MathWorks®
Accelerating the pace of engineering and science

Oil and Gas

Information Kit

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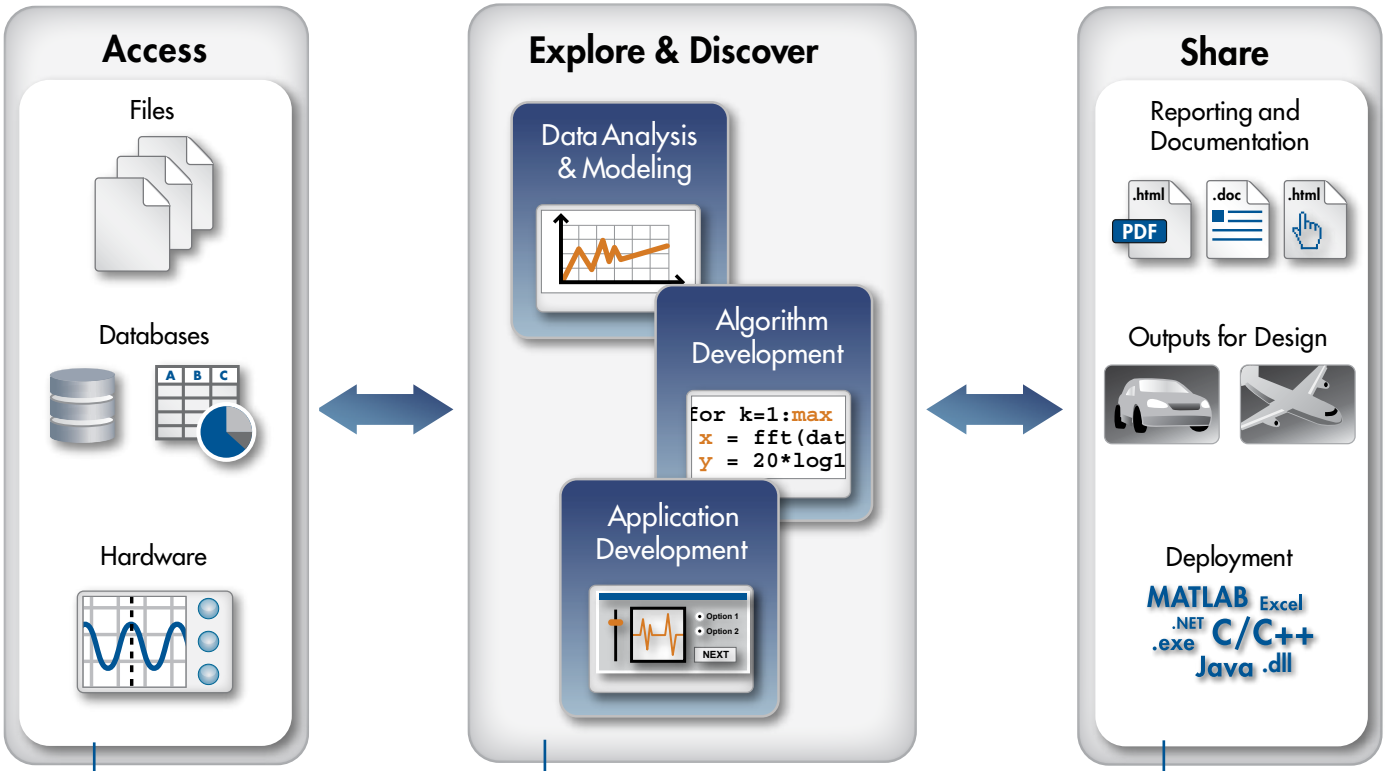
Workflow for Technical Computing

The upstream activities of discovery and extraction of new reserves involve increasingly more complex analyses as resources become sparser and more difficult to reach. Downstream processing requires better analytics and optimization as companies seek to reduce operational costs and impact on the environment. Engineers and scientists choose MathWorks technical computing solutions to aid them as they:

- Analyze seismic data to determine optimal drilling locations
- Develop financial applications for oil and gas pricing

» Learn more



- Data acquisition

- Data analysis
- Mathematical modeling
- Algorithm development
- Parallel computing

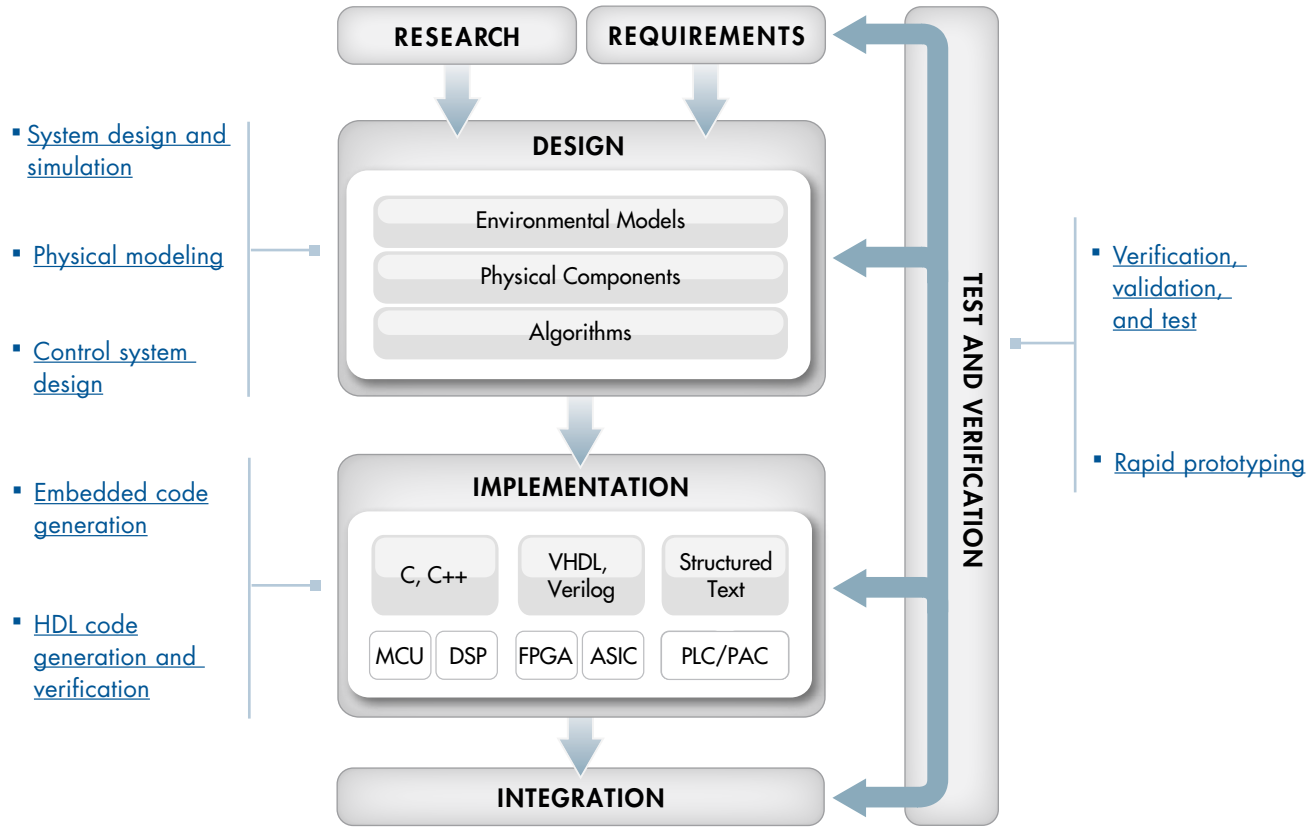
- Desktop and Web deployment

Workflow for Model-Based Design

The upstream activities of discovery and extraction of new reserves involve increasingly more complex analyses as resources become sparser and more difficult to reach. Downstream processing requires better analytics and optimization as companies seek to reduce operational costs and impact on the environment. Engineers and scientists choose MathWorks solutions for Model-Based Design to aid them as they:

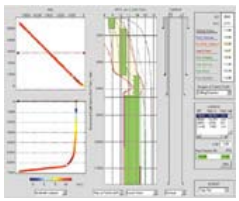
- Model reservoirs to extend the life of oil and gas reserves
- Analyze and optimize control strategies to improve operational efficiencies

» Learn more



User Stories

- Halliburton Makes Oil Exploration Safer Using MATLAB and Neural Networks
  » Read story



- GeoMechanics Cuts Product Development Costs by 50% Using MathWorks Tools
  » Read story

- Geoscience Australia Saves $50,000 in Development Costs by Using MATLAB
  » Read story

- Simulink Helps Pacific Northwest National Laboratory Create Vibration-Free Robotic Control System » Read story

- Zühlke Develops High-Vacuum Pressure Sensor Using MathWorks Tools and Model-Based Design » Read story

Technical Articles

- **Modeling Flexible Bodies in SimMechanics** » Read article

  SimMechanics™ is used to apply the two most common flexible body approximation methods to modeling beams: the lumped-parameter approximation and the state space/frequency response method using finite element analysis (FEA) results. Both methods assume that beam deflection is small and in the linear regime.

- **Best Practices for a MATLAB to C Workflow Using Real-Time Workshop** » Read article

  Manual translation from MATLAB to C involves many challenges. With the Embedded MATLAB™ language subset, the translation to C becomes unambiguous, enabling engineers to focus on refining the design rather than producing and verifying handwritten C code.

- **Developing the World's Most Advanced Prosthetic Arm Using Model-Based Design** » Read article

  Johns Hopkins University Applied Physics Laboratory is leading a worldwide team whose mission is to develop a prosthetic that enables the wearer to move with the speed, dexterity, and force of a real arm and perceive pressure, force, and temperature. MathWorks tools were used to develop these sophisticated systems, as well as the intricate interactions between them, using cutting-edge actuators, sensors, microprocessors, and embedded control software. These techniques work equally well in oil well drilling design.

- **Improving Optimization Performance with Parallel Computing** » Read article

  Engineers, scientists, and financial analysts frequently use optimization methods to solve computationally expensive problems such as smoothing the large computational meshes used in fluid dynamic simulations, performing image registration, or analyzing high-dimensional financial portfolios. However, computing a solution can take anywhere from hours to days. Parallel computing techniques can help reduce the time it takes to reach a solution.

On-Demand Webinars

- **Tips and Tricks: Data Analysis and Surface Fitting with MATLAB** » View webinar

  Engineers and scientists need to understand data quickly and efficiently to make decisions that can impact future research and product design. MathWorks engineers will outline many of the challenges faced in collecting, analyzing, and visualizing data, and illustrate how MATLAB, Statistics Toolbox, and Curve Fitting Toolbox™ can help alleviate these challenges.

- **MATLAB for Signal Processing** » View webinar

  Get an overview of major signal processing capabilities of MATLAB. Through demonstrations, MathWorks engineers will show how to solve problems encountered in the analysis, design, implementation, and verification of signal processing systems.

- **Parallel Computing with MATLAB** » View webinar

  Get an overview of MathWorks parallel computing products and see how use them to solve large engineering and scientific problems with multicore desktops, clusters, grids, and clouds.

- **Hydromechanical Systems in Simulink: Modeling Hydraulic Systems** » View webinar

  Get an overview of MathWorks physical modeling products for modeling hydraulic and mechanical systems. MathWorks engineers will show how to model a custom hydraulic component, and demonstrate best practices in modeling hydraulic systems.

On-Demand Webinars

- **Optimizing Mechatronic Systems Using Simulation** » View webinar

  Learn the benefits of using Simulink as a platform for motion control system design of electrically driven mechanical linkages. MathWorks engineers will demonstrate multidomain modeling involving the interaction of mechanical and electrical systems. They will also show how you can easily import models from CAD systems and perform feedforward control design.

- **Mapping and Geospatial Data Analysis Using MATLAB** » View webinar

  See how to use MATLAB and Mapping Toolbox™ to create maps, access Web Map Service (WMS) servers, analyze terrain data, and perform geodetic calculations and numerical simulations. MathWorks engineers will demonstrate through examples of oil spill simulation, weather avoidance, and terrain analysis.

Demo Videos

- **Analyzing Data in MATLAB** » View video
  Explore the different types of data analysis available in MATLAB.

- **Working Interactively with Distributed Arrays to Process Large Data Sets: Data-Parallel Applications** » View video
  Work with very large data sets that don't fit on a single computer because of memory restrictions.

- **Using Parallel `for`-Loops to Speed Up MATLAB Applications** » View video
  Speed up for loop computations that are taking a long time to run.

- **Overlaying Web Map Service Weather and Satellite Imagery Layers to Calculate Storm Area** » View video
  Download current weather data and overlay it onto a backdrop map using Web Map Service (WMS) capabilities.

- **Simulating In Real Time: Hydromechanical Example** » View video
  Configure solver settings to enable SimHydraulics® and SimMechanics models to execute in real time. Both global and Simscape local solvers are configured, and the model is downloaded to a real-time target.

- **Modeling a DC Motor** » View video
  Model a DC motor using electrical and mechanical physical modeling components in Simscape.

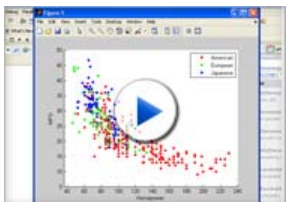
- **Optimizing Performance of a Hydromechanical System** » View video
  Use optimization algorithms to automatically tune the performance of a hydro-mechanical pitch control system until it meets system requirements.

Key Products

- **MATLAB** » Learn more

The Language of Technical Computing

MATLAB® is a high-level language and interactive environment that enables you to perform computationally intensive tasks faster than with traditional programming languages such as C, C++, and Fortran.

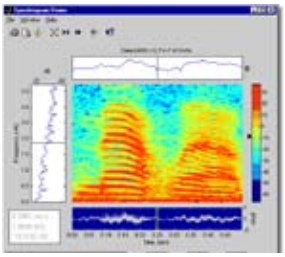


- **Statistics Toolbox** » Learn more

Perform statistical analysis, modeling, and algorithm development

Statistics Toolbox™ provides a comprehensive set of tools to assess and understand data. Statistics Toolbox includes functions and interactive tools for modeling data, analyzing historical trends, simulating systems, developing statistical algorithms, and learning and teaching statistics.

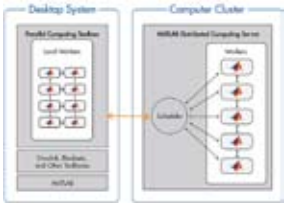
Key Products



Signal Processing Toolbox » Learn more

Perform signal processing, analysis, and algorithm development

Signal Processing Toolbox™ is a collection of industry-standard algorithms for analog and digital signal processing (DSP). Signal Processing Toolbox also provides graphical user interfaces for interactive design and analysis and command-line functions for advanced algorithm development.



Parallel Computing Toolbox » Learn more

Perform parallel computations on multicore computers and computer clusters

Parallel Computing Toolbox™ lets you solve computationally and data-intensive problems using MATLAB and Simulink® on multicore and multiprocessor computers. Parallel processing constructs such as parallel for-loops and code blocks, distributed arrays, parallel numerical algorithms, and message-passing functions let you implement task- and data-parallel algorithms in MATLAB at a high level without programming for specific hardware and network architectures. As a result, converting serial MATLAB applications to parallel MATLAB applications requires few code modifications and no programming in a low-level language. You can run your applications interactively or offline, in batch environments.

Additional Energy Segments

Engineers and scientists worldwide rely on MathWorks software to perform the challenging analysis, simulation, and product development tasks necessary to address the world's energy needs. You can use MATLAB and Simulink to evaluate energy resources, develop systems for power generation and distribution, model energy markets, and create products that consume less energy and are environmentally friendly.

Electric Vehicles

Electric Utilities

Solar Power

Oil and Gas

Wind Power

Trading and Risk