

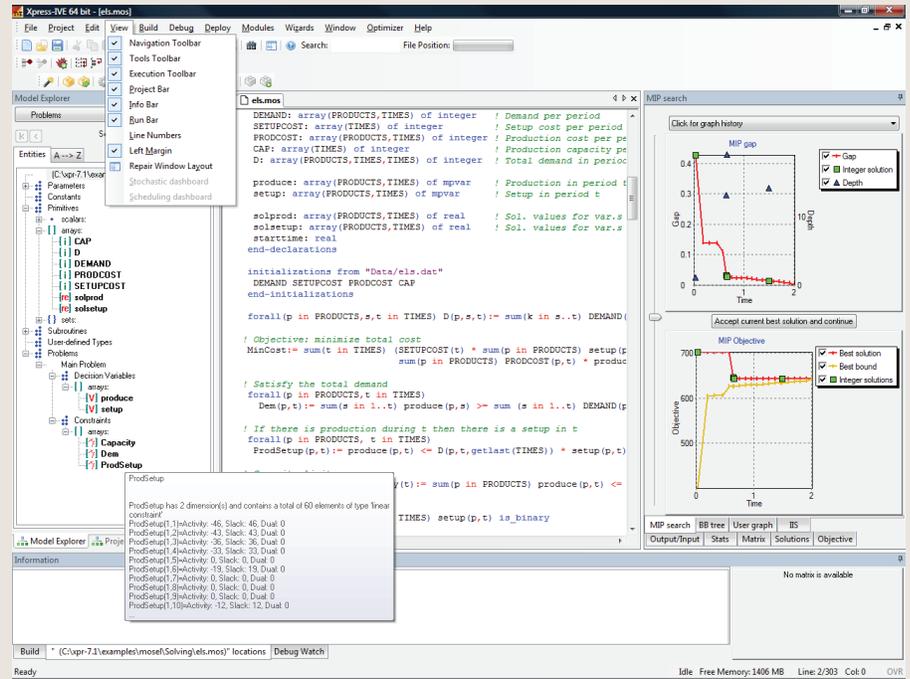
decision management tools

## Solving your biggest and most complex business problems

FICO® Xpress Optimization Suite is the premier mathematical modeling and optimization solution in the world. Its best-in-class tools enable operational research and management professionals, analysts, and consultants to rapidly develop and deploy optimization applications that solve complex, real-world business and customer engagement challenges.

With the Xpress Optimization Suite, organizations can solve bigger problems, design applications faster, and make better decisions in virtually any business scenario.

## Integrated Visual Environment (IVE) Development



FICO® Xpress Optimization Suite enables operations research professionals, analysts and consultants to quickly find the mathematically best solution for a wide range of industry problems.

**S**olving large, complex optimization problems can be the difference between success and failure in today's highly competitive marketplace. As business problems grow in complexity, advanced solver engines are needed to tackle optimization problems efficiently.

FICO® Xpress Optimization Suite decision management tools meet that need, providing an effective platform to create, deploy and utilize business optimization solutions at all levels of complexity.

### » The Structure of Successful Optimization

FICO® Xpress Optimization Suite software is a platform for building optimization solutions that drive business process improvements.

The Xpress Optimization Suite provides easy ways to create, deploy and utilize business optimization solutions based on scalable high-performance algorithms, a flexible modeling environment, and rapid application and reporting capabilities for on premise and cloud installations.

Within each Xpress component are the most sophisticated modeling and analytic techniques for leveraging today's high-performance multi-CPU, multi-sourced and multi-threaded processing environments.

The Xpress Optimization Suite is structured on three layers of tightly integrated and interactive tools: modeling and development tools, optimization solver engines, and business insight model deployment and presentation services.

### With FICO® Optimization Suite software, you can:

- Gain competitive advantage through better use of resources
- Solve enormously complex problems
- Gain insight into the sensitivities of key business factors
- Deliver smarter products and services

## Model Building and Development Tools

**Xpress-Mosel** is an algebraic modeling and procedural programming language specifically designed to be an easy-to-learn, robust way to interact with Xpress solver engines. It is a fully functional, compiled programming language that lets users formulate and solve problems using one or several of the Xpress solver engines. Xpress-Mosel contains drivers for access to text, XML, CSV and Excel files, Hadoop's HDFS, ODBC Oracle databases, and an API connecting it to Java, C/C++, .NET and

other languages as well as web services. Parallel and distributed modeling features leverage multiple cores and computers across the network. Multiple problems are allowed within one model file for easier implementation of more advanced solution algorithms.

Xpress-Mosel models can be developed within IVE for Windows, our complete visual development environment for Xpress-Mosel. IVE incorporates a Mosel program

editor, compiler and execution environment, debugger and profiler. It features development and deployment wizards, visualizations of the solve progress and results.

An additional modeling layer is provided with the Builder Component Library (BCL), an object-oriented API for building, solving and analyzing problems, and C, C++, VB, .NET and Java API support.

## Solver Engines

**Xpress-Optimizer** helps customers solve their most difficult business problems using the following optimization algorithms:

- Linear programming (LP)
- Mixed integer programming (MIP)
- Quadratic programming (QP)
- Mixed integer quadratic programming (MIQP)
- Quadratically constrained quadratic programming (QCQP)
- Mixed integer quadratically constrained quadratic programming (MIQCQP)
- Second order conic programming (SOCP)
- Mixed integer second order conic programming (MISOCP)

Xpress-Optimizer offers multi-threaded parallel processing out of the box, engaging multiple CPU cores to rapidly and efficiently solve clients' most difficult MIP problems.

The Xpress Suite also includes: **Xpress-Nonlinear**—a comprehensive suite of high-performance nonlinear solvers that give Xpress-Optimizer the power to solve more complex general nonlinear problems quickly and accurately. It offers a unified modeling interface for all solvers, from linear to general nonlinear within Xpress-Mosel. Xpress-Nonlinear includes:

- Successive linear programming for nonlinear programming, which is a highly scalable nonlinear optimization method. Each iteration is fast because it solves linearizations of the nonlinear model

and only requires first order derivatives to be available.

- Interior point methods for nonlinear programming solve problems with high accuracy and robustness, made possible by making use of first and second order derivatives. In Xpress-Nonlinear, both methods are available to give users great scalability and high accuracy where needed.

In combination with Xpress-Optimizer, mixed-integer versions of each solver are available.

**Xpress-Kalis**—Constraint Programming software based on the Kalis solver by Artelys. It specializes in discrete combinatorial problems as they frequently occur, for instance, in scheduling and planning problems.

## Optimizing Decisions Across Industries

Some of the extremely complex and time-critical business processes currently being optimized with FICO Xpress Optimization Suite include:

- **A global airline** uses the Xpress Optimization Suite to optimize its demand-based ticket pricing “on the fly” for thousands of daily domestic and international flights. They also optimize rescheduling thousands of delayed passengers, aircraft and flight crews when storms shut down a major airport hub.
- **An international oil company** uses a production scheduling system

powered by the Xpress Optimization Suite to optimize its continuous production process—managing pipeline and marine crude deliveries, refinery blending requirements and processing unit resources, and outbound shipping modes.

- **One of Europe's leading car rental companies** is optimizing the number and type of vehicles available to its 8 million customers at 3,800 locations across Europe—using Xpress Optimization Suite-driven solutions to adjust inventories and pricing on a daily, weekly and seasonal basis.

- **A major US retailer** optimizes its shelf space planning for thousands of line items, adjusting weekly for changes in product mix, seasonality and purchasing patterns.

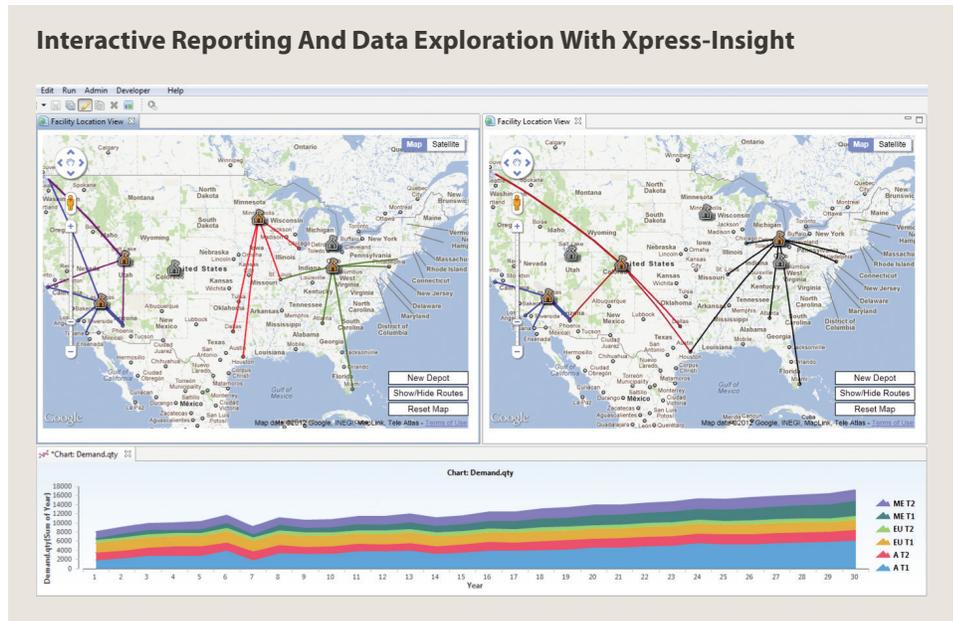
Many of these industries operate on extremely thin margins, making optimization of their business processes and resource utilization a vital element of their profitability and a major competitive advantage. These business solutions are feasible today because the FICO Xpress Optimization Suite integrates today's most sophisticated modeling, analytics and computational technology into every aspect of its optimization solutions.

## Business Insight Model Deployment and Presentation Services

The **Xpress-Insight** component within the FICO Xpress Optimization Suite enables businesses to rapidly deploy optimization models as powerful applications without the need for additional development efforts. Xpress-Insight's adaptive user interface automatically presents the contents of a model in business terms, ready for data explorations and what-if analysis. Xpress-Insight greatly improves visualization, featuring configurable tabular and charting views for data exploration.

Xpress-Insight provides business experts with greater control through an intuitive user interface that can be customized to fit any problem. Business users can:

- Work with the model in business terms.
- Adapt the data and parameters to create new scenarios.
- Turn hard resource constraints into soft constraints with violation penalties.
- Identify limiting factors and spare capacity.
- Understand trade-offs and sensitivities implicit in the business problem.
- Compare the outcome of different scenarios.



Aggregated and filtered data and KPIs can be visualized in a side-by-side comparison for multiple scenarios.

The applications are highly customizable, and data and results can be visualized using maps or advanced visualization tools. Insight users can choose between a desktop client as well as web interface.

Enterprise-level functionality allows multiple users to collaborate on optimization scenarios, engaging a broad spectrum of organizational talents and business requirements to produce a more sophisticated solution, as well as speeding internal agreement and reducing time to value.

## Extending the Power of Optimization to the Cloud

Now, Xpress Optimization Suite capabilities are integrated within the FICO® Decision Management Platform and are available on the FICO® Analytic Cloud, enabling organizations of all sizes leverage the power of optimization. It is connected to other FICO decision management and analytics tools, including FICO's predictive modeling and business rules management solutions. These tools allow you to build

complex decision strategies and analytically powered business applications that can incorporate any number of predictive models while balancing multiple business objectives and resource constraints—even accounting for ranges of uncertainty in source data quality and predictions of risk and propensity.

The suite is also embedded in many FICO and partner software products and solutions,

making leading-edge optimization accessible to a wide range of clients, industries and applications. By continuing to extend the technology, offering excellent client support and fast-tracking product development, FICO continues to drive Xpress Optimization Suite as the leading optimization solution for difficult and large scale business problems.

## About FICO

FICO is a leading analytics software company, helping businesses in 80+ countries make better decisions that drive higher levels of growth, profitability and customer satisfaction. The company's groundbreaking use of Big Data and mathematical algorithms to predict consumer behavior

has transformed entire industries. FICO provides analytics software and tools used across multiple industries to manage risk, fight fraud, build more profitable customer relationships, optimize operations and meet strict government regulations.

**For more information and to request an evaluation copy of FICO® Xpress Optimization Suite software, go to [www.fico.com](http://www.fico.com).**



**For more information**

**North America toll-free**

+1 888 342 6336

**International**

+44 (0) 207 940 8718

**email**

info@fico.com

**web**

www.fico.com