AS468525

8 Yrs’ Worth of Dynamo and Revit Classes from 1 Speaker in 60 Min Volume 2
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Director of Advanced Technology
John A. Martin Structural Engineers

Learning Objectives

- Learn helpful tips on how to push Revit to its limits
- Learn helpful tips on how to push Dynamo to its limits
- Learn eight years’ worth of Revit classes in just one session
- Learn eight years’ worth of Dynamo classes in just one session

Description

This class is part 2 of the top rated lecture class of 2019 of the same name. This class will highlight more of the 25 classes that he has taught classes at Autodesk University since 2012. This class will be presented at a high-speed format that's guaranteed to be fun, fast, and entertaining—from modeling a cow in Revit software to modeling complex structure to using Dynamo. So sit back and enjoy the ride of eight years’ worth of classes volume 2. You’ll be energized by his infectious, passionate style of presenting complex topics and making them easy to understand. No matter your discipline or how you use Revit, you’ll learn something of value and see the different ways to use Revit. This class will cover more than 25 classes and it’s going to be fast and fun from this speaker who has won the 1st place AU speaker award a record 7 times since 2012.
About the Speaker

Marcello currently serves as the Building Information Modelling (BIM) director at John A. Martin & Associates Structural Engineers in Los Angeles, California. Marcello has worked on many BIM projects over the last 18 years including the Walt Disney Concert Hall in Los Angeles; the Ray and Maria Stata Centre at the Massachusetts Institute of Technology; and the Tom Bradley International Terminal Expansion at Los Angeles International Airport. Sgambelluri is internationally recognized as one of the top BIM leaders and contributors to the education and implementation of BIM technology in the building industry. He continually speaks at Autodesk University and the Revit Technology Conference, and he has received a record total of 15 1st place speaker awards between both conferences. Marcello Sgambelluri received his bachelor’s and master’s degrees in civil engineering, and he is a licensed civil and structural engineer.

Marcello also has been building media that includes the following:

Grasshopper and Dynamo for Revit Reference Manual
https://www.simplycomplex.org/dynamo-reference-manual

Simply Complex Blog Site -
http://therevitcomplex.blogspot.com/

Simply Complex Podcast -
http://simplycomplex.sharedcoordinates.com/

AEC Complex Comic -
https://www.aeccomplexcomic.com/
THE DATASET

The Entire DATASET OF all 8 years and 25 classes could be downloaded here. This includes every handout, every dataset and every presentation slide. That's over 13GB worth of datasets, and about 1000 total pages of handouts.

https://a360.co/361XgcN
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<td>5</td>
<td>Zero Touch for Dynamo (1&amp;2)</td>
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<td>2018</td>
<td>6</td>
<td>More Dynamo for Structure</td>
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<td>Who Should Model the Structural Analysis Model?</td>
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<td>2012</td>
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<td>Customizing the Graphical Column Schedule</td>
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Customizing the Graphical Column Schedule (GCS) 2012

CREATE SMART TAGS AT BOT OF GRAPHICAL COLUMN SCHEDULES

STEP 1
CREATE A COLUMN TAG FAMILY WITH BOUNDARY AND GRAPHICS AS SHOWN.

STEP 2
CREATE SHARED PARAMETERS IN COLUMN FAMILY THAT SHOULD BE DISPLAYED IN COLUMN TAG (BASE PLATE DIMENSIONS AND BOLT INFO SHOWN)

STEP 3
ADD SHARED PARAMETERS OF COLUMN TO TAG

STEP 4
ADD TAG TO BASE OF COLUMN SCHEDULE

BASE PLATE DIM, DETAIL INFORMATION PARAMETRIC IN COLUMN SCHEDULE

NOTE:
THE GRAPHICAL COLUMN SCHEDULE IS NOT CUSTOMIZABLE THEREFORE ADDING A SMART TAG AT THE BASE OF THE COLUMN SCHEDULE ALLOWS FOR INFORMATION SUCH AS BASE PLATE SIZES AND DETAIL INFORMATION TO SHOWS UP.
CREATE A ROTATION RIG IN REVIT AC OR MASSING FAMILY

RIDE THE RAIL METHOD

1. CREATE A REFERENCE CIRCLE
2. PLACE TWO POINTS ANYWHERE ON THE CIRCLE.
3. CHANGE THE MEASUREMENT TYPE TO "ANGLE" IN THE PROPERTIES FOR BOTH POINTS.
4. CREATE PARAMETER TO THE FIRST POINT
5. CREATE A PARAMETERS FOR THE SECOND POINT THAT IS + 180 DEGREES OF THE FIRST
6. SELECT BOTH POINTS AND CLICK "SPLINE THRU POINTS"
7. CHANGE NEW LINE TO "REFERENCE LINE" (THIS IS THE NEW HOSTING REFERENCE LINE.)
8. HOST WHATEVER YOU WANT TO THE REFERENCE LINE
9. WHEN THE ANGLE PARAMETER IS CHANGED IT IS STABLE AT ANY PRACTICAL ANGLE INCLUDING 0 AND 90 AND 180

NOTES: THIS METHOD USES THE MASSING OR ADAPTIVE COMPONENTS TO CREATE A STABLE FAMILY ROTATION RIG. THIS IS A GENERAL USE RIG AND COULD BE LINKED TOGETHER TO FORM MULTIPLE ROTATION RIGS.
CREATE A DROPPED CEILING USING A DIVIDED PATH+AC

STEPS

1. OPEN POWER_POINT_POWER_PlAYS_2012_START.rfa

2. SELECT ON BOTH LINES AND DIVIDE PATH

3. CHANGE THE PATH SETTINGS AS SHOWN

4. PLACE THE 2-PT ADAPTIVE COMPONENT “SINGLE COMPONENT” SUCH THAT PT 1 AND PT 2 ARE AT THE ENDS OF THE DIVIDED PATH AS SHOWN

5. CLICK ON ADAPTIVE COMPONENT AND CLICK THE REPEATER COMMAND.

6. RESULTS ARE SHOWN BELOW

7. CHANGE THE PATH SETTINGS OR LINE GEOMETRY AND WATCH DYNAMIC CHANGES

NOTES: THIS METHOD IS GOOD FOR PLACING FRAMING IN EARLY DESIGN. THESE ARE NOT STRUCTURAL FRAMING ELEMENTS AND MAY NEED TO BE CHANGED AT A LATER TIME AS THE DESIGN IS FINALIZED
HOW TO BUILD A COW IN REVIT

STEPS

1. TAKE PICTURES OF A COW (YES A REAL COW) AND CREATE A 3D MESH MODEL USING 123D CATCH OR SIMILAR SOFTWARE. IF YOU ALREADY HAVE A 3D MESH OF A COW THEN SKIP THIS STEP.

2. CLEAN UP THE MESH AND OPEN IN RHINO OR 3DSMAX. GO TO A SIDE VIEW AND REPLICATE BY ARRAY THE PLANES AS SHOWN. SELECT THE PLANES AND COW AND USE THE "INTERSECT" COMMAND. THIS WILL CREATE ALL THE PROFILES NECESSARY TO MAKE A FORM IN REVIT. NOTICE THAT THE PROFILES ARE RADIAL FROM THE BACK FEET TO THE MIDDLE OF THE COW.

3. EXPORT PROFILE LINES INTO REVIT MASSING OR AC FAMILY AND SELECT THE SPLINE THRU POINTS COMMAND AND CLICK THE ENDS OF EACH STRAIGHT-LINE SEGMENT TO CREATE REVIT SPLINES AS PROFILES.

4. WITH ALL THE REFERENCE LINES SELECTED CLICK THE "CREATE FORM" BUTTON. MIRROR THE OTHER SURFACE TO COMPLETE THE COW.

NOTE: MAKE SURE THAT THERE ARE SMOOTH TRANSITIONS BETWEEN EACH PROFILE CURVE. THIS HELPS TO GET THE BODY SURFACE CREATED IN ONE FORM. THIS METHOD ONLY EXPLAINS HOW TO CREATE THE MAIN BODY OF THE COW NOT THE HORNS ETC.
CREATE FLOOR THAT FollowS CURVED WALL

STEPS

1. CREATE A WIDE AND THICK FLOOR SURFACE AT THE DESIRED LOCATION OF THE FLOOR
2. JOIN THE COW WALL AND FLOOR.
3. EDIT THE WALL BOUNDARY
4. SELECT THE EDGE OF THE NEWLY CREATED JOINED WALL.
5. COMPLETE THE SKETCH SO THE FLOOR BOUNDARY CREATES A CLOSED LOOP.
6. CLICK FINISH. THE FINAL PRODUCT SHOULD LOOK LIKE THE FIGURE BELOW.

NOTE: THE METHOD ABOVE COULD BE USED TO HAVE FLOORS FOLLOW ALL TYPES OF WALL SHAPES. ROOF ELEMENTS ALSO WORK. THE IMPORTANT STEP IF TO JOIN THE FLOOR WITH THE WALL SO THE RESULTING JOINED SOLID HAS A “PICKABLE” EDGE
HOW TO SCALE USING PLANTING CATEGORY

Scalable by planting family is basically a trick that is from http://revitswat.wordpress.com/ where nesting the family into another planting family or change the category to planting. When the family is loaded into the project and the preset height parameter value is changed then the entire family scales as shown. If there is no "height" parameter then create one as a type.

Note: This method works great on complex families as shown however requires multiple nesting to get it to scale in a predictable manner and there is little to no control over the scale origin or fine tune control.
# HARDSCAPE FOLLOW TOPO USING DWG

## STEPS

1. OPEN THE FILE "STRAIGHT_WALL_START.RVT" OR CREATE A NEW TOPO SURFACE.

2. GO TO THE SITE PLAN AND ADD A RECTANGULAR BUILDING PAD BOUNDARY BETWEEN GRIDS 1 TO 2 AND A TO B AS SHOWN.

3. SELECT THE "NEW TOPOGRAPHY" ELEMENT ISOLATE AND EXPORT THAT NEW TOPOGRAPHY ELEMENT AS A .DWG.

4. CREATE AN IN-PLACE MASS.

5. INSERT THE NEWLY EXPORTED .DWG.

6. GO BACK TO THE SITE PLAN AND ADD A STRAIGHT WALL IN PLAN. EDIT THE PROFILE AND PICK THE EDGE OF THE INPLACE MASS .DWG UNTIL THE ALL THE EDGES ON GRID A OF THE .DWG ARE PICKED.

7. RESHAPE THE WALL PROFILE. SELECT THE TOP OF THE WALL AND COPY IT VERTICALLY. THE WALL PROFILE SHOULD LOOK LIKE THE FIGURE SHOWN.

## NOTES

- The building pad is sacrificial geometry to create the straight wall and you will be using its upper edge to locate the wall. If a DWG is not preferred to be left in Revit then delete it, not using this method is also an option.
ENAGGE YOUR AUDIENCE BY MAKING THEM FEEL GREAT

I've learned that people will forget what you said, people will forget what you did, but people will never forget how you made them feel.

Maya Angelou

TIPS TO ENGAGE YOUR AUDIENCE DURING A PRESENTATION

YOU NEED TO ENGAGE THE AUDIENCE AND YOU NEED TO MAKE SURE THAT WHAT YOU ARE SAYING IS COMING FROM YOUR HEART. I REALIZED QUICKLY THAT IT IS PEOPLE’S EMOTIONS THAT YOU NEED TO REACH OUT TO AND MAKE THEM FEEL LIKE YOU CARE. THAT IS HOW YOU GET THE AUDIENCE TO REMEMBER YOUR PRESENTATION. ALL YOU NEED TO DO IS KEEP THEM INTERESTED, ACTIVE AND FEELING LIKE YOU CARE ABOUT THEM. WHEN I AM AT A CONFERENCE, I ASK PEOPLE I KNOW WHEN THEY LEAVE A PRESENTATION, WHAT THEY THOUGHT ABOUT IT. WHEN THE PRESENTATION IS UNEVENTFUL I GET AN ANSWER SUCH AS “IT WAS OK” OR A LITTLE SHOULDER SHRUG. WHEN THE PRESENTATION WAS ENGAGING OR MADE THEM FEEL GOOD THE ANSWER IS ALMOST ALWAYS “THAT WAS AMAZING!” SO THE POINT IS YOU WANT TO ENGAGE THE AUDIENCE TO TURN THIS COMMENT “IT WAS OK” TO THIS COMMENT “THAT WAS AMAZING!”

THE EASIEST WAY TO ENGAGE AN AUDIENCE IS TO ASK QUESTIONS. BEFORE I START A PRESENTATION I ALWAYS POLL THE AUDIENCE TO FIND OUT WHO IS ACTUALLY IN THE AUDIENCE.

NOTES: FOR MORE INFORMATION VISIT THE AUTODESK WEBSITE AND WATCH THE CLASS ON “HOW TO ENGAGE AN AUDIENCE”
CREATING SURFACES WITH PROFILE ORDER

THESE NODES SELECT THE PROFILE CURVES

THIS NODE CREATES A LIST IN THE CORRECT PROFILE ORDER

THIS NODE CREATES THE SURFACE LOFTED OVER THE CORRECT PROFILE ORDER

STEP 1: OPEN REVIT FILE “PROFILEORDER_START.RVT”
STEP 2: OPEN A NEW DYNAMO FILE AND ADD NODES AS SHOWN
STEP 3: SELECT ELEMENT 0, 1, 2 IN THAT ORDER USING THE “SELECT” NODE AND RUN
NOTE: THE REVIT MASSING FAMILY DOES NOT ALLOW FOR PROFILES TO BE SELECTED IN ORDER
GET AND SET INSTANCE PARAMETERS WITH LINK FILE

SELECTS LINKED FILE IN REVIT

GETS THE WALL ELEMENTS FROM THE LINKED FILE IN REVIT (AMAZING!)
(NOTE: THIS IS A CUSTOM NODE IN THE SPRING NODE PACKAGE)

GETS THE BASE OFFSET PARAMETER VALUE

SETS THE WALL CAT.

SELECTS ALL THE COLUMN TYPES IN THE PROJECT

SETS THE BASE OFFSET PARAMETER OF THE COLUMN TO THE BASE OFFSET PARAMETER OF THE WALL

WALL IS FROM A LINKED FILE!

ORIGINAL LOCATION OF BOTTOM OF COLUMNS

NEW LOCATION OF BOTTOM OF COLUMNS

STEP 1: OPEN FILE “GET_SET_PARAMETERS_START_LINK.RVT”
STEP 2: OPEN A NEW DYNAMO FILE, PLACE NODES AS SHOWN AND RUN SCRIPT FOR EACH COL
SELECT THE LINKED FILE USING THE “SELECT MODEL ELEMENT” UI NODE
NOTES: LINKED FILES ARE “READ ONLY”
TOTAL SURFACE AREA OF STRUCTURAL BEAMS

**Categories**
- Structural Framing > Category

**All Elements of Category**
- Category Elements

**Element.Solids**
- element > Solid[]

**Solid.Area**
- solid > double

**List.Flatten**
- list > var[]...[]
- amt >

**Math.Sum**
- values > sum

**Steps & Notes**
- Step 1: Open file "TOTAL_SURFACE_AREA_OF_STRUCT_BEAMSRVT"
- Step 2: Open a new Dynamo file, place nodes as shown and run script
- Notes: Alt. method is to extract solid and get surface area and could be used on most Revit solid and surface elements

CONVERTS THE REVIT GEOMETRY OF BEAM TO DYNAMO SOLIDS

SELECTS ALL THE INSTANCES OF BEAM TYPE

GETS THE SURFACE AREA OF EACH SOLID

FLATTENS THE AREA LIST TO 1 LIST

SUMS THE LIST OF EACH BEAM AREA
### Total Surface Area of Mech Equipment

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<th>Select Model Elements</th>
<th>Element.Faces</th>
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<tr>
<td>5557 5574 5634</td>
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**This node selects all the elements in Revit**

**This node converts all the Revit family geometry to Dynamo surfaces**

**This node flattens all the items into a single list**

---

**Dynamo Geometry**

**Revit Geometry**

---

**Steps & Notes**

1. Open file "SURFACE_AREA_ROBOT_START.RVT"
2. Open a new Dynamo file, place nodes as shown and run script

Notes: Alt. method is to extract solid and get surface area and could be used on most Revit solid and surface elements
CREATE A ROTATION RIG IN REVIT USING A REVOLVE

REVOLVE ELEMENT
(WITH CONSTANT LENGTH)

START ANGLE

END ANGLE

HOST CONTENT ON THIS REFERENCE LINE

REFERENCE LINE

CONTROL ROTATION VIA
START AND END ANGLES OF
REVOLVE EXTRUSION

REVOLVE METHOD

3D VIEW

NOTES: THIS METHOD USES THE START AND END ANGLES TO CONTROL THE ANGLE, NOT THE
ANGLE PARAMETER. THIS WAY, THE REVOLVE ELEMENT COULD BE A CONSTANT ARC LENGTH
AND ANGLE AND THE END ANGLE IS "CHASING" ITS START ANGLE. THIS COULD BE USED ON FAMILIES
AT ROTATION POINTS SUCH AS FOR THIS TELEHANDLER FAMILY.
TEXT TO UPPERCASE ROOM NAMES

1. THIS NODE SELECTS THE ROOM CATEGORY
2. THIS NODE SELECTS ALL THE INSTANCES OF ROOMS IN THE REVIT PROJECT
3. THESE NODES "GET" OR DISPLAY THE CURRENT NAME OF THE ROOM
4. THESE NODES "SET" THE CURRENT NAME OF THE ROOM TO THE ROOM NAME PARAMETER
5. THIS NODE SETS ALL THE UPPER CASE TEXT TO THE ROOM NAME PARAMETER

STEP 1: OPEN REVIT SAMPLE PROJECT "TEXT_TO_UPPERCASE_ROOM_TEXT_START.RVT"
STEP 2: OPEN A NEW DYNAMO FILE, PLACE NODES AS SHOWN AND RUN SCRIPT
NOTES: THE METHOD ABOVE WORKS WELL WHEN CHANGING MANY ROOM TEXT NOTES TO UPPER CASE
ORIENT BEAM FRAMING TO SURFACE USING AC

STEP 1
OPEN FILE BEAM_ORIENTATION_START.RVT
SELECT THE SURFACE AND CLICK DIVIDE SURFACE
CHANGE THE GRID SPACING TO 1 AND 12
DISPLAY THE NODES ON THE DIVIDED SURFACE
ADD THE TWO-POINT AC TO EACH DIVIDED SURFACE NODE

STEP 2
SELECT THE AC AND CLICK THE REPEAT ICON
WATCH THE BEAMS ORIENT TO THE SURFACE

NOTES: THIS METHOD USES ADAPTIVE COMPONENTS AS BEAMS AND SINCE THE POINTS ARE HOSTED TO THE SURFACE THE ADAPTIVE COMPONENTS WILL ORIENT TO THE SURFACE
CREATE BALL JT ROTATION VIA HOSTING PT ON SURFACE

STEP 1
CREATE A REFERENCE LINE REVOLVE A CIRCLE ROUND THAT REFERENCE LINE TO CREATE A SPHERE.

STEP 2
PLACE TWO POINTS AND HOST THEM ON THE SPHERE. PLACE A REFERENCE "SPLINE" BETWEEN THESE POINTS HOST ANYTHING TO THE REFERENCE LINE CREATE PARAMETERS TO CONTROL THE LOCATIONS OF REFERENCE LINE SIMILAR TO THE "REVOLVE" METHOD. USE "PICK NEW HOST" IF POINTS NEED TO BE REHOSTED

NOTES: THIS METHOD USES THE START AND END POINTS HOSTED ON THE SPHERE TO CONTROL THE REFERENCE LINE. THIS METHOD COULD BE USED TO SIMULATE BALL JOINT MOVEMENTS. IN THE EXAMPLE SHOWN IT IS SHOWING HOW TO MOVE THE HEAD OF A COW MODELED IN REVIT
CHANGE BEAM TYPES USING ENGINEERING LOGIC

1. **SELECTS ALL THE STRUCTURAL FRAMING**
   - Code Block:  
     ```
     Category
     Structural Framing
     ```

2. **GETS THE BEAM LENGTHS**
   - Code Block:  
     ```
     Element.GetParameterValueByName
     element
     parameterName
     value
     ```

3. **SETS THE BEAM SIZES BASED ON MIN VALUE FOR JUST 2 BEAM TYPES**
   - Code Block:  
     ```
     Structural Framing Types
     W12x19
     W24x55
     ```
   - Note: More beams sizes could be used by using more if statements

4. **SWITCHES THE BEAM FRAMING TYPE**
   - Code Block:  
     ```
     "Family and Type":
     ```

**BEAM SIZES BEFORE CHANGE**

**BEAM SIZES AFTER CHANGE**

**STEPS & NOTES**

1. Open "CHANGE_BM_TYPE_LOGIC_START.RVT"
2. Open a new Dynamo file and add nodes and run

**NOTES:** The "FAMILY AND TYPE PARAMETER" is used to change the family type also consider using your own engineering rules of thumb
CONVERT REVIT ANALYTICAL BMS + PTS TO SOLIDS FOR RENDERING IN A GAME ENGINE (SIMPLE METHOD)

ANALYTICAL NODES

- SELECTS ALL ANALYTICAL NODES IN THE PROJECT
- CONVERTS ANALYTICAL NODES TO DYNAMO PTS
- ADDS SPHERES TO ALL ANALYTICAL NODES
- IMPORTS ALL SOLIDS INTO REVIT VIA SAT IMPORT

ANALYTICAL BMS

- SELECTS ALL ANALYTICAL BMS IN THE PROJECT
- CONVERTS ANALYTICAL BMS TO DYNAMO CURVES AND JOINS THEM
- ADDS CYLINDERS TO ALL ANALYTICAL LINES
- IMPORTS ALL SOLIDS INTO REVIT VIA SAT IMPORT

ANALYTICAL LINES IN REVIT

ANALYTICAL MODEL CONVERTED TO SOLIDS IN REVIT

ANALYTICAL REVIT SOLID MODEL RENDERED IN A GAME ENGINE

STEP 1: OPEN “ANALYTICAL_MODEL_START.RVT”
STEP 2: OPEN A NEW DYNAMO FILE AND ADD NODES AS SHOWN AND RUN SCRIPT
STEP 3: ISOLATE AND OPEN OR EXPORT TO GAME ENGINE
NOTE: GAME ENGINES WILL NOT RENDER SINGLE LINES AND NODES THUS NEED METHOD ABOVE
INTERACTIVE: SIMPLY CONSTRUCTION ANIMATIONS

STEP 1
OPEN MAX FILE AND SET UP ANIMATIONS. SELECT THE ELEMENTS AND EXPORT "FBX SELECTED. VERIFY THAT "BAKE ANIMATION" IS CHECKED

STEP 2
OPEN INTERACTIVE FILE (BEST RESULTS WITH LIVE TEMPLATE AND IMPORT THE FBX.

STEP 3
AFTER FBX IMPORT PLACE THE ASSET IN SCENE. ADD FLOW NODES AS SHOWN TO CONTROL THE ANIMATION (ANIMATION CONTROLLER IS NOT NEEDED) CONSIDER ADDING A “STOP” CONTROL AS WELL. TEST AND DEPLOY! NOW YOUR USERS COULD ZOOM AND PAN AS ANIMATION RUNS. NO MORE STATIC ANIMATION CAMERAS

NOTE
FOR ELEMENTS WITH ANIMATION ITS MORE STABLE TO EXPORT VIA FBX AND THEN IMPORT INTO INTERACTIVE THEN TO USE THE MAX TO INTERACTIVE LINK

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Who Should Model the Structural Analysis Model? 2017

THE AEC-COMPLEX COMIC

***BACK AT THE***
STRUCTURAL ENG. OFFICE

I'M TIRED OF JUST HAVING READ ACCESS TO REVIT.
AS AN ENGINEER, I NEED WRITE ACCESS AS WELL.
I AM TIRED OF THE BIM STAFF SAYING ENGINEERS ARE GOING TO MESS UP REVIT.

OK BUT ONLY IF THE BIM STAFF GETS READ AND WRITE ACCESS TO YOUR STRUCTURAL ENGINEERING MODELS.

NO WAY THEY COULD MESS IT UP.
THEY HAVE NO BUSINESS OPENING THOSE UP.

WELL NOW YOU KNOW HOW THEY FEEL.

WOW. I NEVER THOUGHT ABOUT IT LIKE THAT BEFORE.
OK BIM STAFF COULD HAVE READ ACCESS ONLY TO THE STRUCTURAL ANALYSIS MODELS.

OK, THEN ENGINEERS GET READ ONLY ACCESS TO REVIT.

HERE WE GO AGAIN.
ALIGN REVIT BEAMS WITH AN OFFSET WITH DYNAMO PLAYER

**Select Model Element**
- Change: Element
- Element: 388863

**Select Edge**
- Change: Curve
- Edge of Element Id: 815786

**Element.SetLocation**
- element: void
- geometry: 

**Dynamo Nodes**
- **Curve.Offset**
  - curve: Curve
  - distance: 

**Offset Curve From Edge**
- Offset curve from edge of slab by “1” note: sliders become input in Dynamo player

**Steps**
1. Open file “ALIGN_OFFSET_START.RVT”, open new Dynamo, add nodes, and save
2. Open Dynamo player and navigate to folder with .dyn file
3. Select the “Edit Inputs’ on player, select slab edge and beam and click run
ANATOMY OF A SIMPLE ZERO TOUCH NODE W/ INPUT

1: THE NAME OF THE ZERO TOUCH LIBRARY OR HIGHEST LEVEL FOLDER NAME (SHOWN IN THE DYNAMO BROWSER) IS THE NAME OF THE DLL.


4: THE NAME OF THE ZERO TOUCH NODE IS THE NAME OF THE METHOD IN THE ZERO TOUCH CODE.

5: THE NAME OF THE INPUT PORT IS THE NAME OF THE PARAMETER. ALSO IF PARAMETER IN METHOD IS `="` TO A VALUE, THAT VALUE IS THE DEFAULT VALUE IN THE INPUT PORT.

6: THE NAME OF THE OUTPUT PORT IS THE NAME OF THE METHOD TYPE RETURNED (INT IN THIS EXAMPLE.) ALSO SEE NOTES BELOW.

DYNAMO BROWSER

LIBRARY (DLL) LOC.

VISUAL STUDIO CODE

namespace MY_LIBRARY_FOLDER
{
    public class GETSIMPLEINFO
    {
        private GETSIMPLEINFO()
        {
        }
        
        public static int marcelloAgeNodeNoInput(int fudgefactor = 0)
        {
            int marcelloAge = friends.Marcello.Age + fudgefactor;
            return marcelloAge;
        }
    }
}

GETSIMPLEINFO.marcelloAgeNodeNoInput

fudgefactor

int

NOTES:
UNDERSTANDING THE STRUCTURE OF THE ZERO TOUCH PROJECT IS IMPORTANT AS IT WILL DETERMINE THE ORGANIZATION OF THE DYNAMO NODE LIBRARY. ALSO IF MULTIPLE OUTPUT IS REQUIRED THEN THE METHOD WILL NEED TO OUTPUT A “DICTIONARY” OF MULTIPLE VALUES.
Zero Touch for Dynamo COW 2019

CREATE A COW IN DYNAMO WITH MULTIPLE OUTPUT PORTS

//SETTING UP MULTIPLE RETURNS TAG

```
[MultiReturn(new[] { "LeftBody", "LeftLeg", "RightBody", "RightLeg", "LeftEye", "RightEye", "LeftHorn", "RightHorn" })]
```

//RETURNING

```
Dictionary<string, object> OutInfo =
   new Dictionary<string, object>
{
   {"LeftBody", Surfaceratorio},
   {"LeftLeg", Surfacedleaf},
   {"RightBody", Mirrorsurfaceratorio},
   {"RightLeg", Mirrorsurfacedleaf},
   {"LeftEye", RotationEyeball},
   {"LeftHorn", RotationHorn},
   {"RightEye", MirrorRotationEyeball},
   {"RightHorn", MirrorRotateHorn},
};
return OutInfo;
```

//RETURNING

```
Dictionary<string, object> OutInfo =
   new Dictionary<string, object>
{
   {"LeftBody", Surfaceratorio},
   {"LeftLeg", Surfacedleaf},
   {"RightBody", Mirrorsurfaceratorio},
   {"RightLeg", Mirrorsurfacedleaf},
   {"LeftEye", RotationEyeball},
   {"LeftHorn", RotationHorn},
   {"RightEye", MirrorRotationEyeball},
   {"RightHorn", MirrorRotateHorn},
};
return OutInfo;
```

MY ZERO TOUCH LIBRARY
- MY LIBRARY FOLDER
  - Dynamo Geometry
  - DynamoCow

OPEN VISUAL STUDIO FOLDER "CREATE_DYNAMO_COW_FINAL" OPEN SLN FILE.
TYPE CODE AS SHOWN. BUILD THE SOLUTION.
OPEN DYNAMO AND START A NEW FILE, LOAD THE DLL FROM BIN FOLDER.
ADD NODES AS SHOWN. OPEN "FINAL" FILE FOLDER IF NEEDED. NOTE VALUE IS ALWAYS IN DECIMAL FEET.
**GET ETABS ANALYSIS FRAME RESULTS**

CASE TYPE "1" IS ENUM = LINEAR

GETS LOAD CASES FROM ETABS FILE

SEPARATES LOAD CASE TO BE DISPLAYED. (DEAD) IN THIS CASE

DISPLAYS OUTPUT LOAD CASE

GETS FRAME ANALYSIS RESULTS FROM FRAME

CREATE AN EMPTY LIST IF NO LOAD COMBO OUTPUT IS DESIRED

DISPLAYS OUTPUT MOMENT IN STRONG DIR. UNITS = LB-IN

VIA DYNAMO CONVERT UNITS TO K-FT

**ETABS RESULTS**

**Diagram for Beam B 10 at Story Storey 4 90070132**

**Steps & Notes**

1. OPEN ETABS "ETABS_GEOMETRY_ANALYTICS_FINAL EDB" AND RUN ANALYSIS
2. AND OPEN DYNAMO AND ADD THE NODES ABOVE

**Notes:**
1. RESULTS SHOW LOAD CASE OR LOAD COMBO ALSO NOTE UNITS ARE IN LB-IN
2. IF THE NODE DOES NOT UPDATE PLACE A NEW NODE ON CANVAS
GET ETABS GEOMETRY TO GAME ENGINE

STEPS: 1. OPEN ANY ETABS MODEL “ETABS MODEL VIEWER.EDB” OPEN DYNAMO
2. OPEN ADD THE NODES ABOVE
NOTES: 1. BEST IF DYNAMO FOR ETABS IS RUN IN MANUAL-
2. ONLY FRAMES ELEMENTS ARE SHOWN IN GAME ENGINE
CREATE WALKING CROWD USING POPULATE IN 3DSMAX

STEP 1: OPEN THE POPULATE MENU

STEP 2: CREATE A FLOW PATH BY LEFT CLICKING ON THE CANVAS AND RIGHT CLICK WHEN DONE

STEP 3: CLICK SIMULATE AND THE CHARACTERS WILL POPULATE THE FLOW AREAS. ADJUST OPTIONS IF NEEDED

CHANGES THE DENSITY OF THE AMOUNT OF PEOPLE ON THE FLOW AREA.

SIMULATED WALKING CROWDS

NOTES
THIS METHOD FOR POPULATING AN AREA IN 3DSMAX IS ONLY TO SHOW ONE SIMPLE METHOD. THERE ARE MANY OTHER METHODS AND MANY OTHER OPTIONS FOR POPULATING AREAS IN 3DSMAX.
GET BEAM DESIGN INFO: STUDS,CAMBER, ETC USING DYNAMO

CONNECTING DYNAMO WITH RAM VIA API 2018

STEP 1: OPEN FOLDER "BEAM DESIGN_OUTPUT" OPEN BLN FILE, BUILD SOLUTION
STEP 2: OPEN ETABS FILE "ETABS TO_RAM_START.DBD"
STEP 3: OPEN DYNAMO, LOAD RECENTLY BUILT DLL, PLACE NODES AS SHOWN (MAKE SURE TO HAVE SIMPLEX INSTALLED)
STEP 4: SELECT THE RAM FILE VIA FILE PATH NODE AND WATCH THE RESULTS

NOTE: RAM DOES NOT NEED TO BE OPEN. SEE SIMPLEX PACKAGE AND RAM API MANUAL FOR REFERENCE
COMPARING STORY NAMES TO GET STORY IDS, SOMETIMES WILL TAKE A MOMENT TO RUN RESULTS
LEARN HOW TO GET YOUR REVIT FAMILIES TO MOVE IN THE AUTODESK STINGRAY GAME ENGINE (CLASS PROPOSAL 2017)

NOTE:
The typical workflow is Revit to Stingray, some families require Revit to 3dsmax to Stingray
DEPLOY REVIT PROJECTS VIA ENSCAPE

1. REVIT TO ENSCAPE
OPEN REVIT AND GO TO A 3D VIEW
CLICK ON ADDINS
CLICK ON ENSCAPE
CLICK ON START

THE REASON TO CREATE A STANDALOG .EXE FILE IS TO SHARE WITH OTHERS YOUR ENSCAPE SCENE. THE EXE FILE COULD BE OPENED BY OTHERS WHO DO NOT HAVE ENSCAPE. NOTE THAT IT TAKES A LOT OF COMPUTER RESOURCES TO VIEW THE STAND ALONG EXE FILE FROM ENSCAPE AND SOME PEOPLE MAY NOT BE ABLE TO OPEN OR VIEW THE .EXE FILE.
Connecting Dynamo with RAM via API 2019

**GET COLUMN AND BEAM CENTERLINES FROM RAM AND CONVERT TO DYNAMO LINES**

**DYNAMO NODES**
- **SELECTS THE RAM MODEL**
- **GETS BM LINE AND CONVERTS TO DYNAMO LINE PER STORY**
- **GETS COL LINE AND CONVERTS TO DYNAMO LINE PER STORY**
- **CREATES A LIST OF STORIES**

**DYNAMO GEOMETRY**
- **VIEWING BEAM AND COLUMN CENTERLINES IN DYNAMO ALLOWS FOR QUALITY CONTROL OF JOINTS BECAUSE RAM DOES NOT SHOW CENTERLINE GEOMETRY IN 3D VIEW IN RAM**

**STEPS & NOTES**
- **STEP 1:** OPEN VISUAL STUDIO FOLDER “GET_BEAM_COL_GEOMETRY” OPEN SLN FILE
- **STEP 2:** OPEN DYNAMO AND LOAD DLL AND PLACE NODE ADD STORIES AS A LIST
- **STEP 3:** SELECT THE RAM FILE VIA FILE PATH NODE AND WATCH THE RESULTS
- **NOTE:** RAM DOES NOT NEED TO BE OPEN. SEE SIMPLEX PACKAGE AND RAM API MANUAL
REVIT FAMILY GEOMETRY TO RHINO GEOMETRY

**STEPS**
1. OPEN REVIT MODEL RHINO_TO_REVIT.RFA
2. ACTIVATE RHINO INSIDE REVIT
3. OPEN NEW GRASSHOPPER FILE
4. OPEN NEW RHINO FILE
5. ADD GRASSHOPPER NODES AS SHOWN
6. RIGHT CLICK ON “FACE” NODE AND MULTISELECT REVIT FACES AND CLICK “FINISH”
7. RIGHT CLICK ON “GEOMETRY” NODE AND SELECT “BAKE”
   NOTE: “BAKE” WRITES GRASSHOPPER GEOMETRY TO RHINO

**NODE SELECTS FACES ON REVIT FAMILY**

**NODE CONVERTS REVIT GEOMETRY TO GRASSHOPPER GEOMETRY**

**RHINO**

**RHINO_TO_REVIT.3DM FILE**
(YES IT IS A RHINO IN RHINO)

**NOTES:**
THERE ARE MANY WAYS TO BRING REVIT GEOMETRY INTO RHINO. THIS IS ONLY ONE METHOD.
USE FACE NODE TO SELECT GEOMETRY DIRECTLY FROM REVIT FAMILY. FOR A FAMILY IN A PROJECT FILE USE SELECT ELEMENT NODE.
8 Yrs’ Worth of Dynamo and Revit Classes Volume 2 2020

GRASSHOPPER FOR REVIT

INTEROPERABILITY

RHINO CURVES TO REVIT BMS SIZES VIA USER TEXT

GETS THE USER ATTRIBUTES IN KEY VALUE PAIR FORM FROM BM CL IN RHINO (USES ELEFRONT COMPONENT)

KEY VALUE PAIR

CREATE A BM IN REVIT BASED ON RHINO BM CENTERLINE (LOCATION)

GET COL SIZE (TYPE) FROM KEY VALUE PAIR

Revit
0 FamilySymbol : W
Shapes : W12X26

STEP 1: OPEN FILE “GH_RHINO_TO_REVIT_BM_START.RVT” OPEN *.3DM
STEP 2: PLACE NODES AS SHOWN RUN AND SEE RESULTS (NOTE ELEFRONT CUSTOM NODE)
NOTE: THESE BMS WERE SIZED BASED ON USER ATTRIBUTES/KEY VALUE PAIRS ASSIGNED IN RHINO. KEY VALUE PAIRS HELP PASS DESIGN INFO BEYOND JUST GEOMETRY TO REVIT.