

Inference in Excel Overview

The screenshot displays the Microsoft Excel interface with the Inference Excel Task Pane open on the left. The task pane includes sections for 'Inputs', 'Edit Input Properties', and 'Parts Container'. The 'Inputs' section lists 'Expt (numeric-integer)', 'Run (numeric-integer)', and 'Speed (numeric-real)'. The 'Edit Input Properties' section shows 'Range Name: Speed' and 'Data Type: numeric-real'. The 'Parts Container' shows 'Inputs' and 'Outputs'.

The main Excel window shows two worksheets: 'Michelson Input Data' and 'Analysis Output'. The 'Michelson Input Data' worksheet contains the following data:

	Speed	Run	Expt
1			
2			
3	850	1	1
4	740	2	1
5	900	3	1
6	1070	4	1
7	930	5	1
8	850	6	1
9	950	7	1
10	980	8	1
11	980	9	1
12	880	10	1
13	1000	11	1
14	980	12	1
15	930	13	1
16	650	14	1
17	760	15	1
18	810	16	1
19	1000	17	1
20	1000	18	1
21	960	19	1
22	960	20	1
23	960	1	2
24	940	2	2
25	960	3	2

The 'Analysis Output' worksheet contains the following data:

	Analysis Output:
1	
2	
3	Number of Experiments:
4	Number of Runs:
5	
6	
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Paul van Eikeren, PhD

Blue Reference, Inc.

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Bring dynamic scripting to Microsoft Excel spreadsheets

Summary

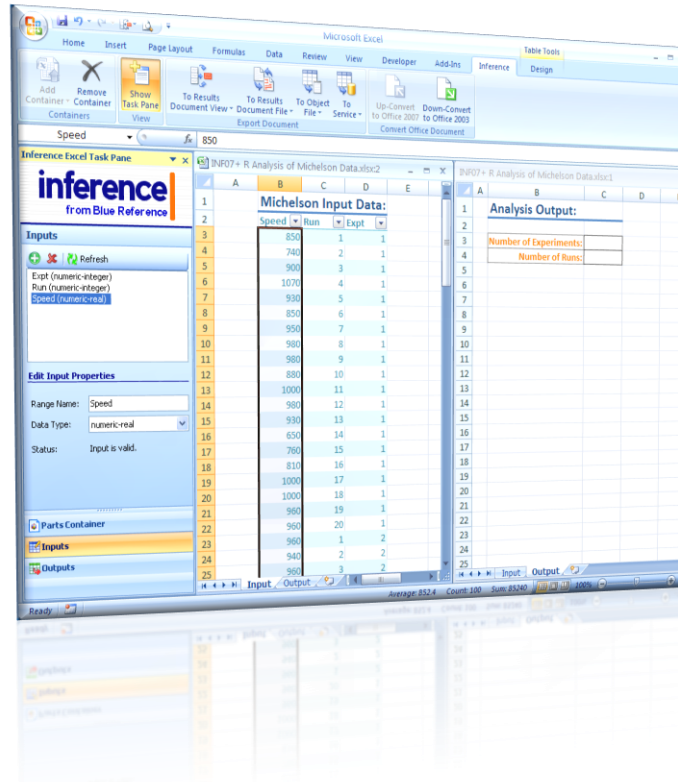
Inference in Excel brings the benefits of dynamic scripting in platforms like R, S-Plus, MATLAB, Python, IronPython and IronRuby for .NET to your Microsoft Excel spreadsheets. Inference in Excel is an essential tool for business and technical professionals who regularly use Excel and need to expand its computational, graphic and automation capabilities. It provides a way for business analysts, financial analysts, line-of-business managers, scientists, engineers, educators and researchers to take advantage of Microsoft Excel to perform flexible, interactive exploration, analysis and visualization of multidimensional data by leveraging the power of these dynamic scripting platforms.

With Inference in Excel, you can have it all: all the power and sophistication of the dynamic scripting platform while retaining the familiarity and convenience of Excel. Inference in Excel bridges Excel and dynamic scripting platforms, giving you the best of both worlds. By using data preparation in Excel in conjunction with high-level dynamic scripts, technical analysts can answer key questions, solve technical and business problems, and present results in ways that help drive decision making. The self-service nature of Inference in Excel means that users do not depend on IT support to get the job done.

Inference in Excel adds thousands of new and powerful analysis and visualization functions to Excel. Inference in Excel provides a bi-directional link between Excel and the dynamic scripting platform that gives users the ability to:

- choose the dynamic scripting environment appropriate for the task (selected from R, S-Plus, MATLAB, Python, IronPython, IronRuby, managed Jscript, or dynamic Visual Basic);
- create spreadsheet formulas that call the dynamic scripting functions from Excel;
- read and write data from the dynamic scripting platform to Excel ranges—that is, seamless bi-directional data exchange between Excel and the dynamic scripting platform;
- enable strict data typing in Excel by assigning data types to Excel ranges;
- create dynamic spreadsheets that include scripting code that interacts with and automates execution of data analyses and creation of graphics;
- develop custom Excel import and export routines in dynamic scripting code;
- display formatted text and graphical output from execution of dynamic scripts in Excel;
- publish custom Excel-based reports directly from your scripting platform-based analysis; and
- use Excel as a gateway to feed live data and your latest data model parameters in a scripting platform protocol.

Inference in Excel is tightly integrated with the patent-pending Inference platform, enabling technical analysts to interoperate their multidimensional explorations developed with Inference in Excel for technical reporting and analysis with Inference in Word and Inference Studio.



The Business Case for Inference in Excel

Excel Is the Most Widely Used Desktop Analytical Tool

The Microsoft Excel spreadsheet — the most widely used desktop analytical tool — is a permanent fixture in business, science and engineering. According to Microsoft Corporation, there are more than 500 million Excel users in the world. The widespread adoption of Excel is not hard to understand—spreadsheets are powerful and flexible, yet intuitive and easy to learn and use. Excel spreadsheets play an integral role in the smart business strategy of “thinking-by-numbers,” which is the basis of the Predictive Enterprise.

A major reason why users remain loyal to Excel spreadsheets over specialized alternatives is that the context of scientific projects and business problems change much too quickly for IT to respond with updates to specialized alternatives. In the financial services industry, the methodology behind economic capital calculation, which constantly changes due to regulatory and competitive pressures, is a prime example. Ad hoc applications and spreadsheet models provide the necessary flexibility and free users from constant reliance on IT, avoiding the associated delays and costs.

Excel Spreadsheets Have Limitations

Despite their popularity and intrinsic advantages, Excel spreadsheets have significant limitations and lack the following:

1. **Rigorous statistical analysis and complex graphics capabilities.** Much has been written about Excel's weaknesses for performing rigorous statistical computations and providing appropriate supporting graphics. If you have needs in this area, users typically have to move to high-end statistical and graphical computing environments like R or S-Plus.
2. **Modern data mining and multidimensional analysis capabilities.** Data mining and multidimensional analysis are powerful means of extracting maximum value from data and serves as the basis for developing scientific and business understanding. For example: using MATLAB, you can identify critical parameters in a manufacturing process; you can follow trends in customer behavior; you can spot anomalies across products; and you can see performance trends over time.
3. **Powerful scripting capabilities for Excel automation and extension.** Although VBA has been Microsoft's historical means to automate and extend the capabilities of Excel, VBA lacks the capabilities and ease-of-development of modern scripting languages like Python and Ruby and does not allow access to powerful supporting libraries like the .NET framework.
4. **Infrastructure to support reproducible and reusable research.** The Microsoft Excel point-and-click interface is well suited for ad-hoc analysis but does not provide an audit trail of how results were obtained, which is the hallmark of reproducible research. Additionally, Excel does not cleanly segregate data, code instructions (formulas) and annotation, which makes validation and reuse of spreadsheets challenging.
5. **Controls and security.** Spreadsheets typically lack integrity, traceability, consistency, redundancy, security, and compliance, which degrade the business value of the spreadsheet data, information, and results.

The Inference in Excel Solution

Extend Excel with Dynamic Scripting

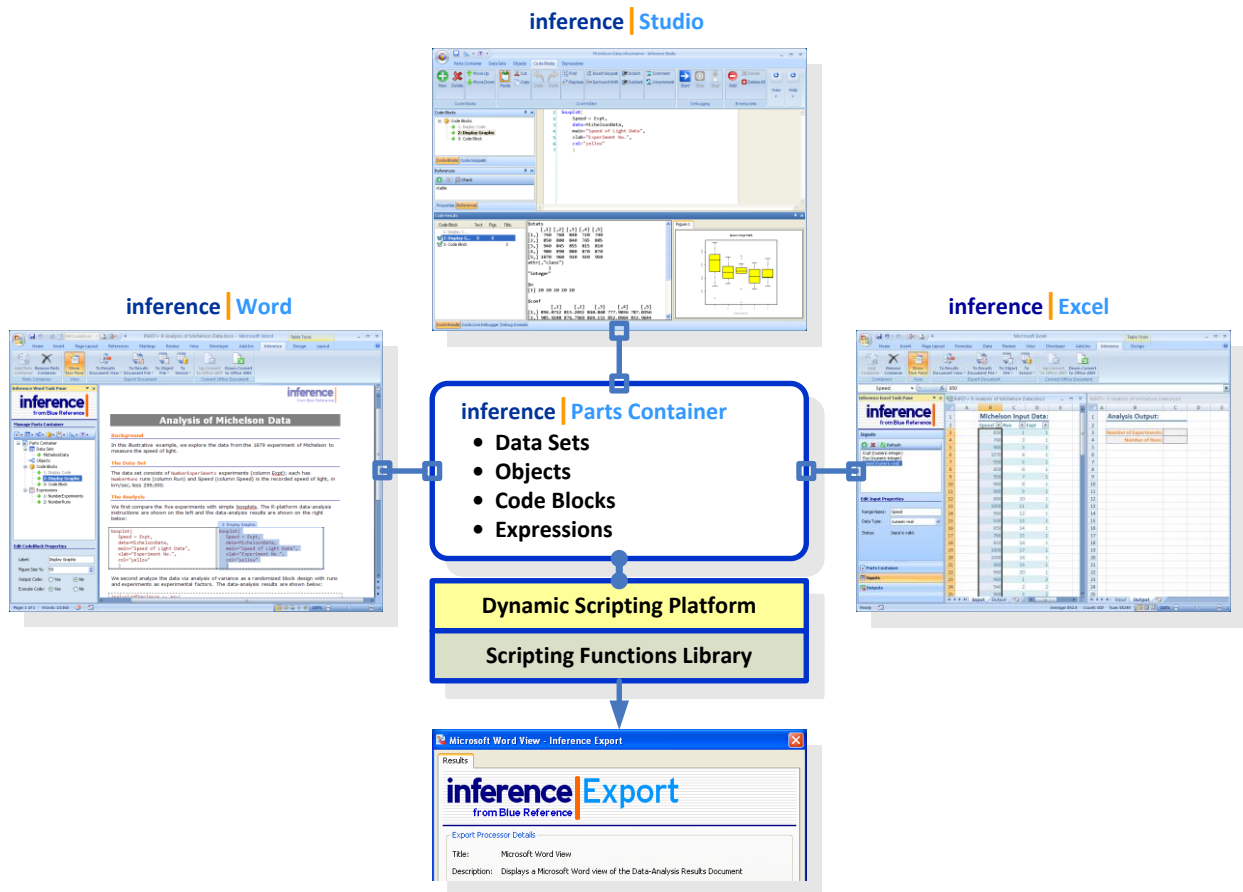
Rather than reacting to the limitations of Microsoft Excel by eliminating the use of Excel spreadsheets, application developers, information and knowledge managers, and business managers must embrace them — but in a new form that provides the missing functionality and addresses the limitations. Inference in Excel extends Microsoft Excel by providing a bridge to powerful dynamic scripting solutions, which enables users to access the capabilities of R, S-Plus, MATLAB, Python and dynamic scripting for .NET from an Excel spreadsheet. With Inference in Excel users can exchange data between dynamic scripting solutions and Excel, taking advantage of the familiar Excel interface while accessing the powerful computational and visualization capabilities of the R, S-Plus, MATLAB and .NET environments. Inference in Excel makes it possible to have the best of both worlds. Inference in Excel brings the powerful capabilities of the high-end technical scripting platforms to the ease-of-use of the Excel spreadsheet.

Inference in Excel is especially useful as a data preparation editor and interactive data editing for the dynamic scripting platform. Inference in Excel features an Excel spreadsheet add-in that provides the functions that connect Excel with the scripting engine. The add-in handles the inter-process

communication and the link between Excel and the dynamic scripting platform. Any data that you import into Excel can be passed to scripting platforms for analysis and visualization. The connection between the scripting platform and Excel is dynamic—that is, any update in the data can be actively analyzed, requiring no intermediate files, import/export, or low-level inter-process programming.

Extend Dynamic Scripting to Microsoft Office

Inference in Excel is a member of the Inference solution platform, a tightly integrated suite of applications based on Microsoft Office, which operate on a common Inference Parts-Container linked to the dynamic scripting platform and the Inference Export framework, as illustrated in the Figure below. An Inference Parts-Container provides a structured entity for holding and managing data sets, software objects, code blocks and expressions. An Inference Parts-Container can be serialized as a file, as it is for Inference Studio, or directly embedded in Microsoft Office documents, as it is for Word and Excel.



Benefits of Inference in Excel to End Users

Inference in Excel provides technical and business users with a wide range of benefits.

Ease of use

- **Easy to learn** – Explore, perform flexible analysis, and solve problems in the familiar Excel environment you already know.
- **A single, intuitive interface** – Select, filter, and analyze and visualize data to gain a managed view of information with just one intuitive interface that is integrated seamlessly with Excel.
- **Simple to operate** – Seamlessly and automatically pass data and results between Excel and the dynamic scripting platform.
- **Independence from IT** – Self-service capabilities mean that users do not need to rely on IT.

Capability

- **Leverage all Excel features** – Use all of the capabilities of Microsoft Excel to enrich technical and business scenarios and present results that are easy to understand and reuse.
- **Integrate multiple data sources** – Explore and analyze multidimensional information from multiple heterogeneous data sources assembled and prepared in Excel.
- **Extend Excel capabilities** – Enable leading edge analysis and visualization of Excel data using R, S-Plus, MATLAB, Python and .NET scripting in conjunction with their powerful packages and libraries.

Flexibility

- **A formula-based approach** – Execute any R, S-Plus, MATLAB, Python, IronPython, IronRuby, managed Jscript or dynamic VB function directly from within Excel.
- **Data storage and application development** – Excel becomes a data storage vehicle and an easy-to-use application development front end for dynamic scripting languages.
- **Powerful integrated development environment** – Use the integrated Code Block Editor or the integrated development environment of Inference Studio to view, edit, debug and develop dynamic scripting protocols without ever leaving the Excel environment.
- **Display formatted text and graphical output** – Dynamically execute linked spreadsheet formulas and dynamic scripts and display the output formatted text and graphics within Excel.
- **Publish custom Excel-based reports** – Use Excel as a gateway to feed live data and the latest parameter values to a dynamic scripting model and produce a custom report.
- **Reuse exploration and analysis results** – Use the results of data exploration and analysis as inputs for other worksheets or other Inference applications for a complete reporting and analysis solution.

System Requirements

Base Computer Installation:

MS Office Software	Microsoft Excel 2003 or 2007
Operating System	Microsoft Windows XP with Service Pack (SP) 2
Computer and Processor	500 megahertz (MHz) or higher speed; 1 GHz speed recommended
Memory	256 megabyte (MB) RAM or higher; 512 MB RAM recommended
Hard Disk	2 gigabytes (GB)
Drive	CD-ROM or DVD Drive
Display	1024 x 768 or higher resolution monitor
Internet Connection	Connectivity to the Internet for online installation and help
Browser	Internet Explorer 6.0 or later

Dynamic Scripting Platforms Supported:

R	R version 2.5.0 or later (www.r-project.org)
MATLAB	MATLAB version R2007a or later (www.mathworks.com)
Python	Python version 2.5 or later (www.python.org)
IronPython	IronPython version 2.0 Beta 2 or later (www.codeplex.com/IronPython)
IronRuby	In development
managed Jscript	In development
dynamic VB	In development

For More Information:

Visit Inference web sites at:

- Inference Solutions Platform: www.Inference.us
- Inference Vertical Solutions:
 - Inferencefor Quality by Design: www.InferenceForQbD.com
 - Inferencefor R: www.InferenceForR.com
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