Solid Edge Automation Through Programming

James Singleton – Prion Cutting Edge & Dave Rothan – Majenta PLM
Agenda

- Introduction (DR/JS)
- What you will learn (JS)
- Solid Edge Custom Folder (JS)
- Variable Table Scripts (JS)
- Microsoft Excel & VBA (JS)
- VS, .NET & The SE API (DR)
- Addin Walkthrough (DR)
- Links & Resources (DR)
- Q&A (DR/JS)
Who am I?

Dave Rothan
Technical Consultant
Majenta PLM – Solid Edge Division

Dave is part of the growing team of Solid Edge technical consultants at Majenta PLM, having joined the company in 2011 and has been involved in some capacity with Solid Edge since its launch.

Prior to joining Majenta, Dave ran a successful engineering design consultancy for over ten years. He has a general engineering background, gaining a large amount of experience in general mechanical design and has developed many bespoke applications, extending the capabilities of Solid Edge.

Dave works in a predominantly ‘post-sales’ capacity for Majenta, providing bespoke application development, product support and training to the Majenta Solid Edge customer base.
Who am I?

James Singleton
Senior Applications Engineer
Prion Cutting Edge

James is part of the technical team at Prion Cutting Edge and has been with Solid Edge for the last 11 years.

In a previous life he was a CAD Manager and Design Engineer at a global water meter manufacturer. He implemented a global CAD standard and successfully migrated from several other CAD systems to Solid Edge.

James roles are diverse not only looking at Solid Edge but also Siemens portfolio of data management applications and IT systems along with providing training and consultancy. He has implemented a number of bespoke applications for a variety of clients from small applications to full product configurators.
What you will learn

The session will provide a brief introduction to adding value to Solid Edge via the API (Application Programming Interface), built into Solid Edge.

We will take a look at programming tools and fundamental methodologies to get you started.

Exploit the potential of the Solid Edge API to achieve massive productivity gains, by tailoring Solid Edge to suit your particular company requirements.
Solid Edge Custom Folder – What’s new

• Solid Edge Movie Recorder
  • Constants
    • seMovieFormatConstants Enumeration
    • seMovieFormatConstants.seMovieFormatAVI Constant
    • seMovieFormatConstants.seMovieFormatWMV Constant
    • seMovieStandardResolutionConstants Enumeration
    • seMovieStandardResolutionConstants.seMovieStandardResolutionCurrentView Constant
    • seMovieStandardResolutionConstants.seMovieStandardResolutionFullHD Constant
    • seMovieStandardResolutionConstants.seMovieStandardResolutionHD Constant
    • seMovieStandardResolutionConstants.seMovieStandardResolutionNTSC Constant
    • seMovieStandardResolutionConstants.seMovieStandardResolutionPAL Constant
  • Methods
    • View.AddFrameToMovie Method
    • View.BeginMovieRecording Method
    • View.CreateMovieRecorder Method
    • View.DestroyMovieRecorder Method
    • View.EndMovieRecording Method
    • View.GetAvailableMovieCodecs Method
    • View.SetCustomMovieResolution Method
    • View.SetMovieResolution Method
  • Property
    • View.AnimationEvents Property
    • View.MovieAuthor Property
    • View.MovieAuthorURL Property
    • View.MovieBitRate Property
    • View.MovieCodec Property
    • View.MovieCopyright Property
    • View.MovieDescription Property
    • View.MovieFrameRate Property
    • View.MovieQuality Property
    • View.MovieSubtitle Property
    • View.MovieTitle Property
Solid Edge Custom Folder

- **Batch**
  - Global constants
- **AsmRelDoctor**
  - Assembly Relationships
  - Occurrences
- **Draft Spell Checker**
  - Sheets
  - Drawing views
  - Balloons/Callouts
  - Dimensions
  - Text Boxes
  - Word
- **HoleDatabaseConverter**
  - XML
  - Excel file
- **File Link Checker**
  - Revision Manager
Variable Table Scripts

Create a basic file
Create a function
Use the $fx$ function to use the macro

Links do not get resolved for basic files
Microsoft Excel & VBA

Suppression Variables
Ordered and Synchronous Dimensions
Patterns

Limitations with native Excel
• Cant suppress parts in assembly
• Extra file to link and maintain
Visual Studio, .NET & The Solid Edge API

• Visual Studio 2015 Product Offerings

**Visual Studio Community**
- **Full-featured** Integrated Development Environment for building Web, Windows Desktop and cross-platform iOS, Android, and Windows apps
- **Ecosystem** with thousands of extensions to choose from in the Visual Studio Gallery, or create your own
- **Free** for open source projects, academic research, training, education and small professional teams

**Visual Studio Professional with MSDN**
- **Professional** developer tool for building any application type
- **Powerful features** to improve your team’s productivity such as CodeLens
- **Improve team collaboration** with Agile project planning tools, Team Rooms, charts and more
- **MSDN subscription benefits** including access to core software for dev/test, Team Foundation Server, Visual Studio Online Basic, $50/month in Azure credits, training and support

**Visual Studio Enterprise with MSDN**
- **End-to-end solution** for your development teams, including the most feature-rich Visual Studio IDE for working on any type of project
- **Build quality applications** at scale with advanced features such as Load Testing, automated and manual testing and new IntelliTest capabilities
- **Manage complexity and resolve issues quickly** with features such as Code Map and IntelliTrace
- **Enhanced MSDN subscription benefits** including comprehensive access to software for dev/test, Team Foundation Server, Visual Studio Online Advanced, $150/month in Azure credits, training and support
Visual Studio, .NET & The Solid Edge API

- DOT NET
- VB6 vs DOT NET
- Framework
- Library
- CLR
- Visual Studio

The .NET Framework (pronounced dot net) is a software framework developed by Microsoft that runs primarily on Microsoft Windows. It includes a large library and provides language interoperability (each language can use code written in other languages) across several programming languages. Programs written for the .NET Framework execute in a software environment (as contrasted to hardware environment), known as the Common Language Runtime (CLR), an application virtual machine that provides services such as security, memory management, and exception handling. The class library and the CLR together constitute the .NET Framework.

The .NET Framework's Base Class Library provides user interface, data access, database connectivity, cryptography, web application development, numeric algorithms, and network communications. Programmers produce software by combining their own source code with the .NET Framework and other libraries. The .NET Framework is intended to be used by most new applications created for the Windows platform. Microsoft also produces an integrated development environment largely for .NET software called Visual Studio.
Visual Studio, .NET & The Solid Edge API

- Solid Edge API
  - ‘Core’ Type Libraries
  - The Solid Edge core COM type libraries are the APIs that are available to automate the Solid Edge application
  - These APIs can be used by any programming or scripting language that supports COM

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Type Library</th>
</tr>
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<tbody>
<tr>
<td>SolidEdgeFramework</td>
<td>Solid Edge Framework Type Library</td>
<td>framework.tlb</td>
</tr>
<tr>
<td>SolidEdgeFrameworkSupport</td>
<td>Solid Edge FrameworkSupport Type Library</td>
<td>fwksupp.tlb</td>
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<tr>
<td>SolidEdgePart</td>
<td>Solid Edge Part Type Library</td>
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</tr>
<tr>
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<td>Solid Edge Part Synchronous Type Library</td>
<td>partsync.tlb</td>
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<td>SolidEdgeGeometry</td>
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</tr>
<tr>
<td>SolidEdgeAssembly</td>
<td>Solid Edge Assembly Type Library</td>
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<tr>
<td>SolidEdgeAssemblySync</td>
<td>Solid Edge Assembly Synchronous Type Library</td>
<td>assemblysync.tlb</td>
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<tr>
<td>SolidEdgeDraft</td>
<td>Solid Edge Draft Type Library</td>
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</tr>
<tr>
<td>SolidEdgeConstants</td>
<td>Solid Edge Constants Type Library</td>
<td>constant.tlb</td>
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Visual Studio, .NET & The Solid Edge API

- Solid Edge API
  - Utility APIs
    - These ‘lightweight’ APIs allow you to work quickly with Solid Edge data without automating Solid Edge.
  - Each is focused for a specific area of tasks.
- Install Data
- File Properties
- Revision Manager

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<td>SEInstallDataLib</td>
<td>Solid Edge Install Data Library</td>
<td>SEInstallData.dll</td>
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<tr>
<td>SolidEdgeFileProperties</td>
<td>Solid Edge File Properties Object Library</td>
<td>PropAuto.dll</td>
</tr>
<tr>
<td>RevisionManager</td>
<td>Solid Edge Revision Manager Object Library</td>
<td>RevMgr.tlb</td>
</tr>
</tbody>
</table>
Visual Studio, .NET & The Solid Edge API

- Solid Edge API Object Model
  - Object Hierarchy
  - Properties
    - Line.Colour
  - Methods
    - Line.Delete
  - Events
    - Document.OnSave
Visual Studio, .NET & The Solid Edge API

- Adding (only the required) Solid Edge ‘References’ to your project…
Visual Studio, .NET & The Solid Edge API

• When you add a reference to a Solid Edge type library, Visual Studio .NET automatically build a .NET assembly for use in your project.

• This assembly will contain all of the type library definitions in a format that can be consumed from any .NET programming language.

• These generated assemblies are referred to as ‘Interop Assemblies’.
Visual Studio, .NET & The Solid Edge API

- https://github.com/SolidEdgeCommunity/SolidEdge.Community

![GitHub repository](https://github.com/SolidEdgeCommunity/SolidEdge.Community)

Community enhancements to the Solid Edge API.

<table>
<thead>
<tr>
<th>Commits</th>
<th>Branches</th>
<th>Releases</th>
<th>Contributors</th>
</tr>
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<tbody>
<tr>
<td>42</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

**Update README.md**

- **jinewell** authored 14 days ago
- 107.6.0 release.
- Removed unnecessary files.
- 107.6.0 release.
- Initial commit.
- Update README.md
- 107.6.0 release.
Visual Studio, .NET & The Solid Edge API

- Available through VS ‘Extensions and Updates’
Visual Studio, .NET & The Solid Edge API

- NuGet Package Manager
Visual Studio, .NET & The Solid Edge API

• Writing your first macro...

```
Sub Main()
  Dim seApp As SolidEdgeFramework.Application 'se
  seApp = Marshal.GetActiveObject("SolidEdge.Application") 'connect to se
  With seApp
    .DisplayAlerts = False 'hides prompts to save each open doc
  End With

  Dim seDoc As Object = Nothing 'doc
  For Each seDoc In seApp/Documents 'go through each open doc and...
    '...if it's not the active doc, close it
    If Not seDoc Is seApp/ActiveDocument Then seDoc.Close()
  Next

  With seApp
    .DisplayAlerts = True 'switch alerts back on!
  End With

  If Not seDoc Is Nothing Then Marshal.ReleaseComObject(seDoc) 'release the doc
  Marshal.ReleaseComObject(seApp) 'release se

End Sub
```
Macros vs Addins

• Overview
  • Macro
    • Simple to develop, easy to deploy
    • Starts, does something, finishes
  • Addin
    • More complex to develop and deploy
    • Registers as Solid Edge ‘Addin’
    • Launches when Solid Edge starts
    • Tighter integration
    • ‘Intercept’ Solid Edge functionality
    • Provide multiple tools
Addin Walkthrough

- Solid Edge Community Template
Addin Walkthrough
Links & Resources

- Siemens Solid Edge Developer Help
  http://support.industrysoftware.automation.siemens.com/training/se/107/api/webframe.html
Links & Resources

• The old programmers guide!

.NET Programmer’s Guide
Solid Edge with Synchronous Technology API
Links & Resources

- The old programmers guide!
Links & Resources

• The old programmers guide!
  • This was written in an effort to enable .NET developers to quickly get up to speed with automating Solid Edge
  • Learning the Solid Edge API can be a monumental task in itself
  • It takes most people several years before they feel comfortable with the API
  • While prior programming experience will indeed help, it is not necessary
  • Enables developers new to Solid Edge programming to quickly get started
  • There is an abundance of source code examples to learn from
Links & Resources

• Siemens Solid Edge Developer Community
Links & Resources

• Siemens Solid Edge Developer Community
• Knowledge Base

Search the Knowledge Base

- How can I learn Visual Basic or C#?
- Interop for Solid Edge
- Samples for Solid Edge - Codeplex
- Deep dive into the Solid Edge Draft API
- Solid Edge Develop Day Beginner Track
Links & Resources

- Siemens Solid Edge Developer Community
- Blog

**How to configure Visual C++ 2013 for Solid Edge**

Programming in Visual C++ can be challenging at times for sure. Not only can the language be challenging, but knowing how to configure Visual Studio can also be difficult as settings change from version to version. In the following video, I demonstrate how to configure Visual C++ 2013 for Solid Edge development.

Read more...

**Closing Documents**

Prior to Solid Edge ST8 being released, one of the developers emailed me to give me a heads up on a new API to handle closing documents. The problem has always been that in order to close a document, you had to call the Close() method of that object. The problem was that Solid Edge couldn’t fully close the document because we were still holding a reference to it. In ST8, we have a new option available.

Read more...

**Handling Solid Edge Events**

Solid Edge provides a wide range of COM event sets that notify us when certain things occur. In this article, I will discuss how you can attach to these events from .NET. Prior to .NET, handling COM events was rather straightforward. It’s a little trickier in .NET but still completely possible as you’ll see.

Read more...

**How to export draft images**

Have you ever had a need to export vector?

Read more...

**Solid Edge ST7 AddIn EdgeBar in C++**

by jnewell.com on 02-09-2015

08:08 AM

Read more...

**How to use NuGet for Solid Edge custom development**

by jnewell.com on 01-23-2015 08:52 AM

Read more...
Links & Resources

- Siemens Solid Edge Developer Forum
Links & Resources

- [http://www.experts-exchange.com](http://www.experts-exchange.com)
  - Registration required
  - General programming
  - Pay, or help others
Questions?

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