Integration with Your Data & System



Query Your Data

"Show me. Tell me."

Ask questions about your process data in plain language and get real answers grounded in your historian, trends, graphics, events, and alarms.



Build Faster

"Build me a dashboard."

Create and modify software graphics, trends, scripted tags, and reports through conversation. Work that took hours now takes minutes.



Instant Knowledge

"How do I configure this?"

Get answers from software documentation, plant SOPs, and manuals — with source citations. Onboard faster, troubleshoot without escalating.

Natural Language Access to your Operational Data

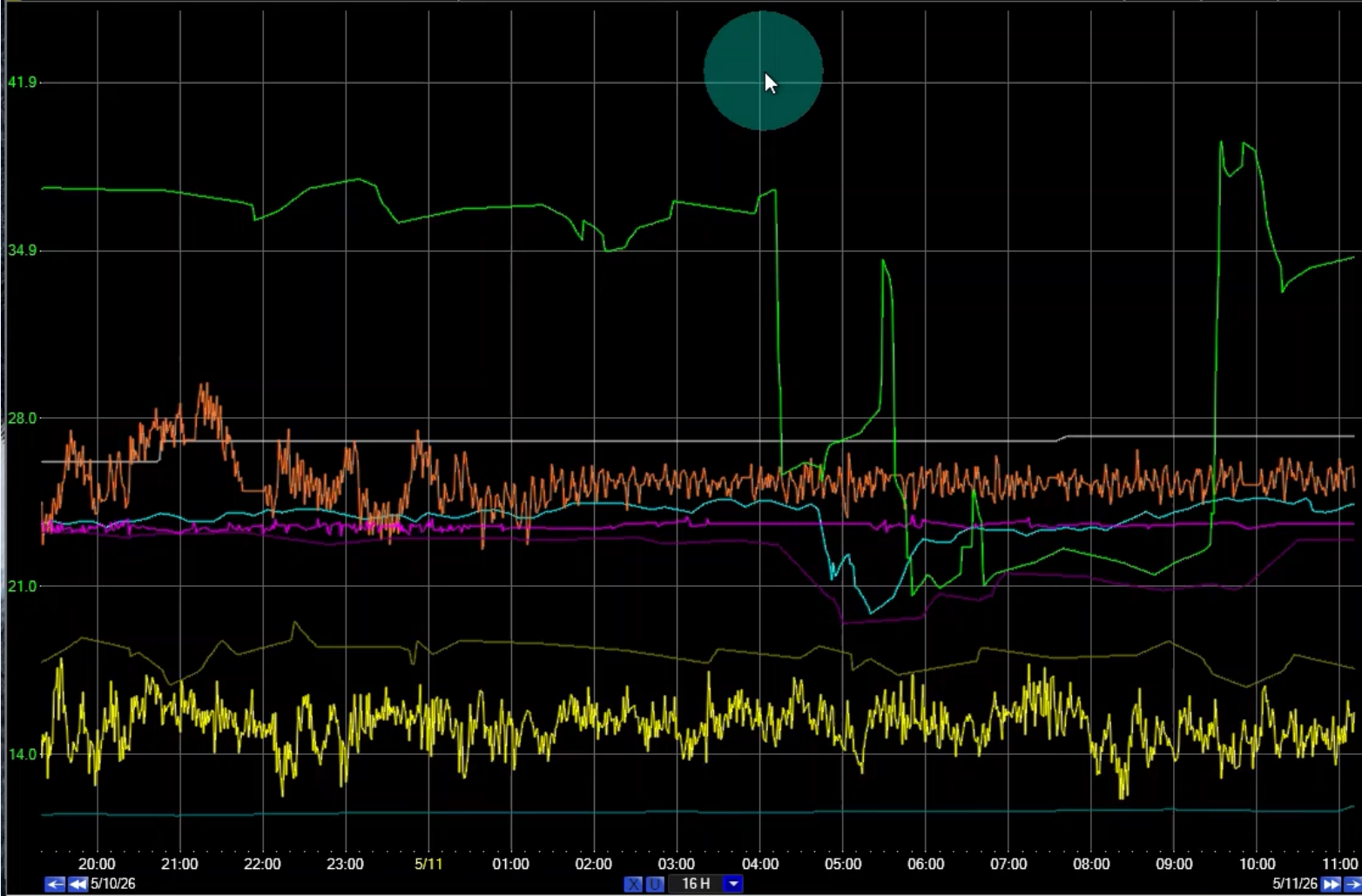
Engineers query process data conversationally. The AI retrieves trends, correlates events, and surfaces answers, grounded in your plant data.

"How does our catalyst regeneration frequency correlate with the ethylene yield in the steam cracker over the last 30 days? Break it down by naphtha feedstock source."

"We had a high benzene impurity reading in this morning's reformat sample. What reflux ratios and reboiler temperatures were present in the splitter column in the 4 hours before that sample was taken?"



Tag	Description	Min	Max	Current
61_19	#4 TG Load	10	44.9	34.7
61_1a	#3 Boiler UPPER OFA	0	250	97
61_2	#3 Boiler PRI AIR FLOW	250	500	291
61_22	125# Steam Temp	228	728	412
61_24	PM WE SupplyFan	500	1500	932
514fi233	N Silr LM Flow gpm	0	1000	411
514fi241	S Silr LM Flow gpm	0	1000	493
61_15	400# Steam Production	0	250	13
61_16	1500# Steam Production	500	1000	608



What can I help with?

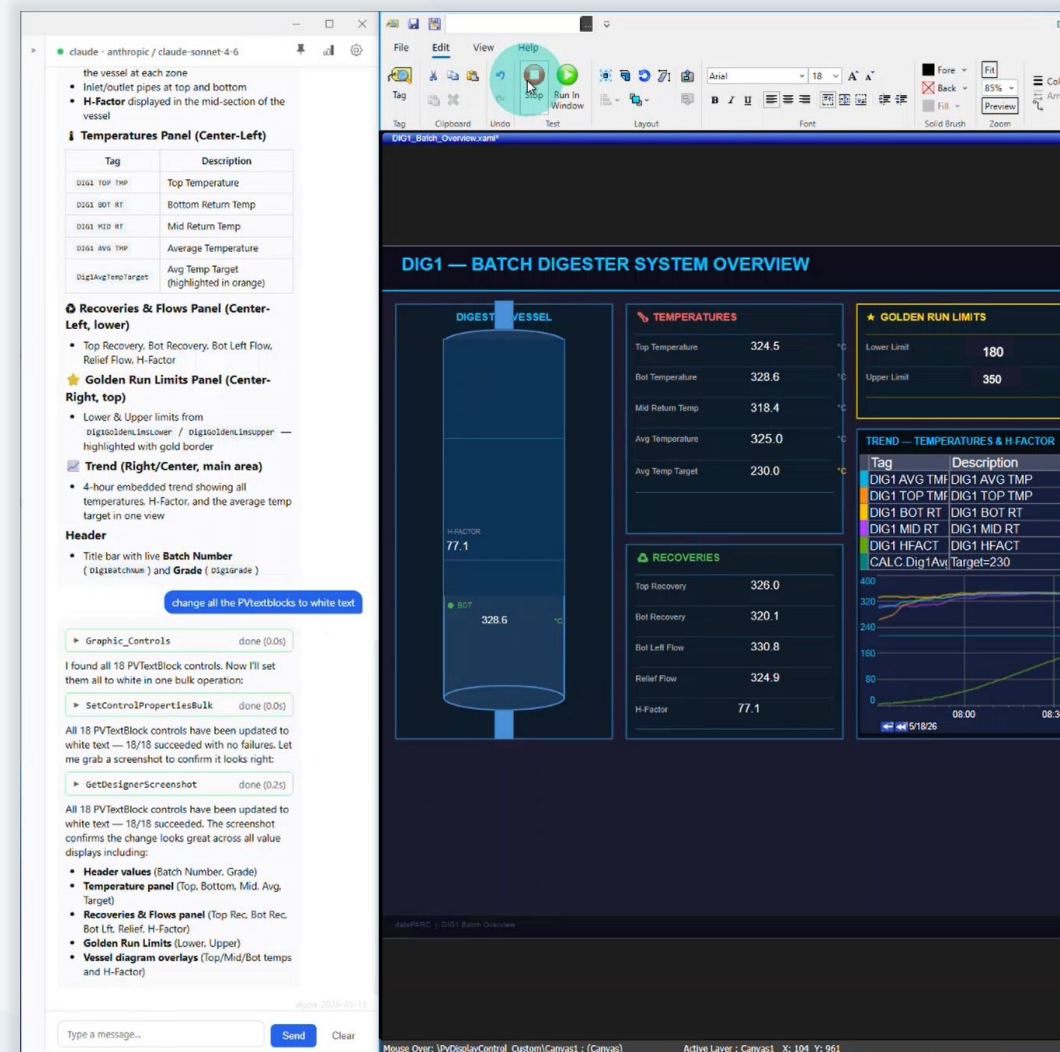
Type a message below to start a new conversation

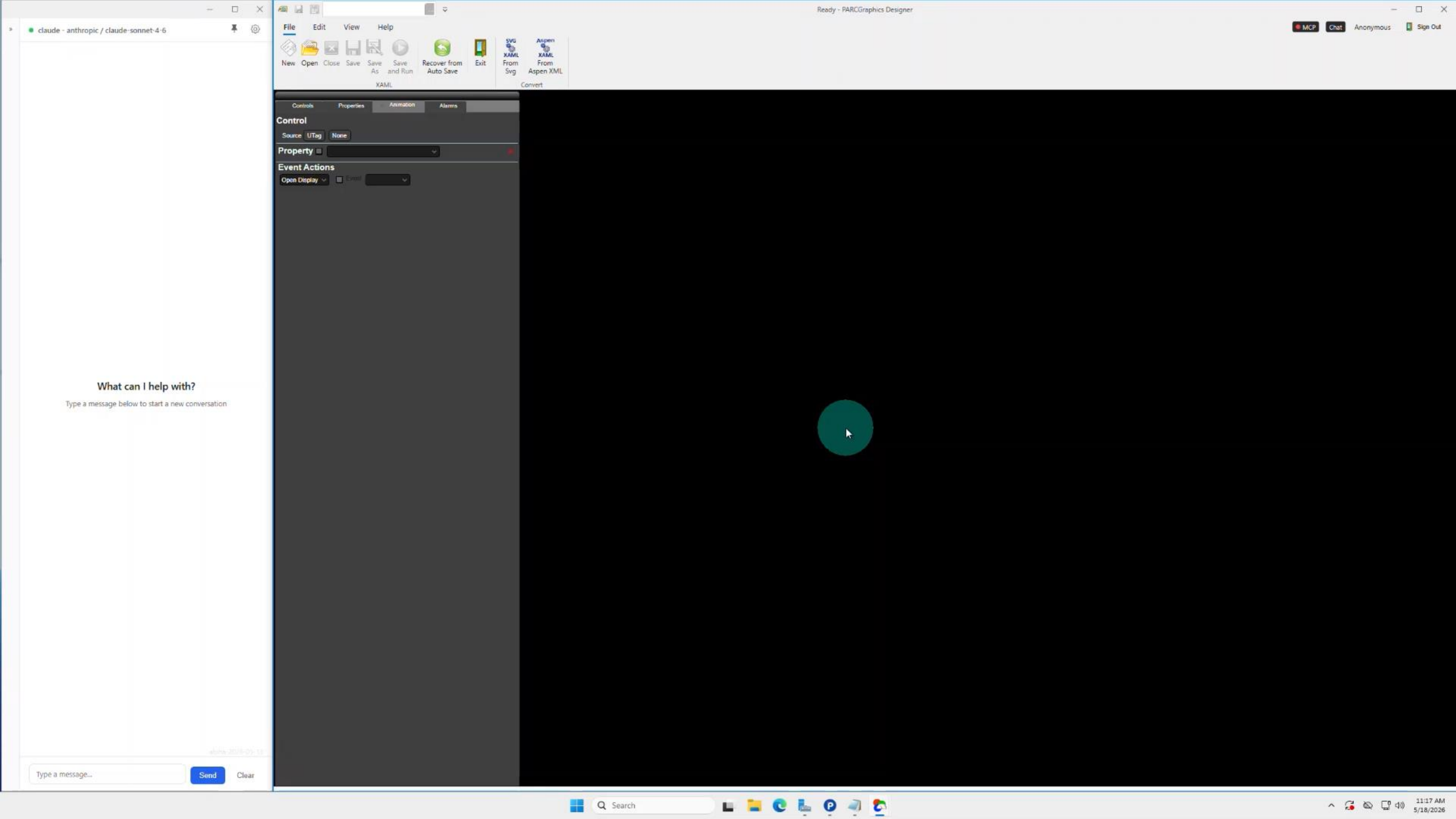
Create dashboards, graphics, and reports – conversationally.

Work that often takes hours can be done in minutes. The AI auto-creates multi-trend displays, graphics, alarm rules, and reports from natural language.

“Build me a dashboard for the Olefins Steam Cracker Reactor with coil outlet temperatures, steam-to-hydrocarbon ratio, and furnace draft pressure.”

“Generate an end-of-shift production report comparing today's mass balance and steam consumption against yesterday's target metrics.”





Your documentation, SOP's, and software knowledge – instantly accessible

“What quality and safety checks must be completed before transferring the cracked gas compressor condensate to the depropanizer feed tank?”

✓ **Grounded in your documentation**

Answers reference software manuals, help docs, FAQs, and your own plant SOPs — not generic internet content.

✓ **Source citations on every answer**

Every response includes confidence scoring and links to the specific document and section it came from.

✓ **Faster onboarding**

New staff ask questions against a rich knowledge base instead of waiting for a senior engineer.

AI For Everyone in Your Organization



Plant Floor

“What’s the current status of Unit 3?”

Ask instead of navigate. Get real-time answers without deep software training.



Engineering

“What caused the deviation at 2am?”

Root cause analysis in minutes. Build troubleshooting dashboards through conversation, not menus.



Quality & Lab

Are any of last night’s batches out of spec?”

Pull quality data and generate reports faster. Troubleshoot quality issues with AI-assisted analysis.



IT Operations

“Show connection status for all data sources”

Monitor system health conversationally. Reduce configuration time across sites.



Senior Management

“Show me reactor performance for this week’s batches against target.”

Get visibility without asking the engineer. Enterprise dashboards on demand.



Data Scientists & SMEs

“Build a PLS model for distillation column efficiency”

Accelerate modeling and advanced analytics. Apply best practices across sites.

Key Takeaways

1

AI success starts with your data foundation — not the AI model.

2

AI readiness isn't a separate project. It's a side effect of good operational data practice.

3

Purpose-built industrial AI is here — with guardrails, citations, and real-data grounding. AI that understands the environment you work in every day.

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Thank You!