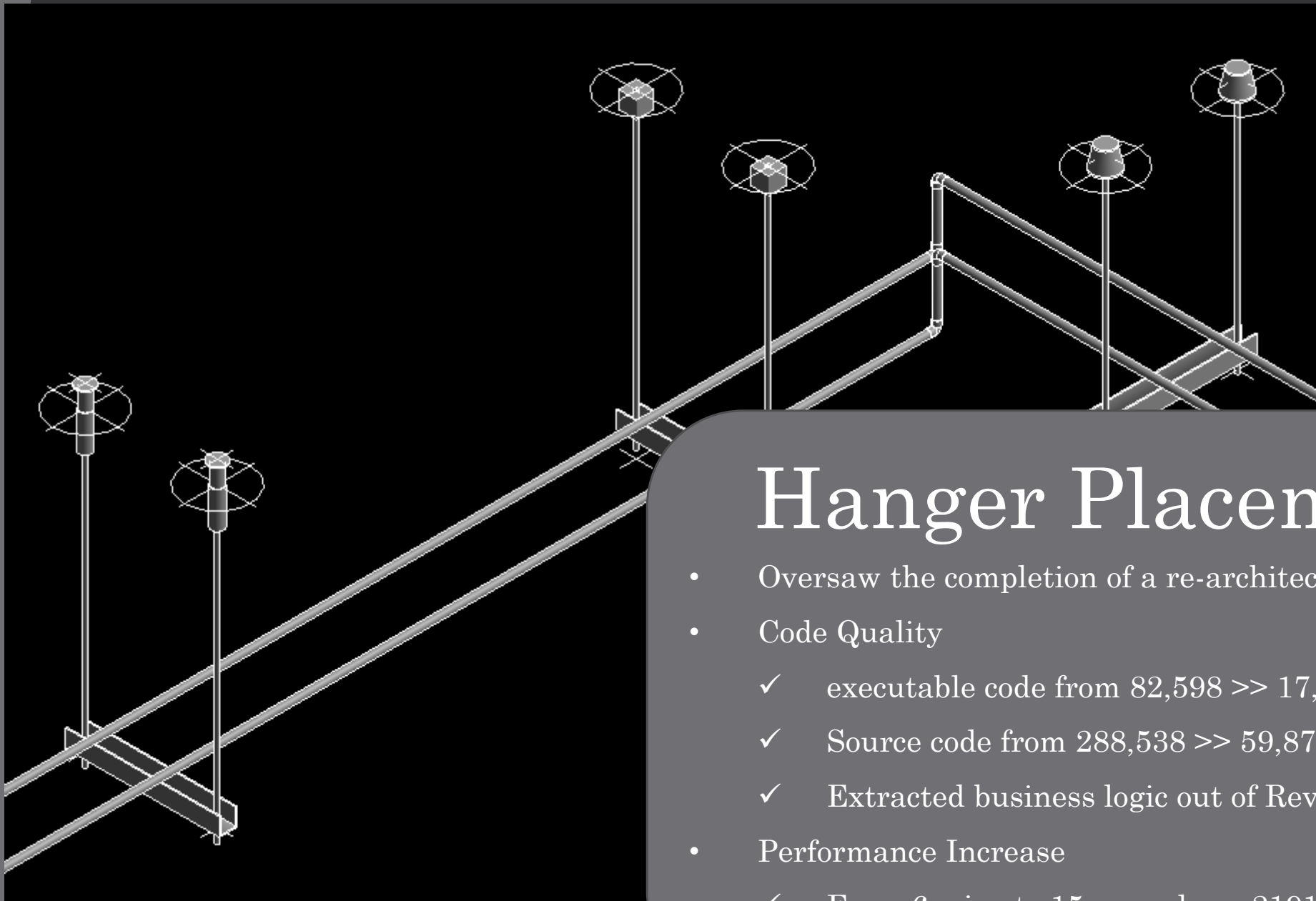


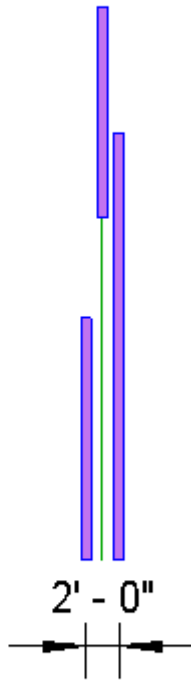
Revit API Accomplishments



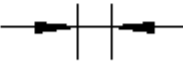
Hanger Placement Tool








- Oversaw the completion of a re-architected hanger placement engine
- Code Quality
 - ✓ executable code from 82,598 >> 17,747.
 - ✓ Source code from 288,538 >> 59,876
 - ✓ Extracted business logic out of Revit to allow for unit tests
- Performance Increase
 - ✓ From 6 mins to 15 seconds on 2191 elements

2' - 0" 1' - 0"



2' - 0"



 Load Beam Hanger #Dev <Load Content>	 Parallel Run Splitter #Dev <Run Splitting>	 Place Strut Hangers #Dev <Hanger Placement>	 Place Offset Hangers #Dev <Hanger Placement>	 Auto Size Hanger Rods #Dev <Hanger Sizing>	 Place Outer Points #Dev <Hanger Sizing>	 Place Ten Thousand Hangers #Dev <Performance Testing>
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HangerWorksPro - Result

Hanger Placement Tool

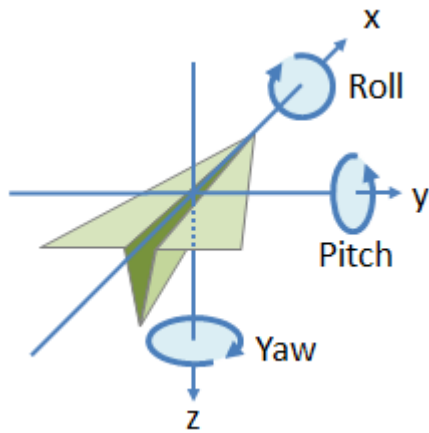
(Continued)

- Decomposition – breaking it down to small manageable parts
 - ✓ Manageable complexity
 - ✓ Faster to dev
 - ✓ Future debugging (allows us to pin-point areas of failure)

	Hangers.UnitTests (59)	156 ms
	Hangers.UnitTests (57)	156 ms
	ConnectivityTests (34)	118 ms
	IsAlmostConnected_Angle (4)	15 ms
	IsAlmostConnected_Angle("0.1 deg",False)	15 ms
	IsAlmostConnected_Angle("44.999 deg",False)	< 1 ms
	IsAlmostConnected_Angle("45 deg","Test")	< 1 ms
	IsAlmostConnected_Angle("45 deg",True)	< 1 ms
	IsAlmostConnected_Angle_Tests(Just over offset tolerance apart (1/31") in lateral direction (not colinear) (1))	< 1 ms
	IsOverlapping_FailingTests(just over offset tolerance apart (1/31") in lateral diretion (not colinear) (1))	< 1 ms
	SplitByConnectivity_HangerRun_Test(Hangers.UnitTests.ConnectivityTests+SplitByConnectivityTestCase)	31 ms
	ElementDistillationTests (2)	5 ms
	RunSplittingTests (20)	26 ms
	SizingTests (1)	7 ms
	Hangers.UnitTests.ConnectivityTests (2)	< 1 ms
	IsOverlapping_FailingTests(just over offset tolerance apart (1/31") in lateral diretion (not colinear) (1))	< 1 ms
	IsOverlapping_Test(just over offset tolerance apart (1/31") in lateral diretion (not colinear) (1))	< 1 ms

(Continued)

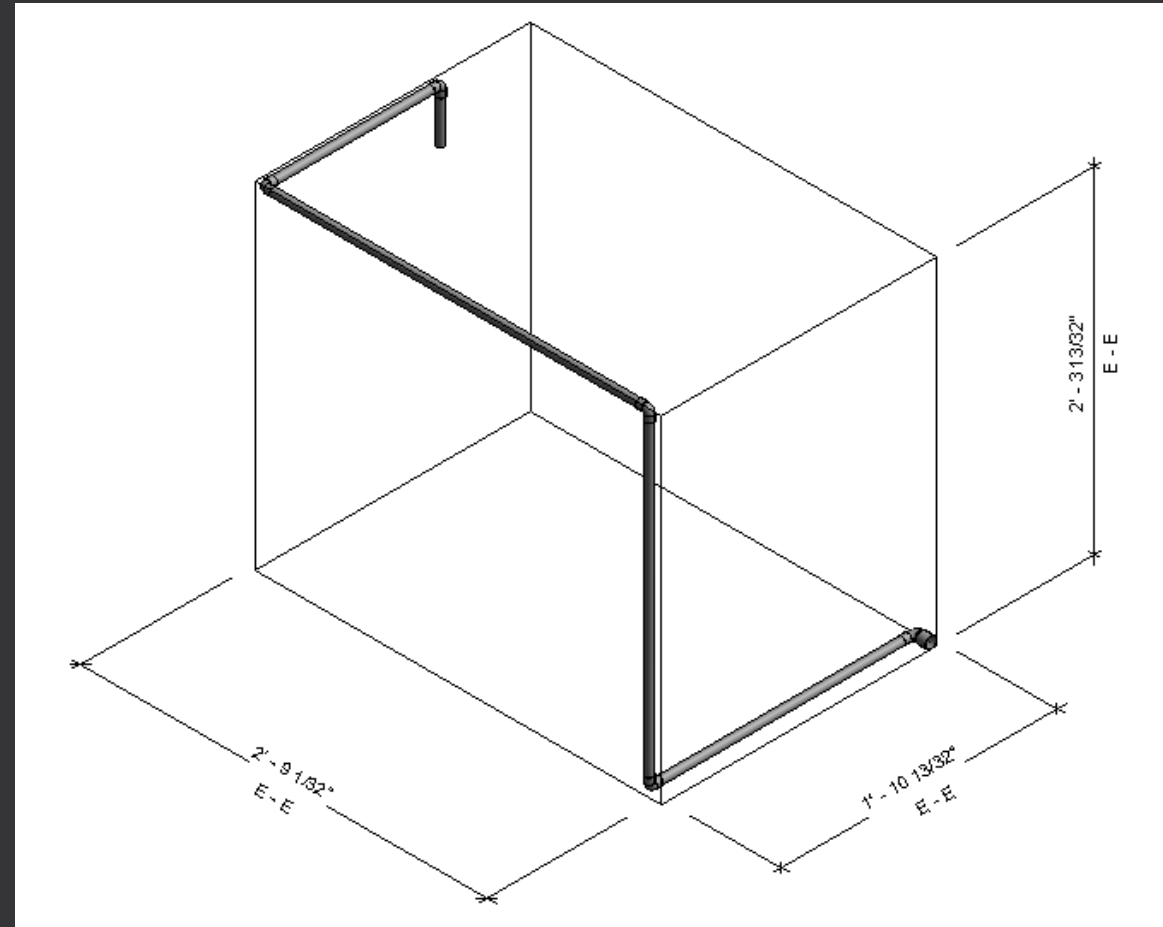
- Code Quality
 - ✓ Abstraction of high-level, critical code
 - ✓ Unit tested

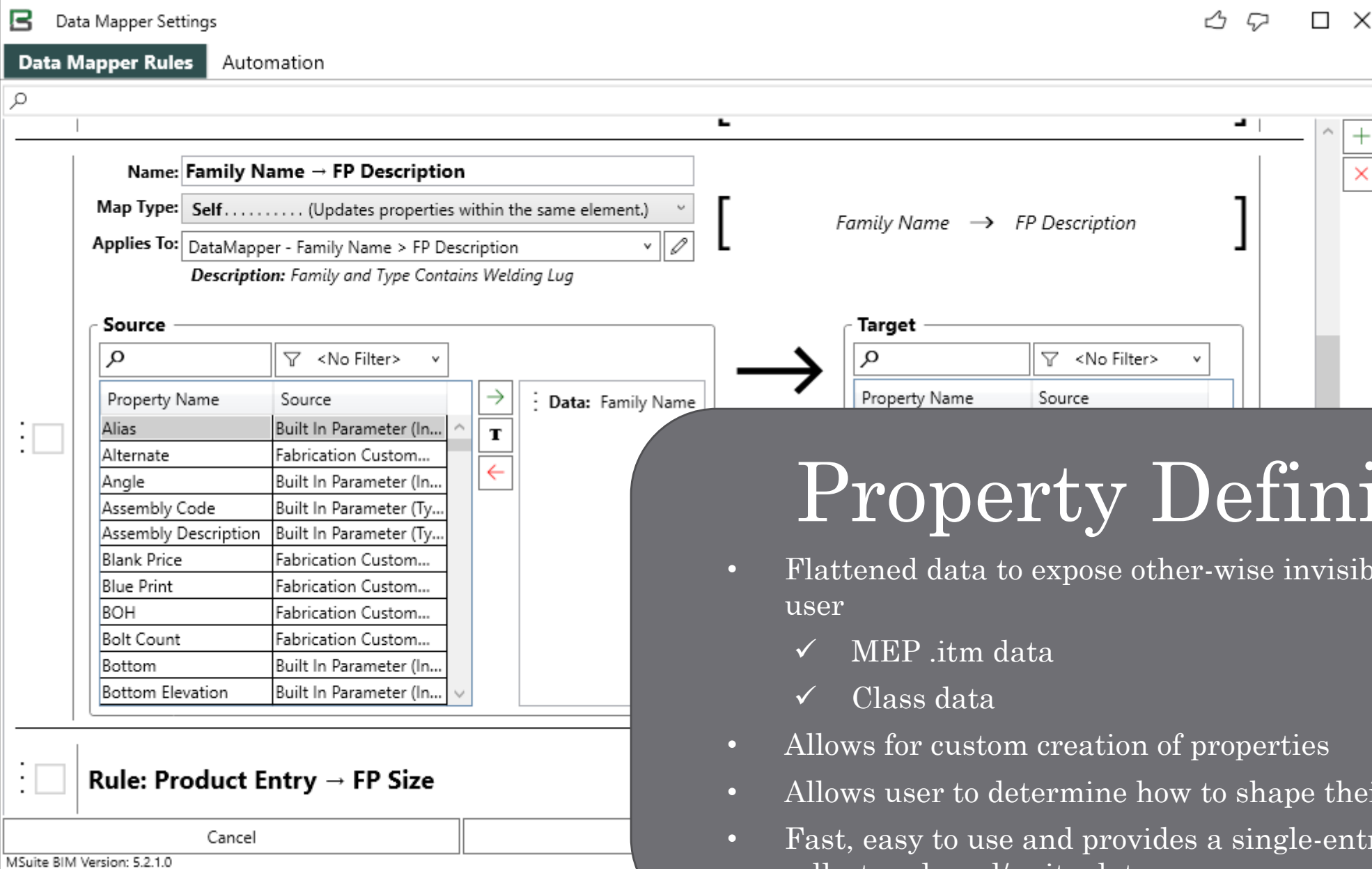


<input type="checkbox"/>	Overall Runs	Below Text: <input checked="" type="checkbox"/>	Dimension Type: <input arial"="" type="text" value="Linear - 3/32\"/>	>
<input checked="" type="checkbox"/>	Overall Edge to Edge (beta)	Below Text: <input checked="" type="checkbox"/>	Dimension Type: <input arial"="" type="text" value="Linear - 3/32\"/>	>
	<input checked="" type="checkbox"/> X (longest direction): <input checked="" type="checkbox"/> Y (next longest direction): <input checked="" type="checkbox"/> Z (shortest direction):			
<input type="checkbox"/>	Rollings Offsets (beta)	Below Text: <input checked="" type="checkbox"/>	Dimension Type: <input arial"="" type="text" value="Linear - 3/32\"/>	>

Overall Dimensions

- Use of Tait-Bryan Euler angles to get rotation matrix from one coordinate system to another
- Accurately determine the volume an assembly will require when shipping to field





Property Definition

- Flattened data to expose other-wise invisible properties to the user
 - ✓ MEP .itm data
 - ✓ Class data
- Allows for custom creation of properties
- Allows user to determine how to shape their data
- Fast, easy to use and provides a single-entry point for how we collect and read/write data