

Empowering the Electric Utility Industry

How MathWorks support Grid Modernization, Technology Integration, and Resilience

Graham Dudgeon, PhD

**Principal Consultant Product Manager
Electrical Technology
MathWorks, Inc.**

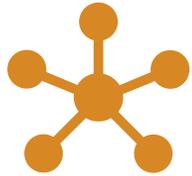
Jonathan LeSage, PhD

**Application Engineering Manager
Energy, Industrial Automation,
Medical Devices Industries
MathWorks, Inc.**

Mil Shastri

**Senior Application Engineer
Utilities & Energy Industries
MathWorks, Inc.**

Accelerating Market Trends for Electric Utilities



Grid Modernization

Decentralization and Distributed Energy Generation (DERs)
 Digital Transformation/Smart Grids
 Advanced Grid Analytics and Instrumentation (PMUs)



Integrating Transformative Technologies

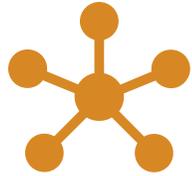
Renewable Energy Integration
 Energy Storage and Advancements in Battery Technology
 Increased Charging Infrastructure for Electric Vehicles (EVs)



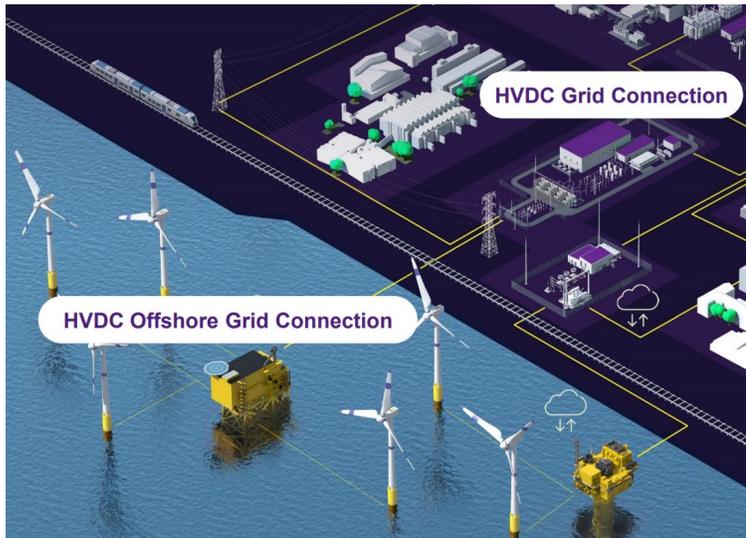
Addressing Increased Uncertainty

New Regulations and Policy Changes
 Cybersecurity and Grid Resilience
 Addressing Climate Uncertainty and Weatherization

Industry Leading the Charge in Transformative Change



Grid Modernization



[Siemens](#) designs complex software to enable efficient HVDC transmission at distance



Integrating Transformative Technologies

[Hydro Quebec/EVLO](#) leverage energy storage for remote communities



Addressing Increased Uncertainty



[Shanghai Electric](#) plans for DER Integration given weather and market uncertainty

MATLAB® & SIMULINK®



Our Products

MATLAB - Programming environment for large-scale data analysis, applied-AI for predictive maintenance and forecasting, and techno-economic analysis.

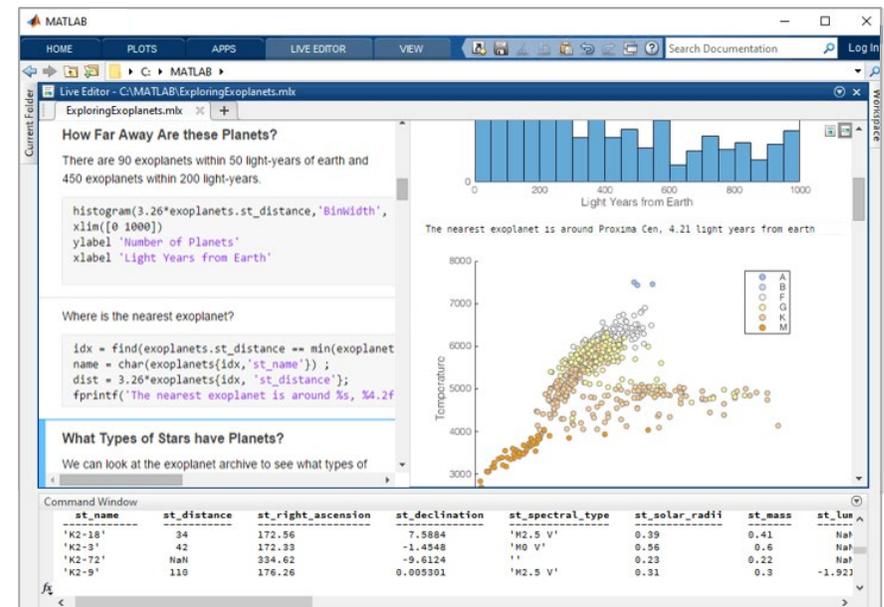
Simulink - Block diagram environment for simulation and Digital Twins of power systems, hardware-in-the-loop testing and model validation.

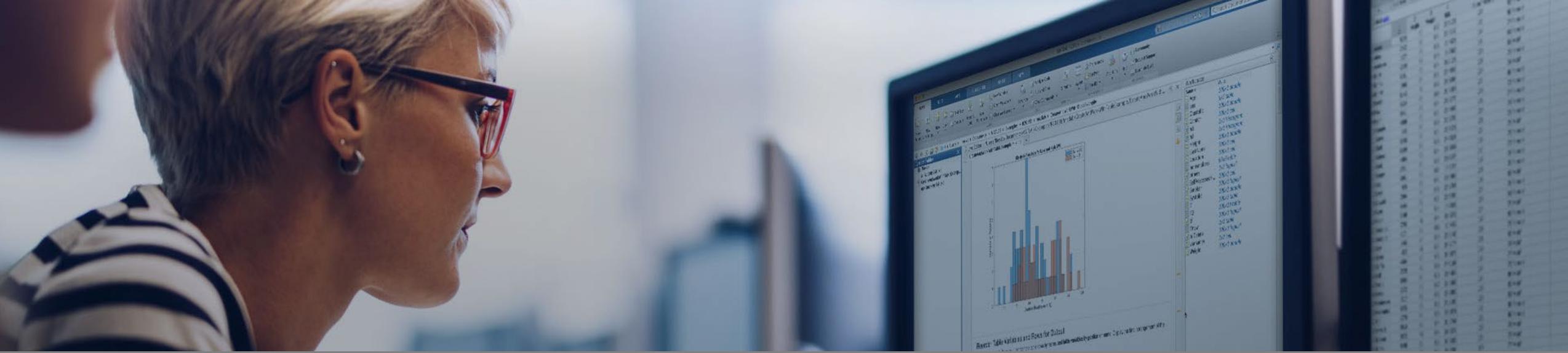
130+ add-on products for specialized tasks.

MATLAB

Computer Vision Toolbox

Simulink





Our Customers

Millions of engineers and scientists worldwide use MATLAB and Simulink.



5 million+

users in over 180 countries



100,000+

businesses, governments,
and universities



All of the top 10
automotive and
aerospace companies

Fortune: 2023 Global 500 auto companies
FlightGlobal: 2022 Top 100 aero companies by revenue*

*Excluding companies that are subject to embargos, sanctions, or other controls



Headquarters
Natick, MA USA

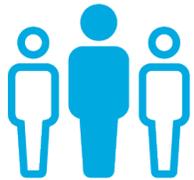
North America
United States

Europe
Finland
France
Germany
Ireland
Italy
Netherlands
Spain
Sweden
Switzerland
UK

Asia-Pacific
Australia
China
India
Japan
Korea



MathWorks Today



6,500+ staff
in 34 offices around
the world



\$1.7+ billion
in revenues

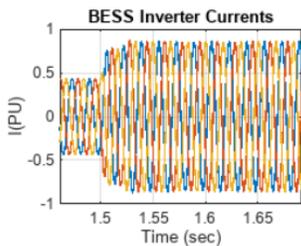
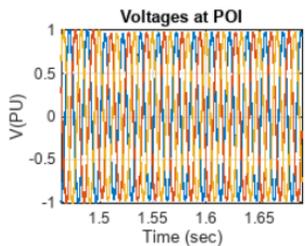
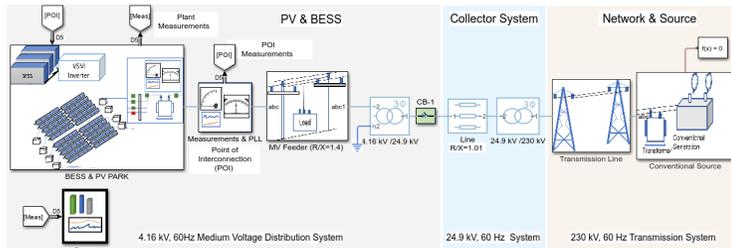


Privately held
and profitable every year

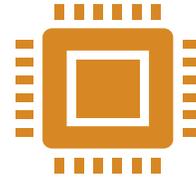
MathWorks supports Grid Modernization Initiatives



Distributed Generation (DERs) and Inverter-based Resources (IBRs)

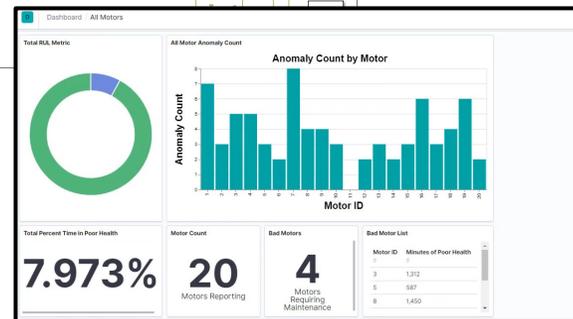
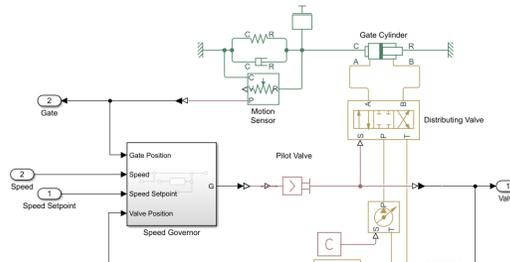


Large-scale Electromagnetic Transient (EMT) simulations for DER / IBR penetration studies

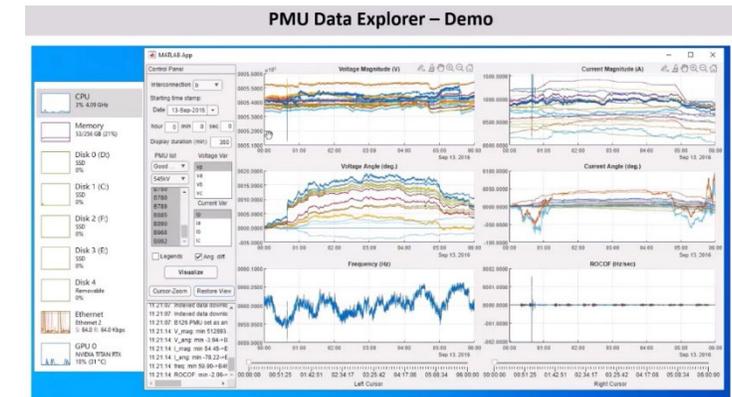


Smart Grid and Digital Twins

Hydro Quebec implements a Digital Twin for Predictive Maintenance using PI Server

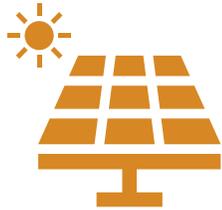


Synchrophasor and Advanced Grid Analytics

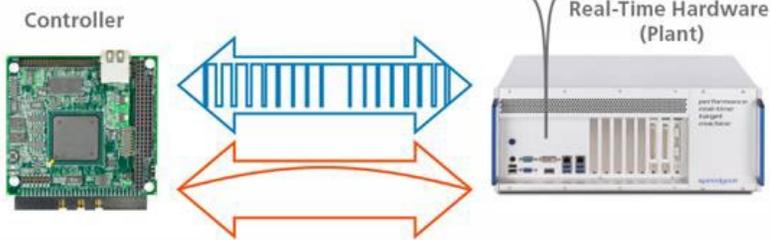
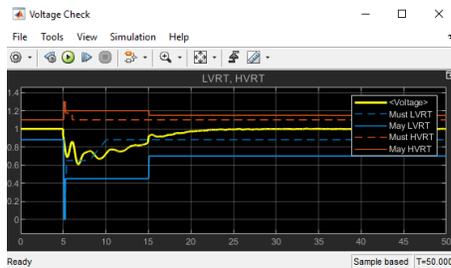


Quanta develops PMU event detection (DOE FOA 1861) for resiliency tracking

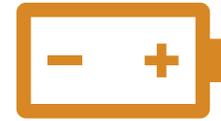
MathWorks supports Integrating Transformative Technologies



Renewable Energy Integration

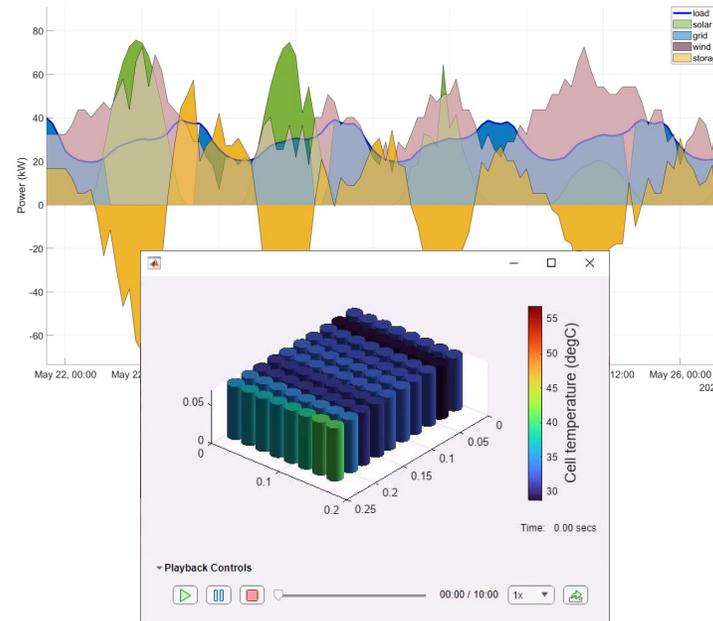


Real-time Testing of Renewables for [Grid Code Compliance](#) (such as IEEE 1547) prior to Grid Integration

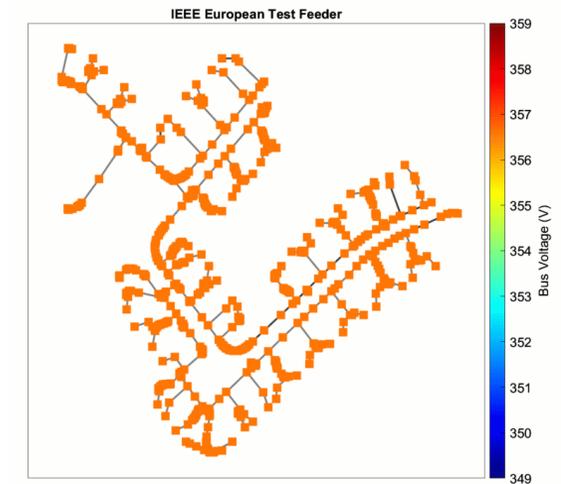


Energy Storage

[Storage sizing](#) and optimization provided historical load/generation and forecasts



Charging Infrastructure for EVs

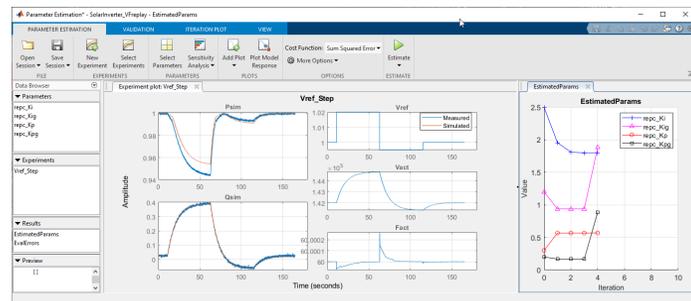
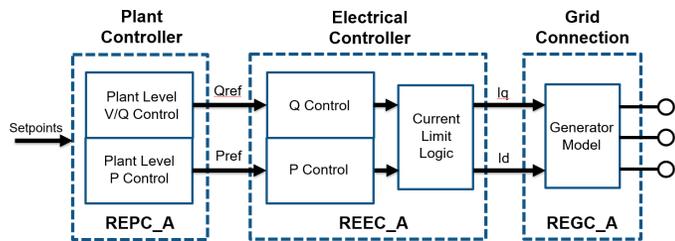


[Techno-Economic Analysis](#) across range of EV Charge Cycles for Grid Impact

MathWorks supports Addressing Uncertainty in the Grid



New Regulations and Policy Changes

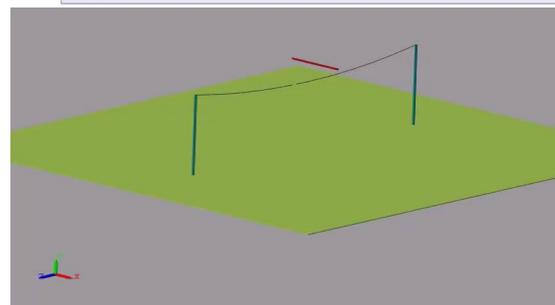
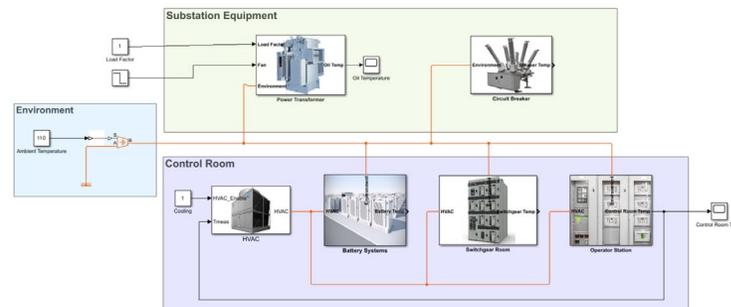


Model validation for NERC MOD-26/27 Compliance and WECC Renewables

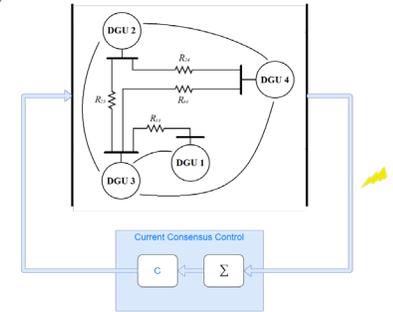
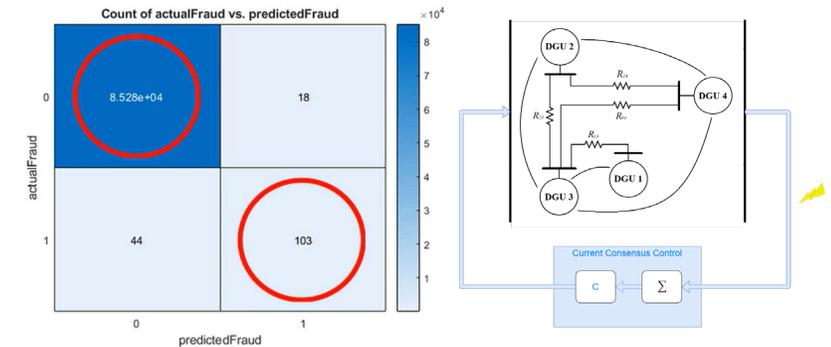


Climate Uncertainty and Grid Weatherization

Forecasting Algorithms and Equipment Digital Twins for Extreme Weather



Cybersecurity and Grid Resiliency



Advanced Metering Infrastructure (AMI) Fraud Detection + Cyberattack Detection for Power Systems

MathWorks Service and Support Mechanisms

MathWorks has a team of over 700 **customer-facing engineers** – we welcome the opportunity to discuss how you can get the most out of your software investments and achieve your goals.



Technical Support

- Product questions
- General support
- 508-647-7000



Application Engineering (AE) Support

- Product/Capability demonstrations
- Workshops, Webinars, etc.
- Evaluation support



Extended AE Support

- Guided support for adoption of new tools/processes
- Deep Engagements
- Proof of Concept



Professional Courses

- Paid training on specific tools and/or processes
- On-site, web-based instructor lead, & self-paced online



Consulting Engineering

- Paid engagements (custom targets, tool customization, advisory services)

Complimentary

Funded



Learn more about MathWorks, our products, and our services at mathworks.com and on social media:

