AUTODESK. UNIVERSITY

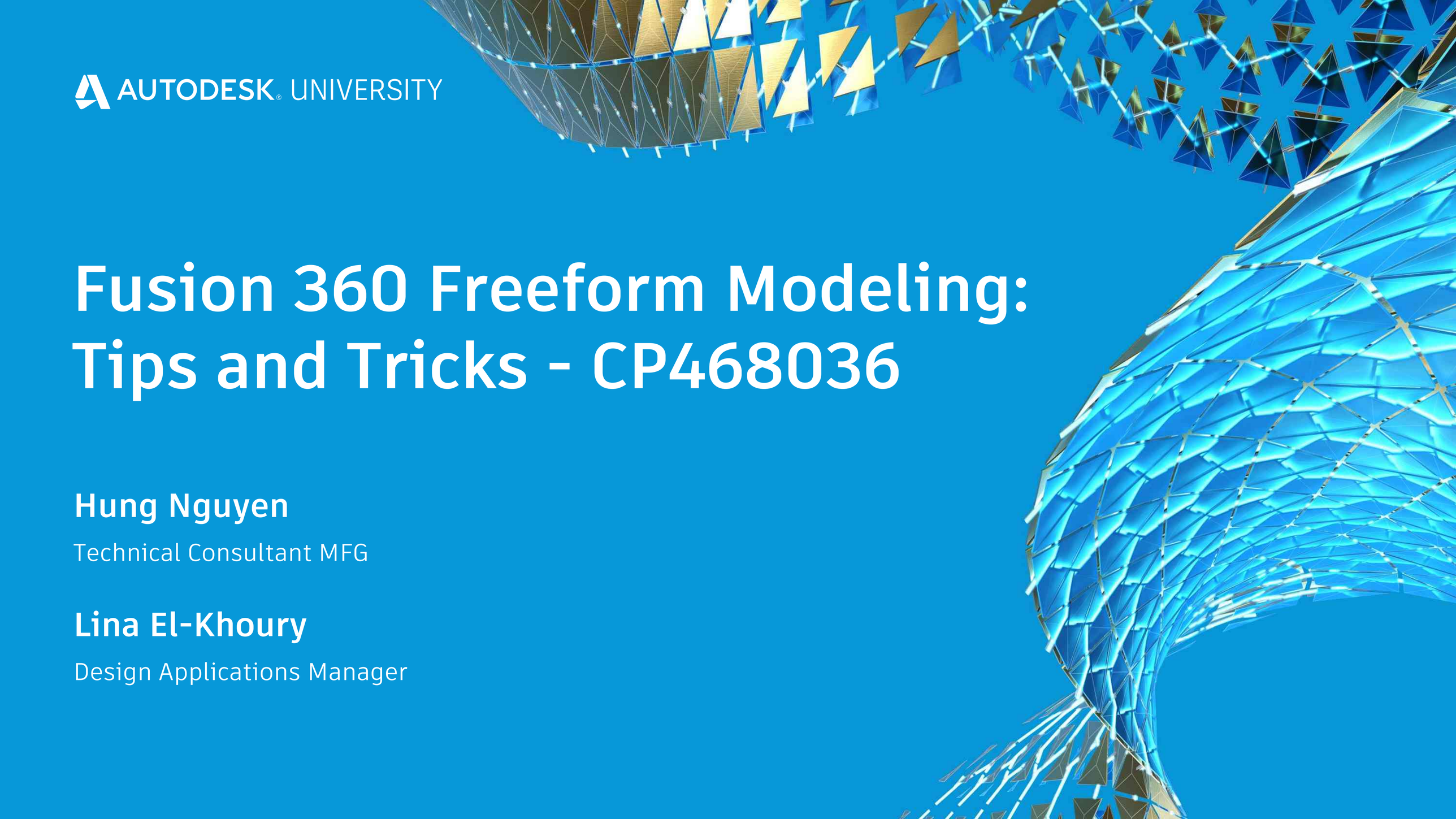
Fusion 360 Freeform Modeling: Tips and Tricks - CP468036

Hung Nguyen

Technical Consultant MFG

Lina El-Khoury

Design Applications Manager



SolidCAD
A Cansel Company

About the speaker

Hung Nguyen

- Many years of experience in Autodesk Products.
- AEC & Manufacturing Technical Consultant.
- Presented multiple times at Revit Technology Conference (RTC), Canadian Festival of Architecture, CanBIM, and Autodesk University from 2013 to 2020.

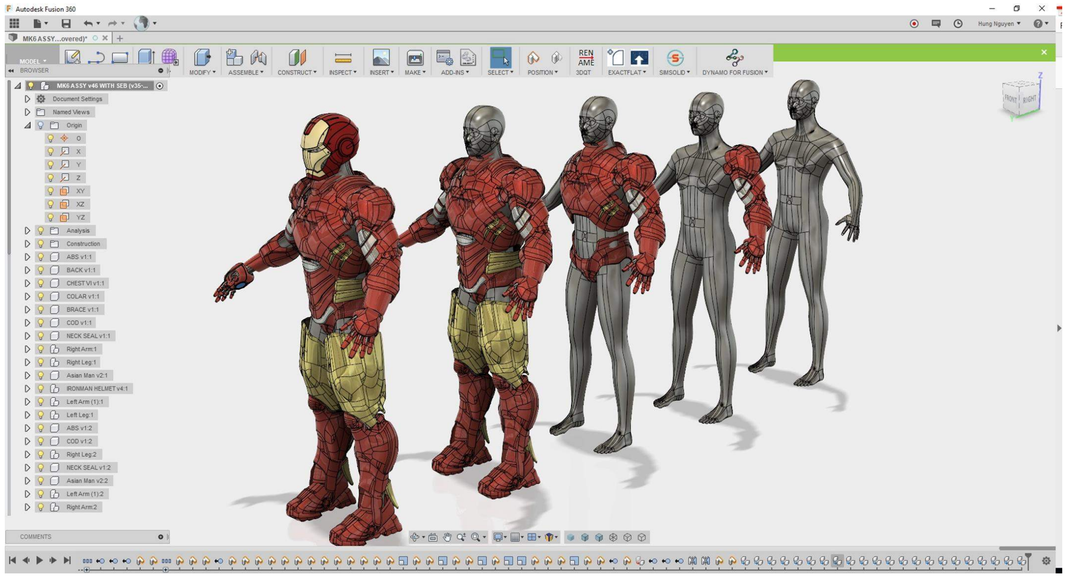
About the speaker

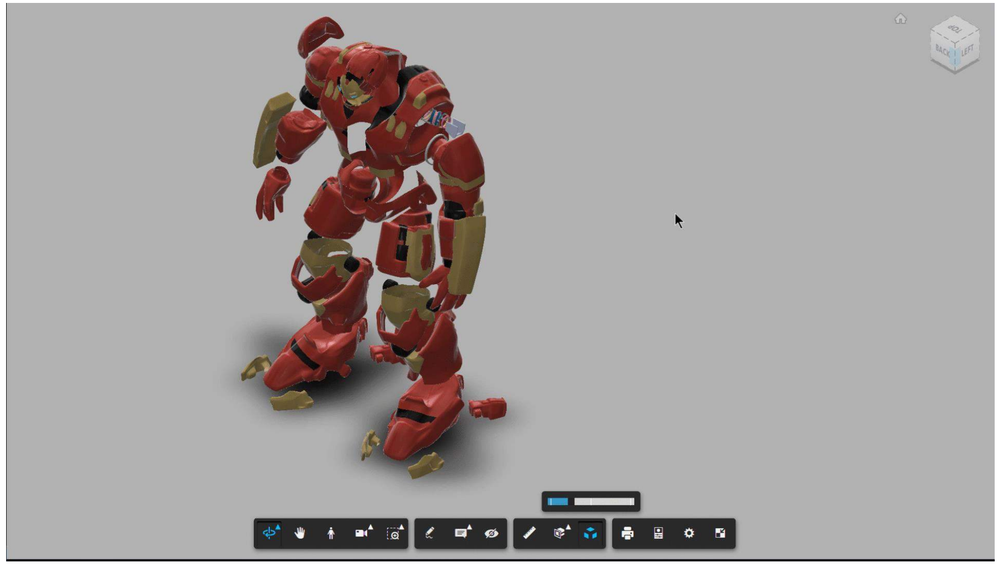
Lina El-Khoury

- Design Applications Manager at James KM Cheng Architects.
- With Over 25 years of experience in AEC and Manufacturing.
- Specializing in BIM technologies implementation and Building manufacturing.
- Always raising the bar for better BIM projects deliverables, team cohesion and collaboration - with a forward-thinking.
- Love ❤️ … and love ❤️ Fusion 360

Class Description

Sharing Fusion 360 free-form modeling tips and tricks that were used to model the Ironman Suit and the Ironman Armor: Mark XLIV–HulkBuster. The process of making these suits were presented at Autodesk University 2017 and 2018. These two models were also posted on the Fusion 360 Gallery.



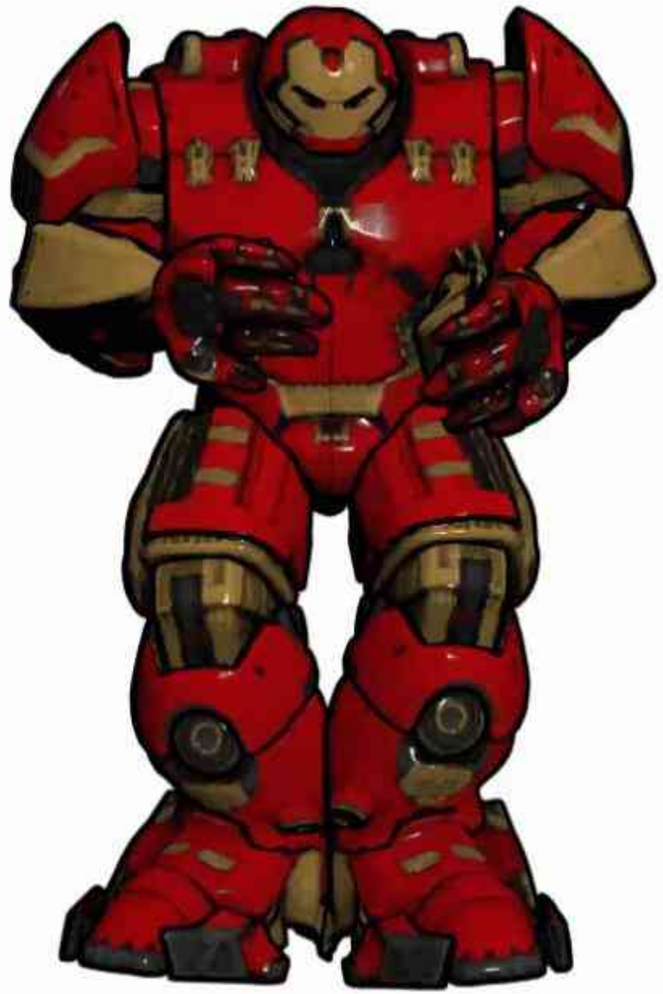


Class Objectives

At the end of this class, you may have:

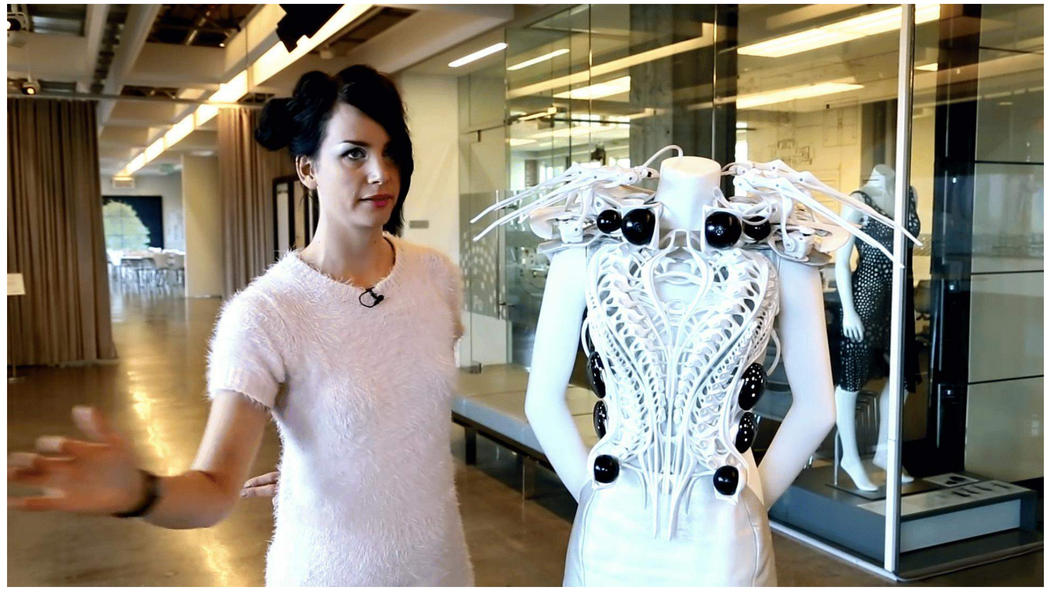
- An understanding of why we design digitally
- A methodology of how to do it.
- Some Inspiration for Using Fusion 360
- A bit of Fun & Stretching your imagination

Let’s warm up & get ready…



The Inspirations

MY LOVE FOR FUSION 360 STARTED HERE…

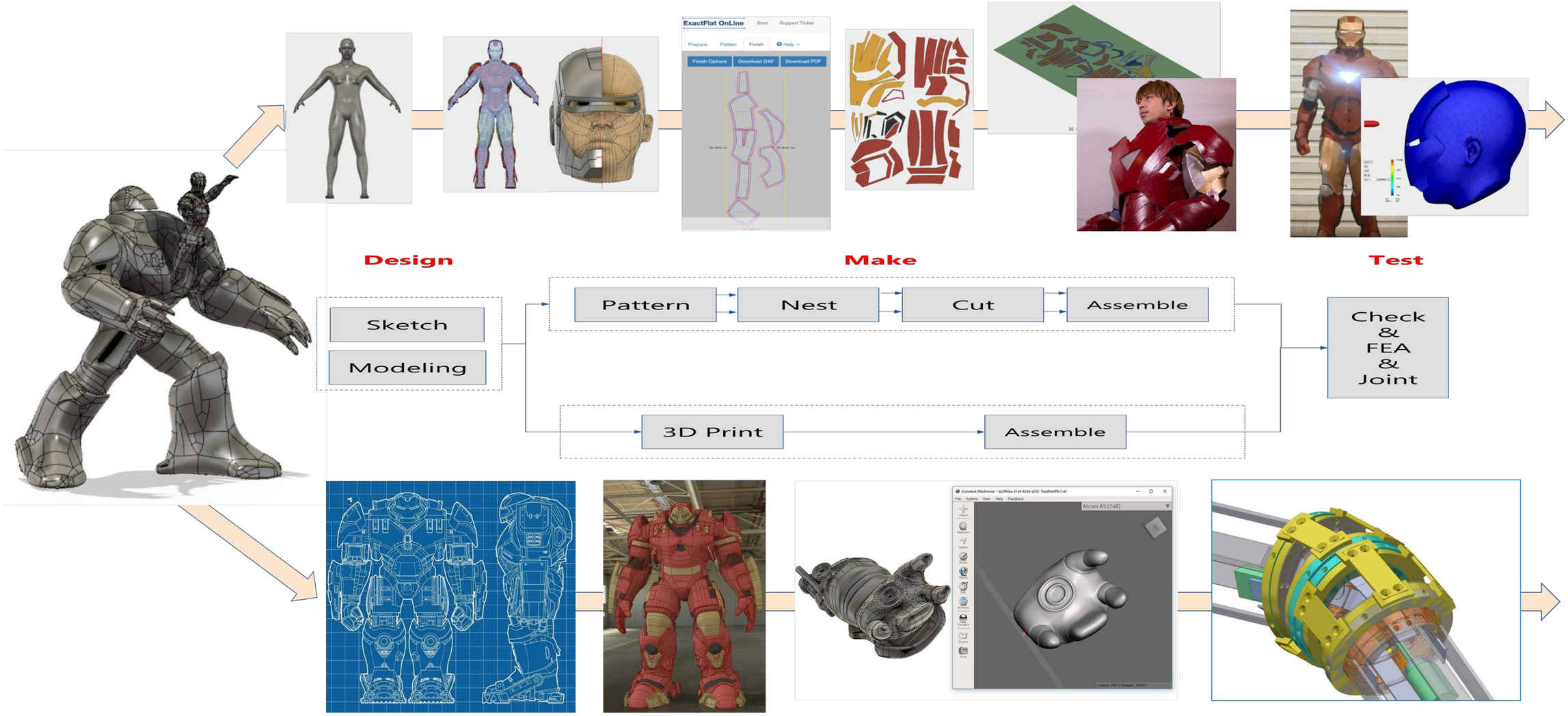


ANOUK WIPPRECHT - ANOUK'S SPIDER DRESS AT THE AUTODESK GALLERY - AUTODESK PIER 9, SAN FRANCISCO

SEBASTIAN NGUYEN– MY SON WHO NEEDS A COSTUME FOR COMIC CONF IN SAN DIEGO

Ironman & Hulk buster Suit with Fusion 360

AU 2017 - MAKING A CUSTOM-FIT IRONMAN SUIT WITH FUSION 360



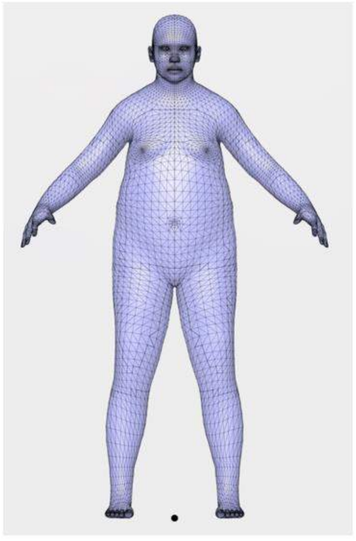
AU 2018 - MAKING THE HULK BUSTER SUIT WITH FUSION 360

The Mannequin

A MANNEQUIN IS AN OFTEN-ARTICULATED DOLL USED BY ARTISTS, TAILORS, DRESSMAKERS.

There are many ways to create a mannequin to be used as the foundation of our digital design:

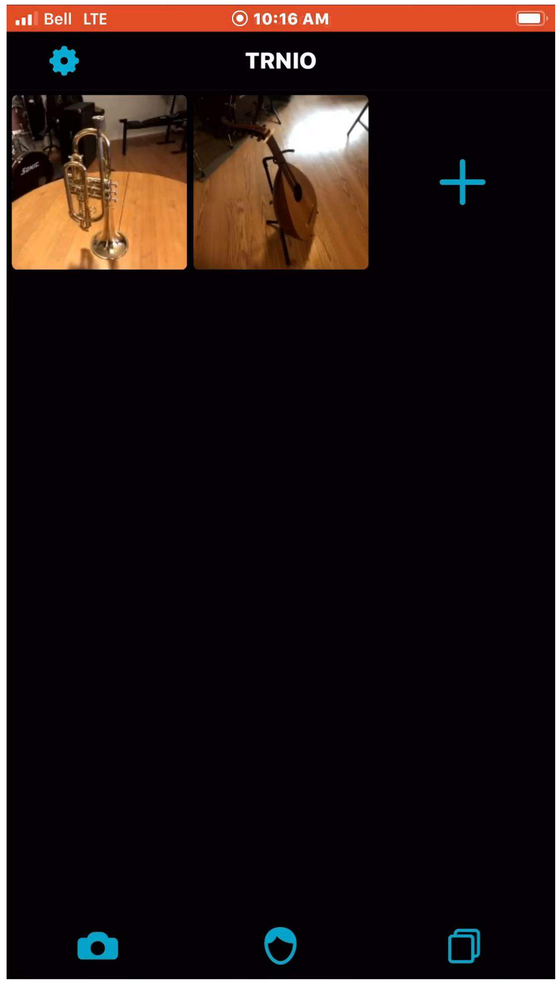
- 3D scanner
- Software that create human model



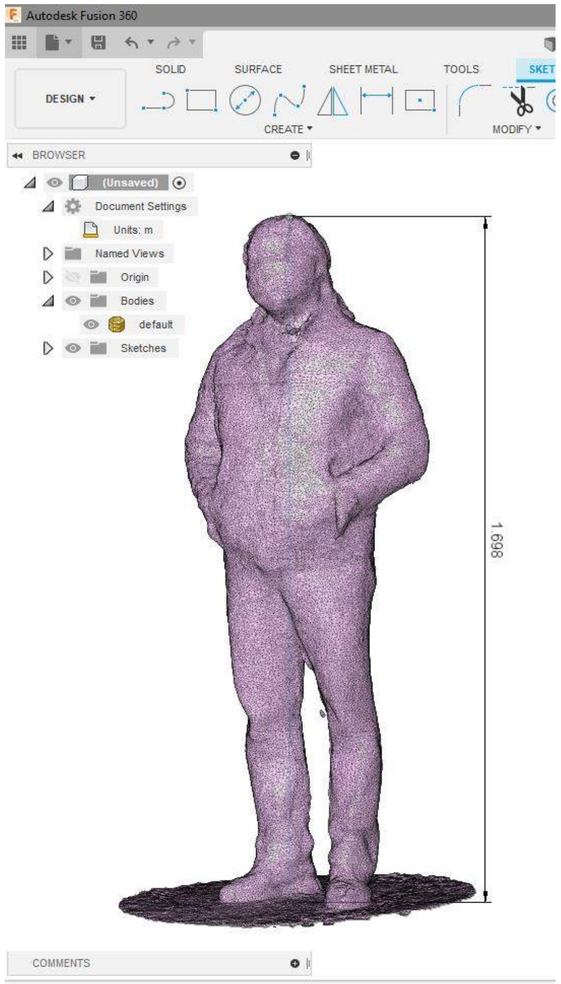
Tip: Modelling Mannequin from 3D Scan Data

3D SCANNER APPS ARE GETTING BETTER AND BETTER. THEY'VE BECOME NOT ONLY EASIER TO USE BUT ALSO BETTER IN QUALITY AND RELIABILITY.

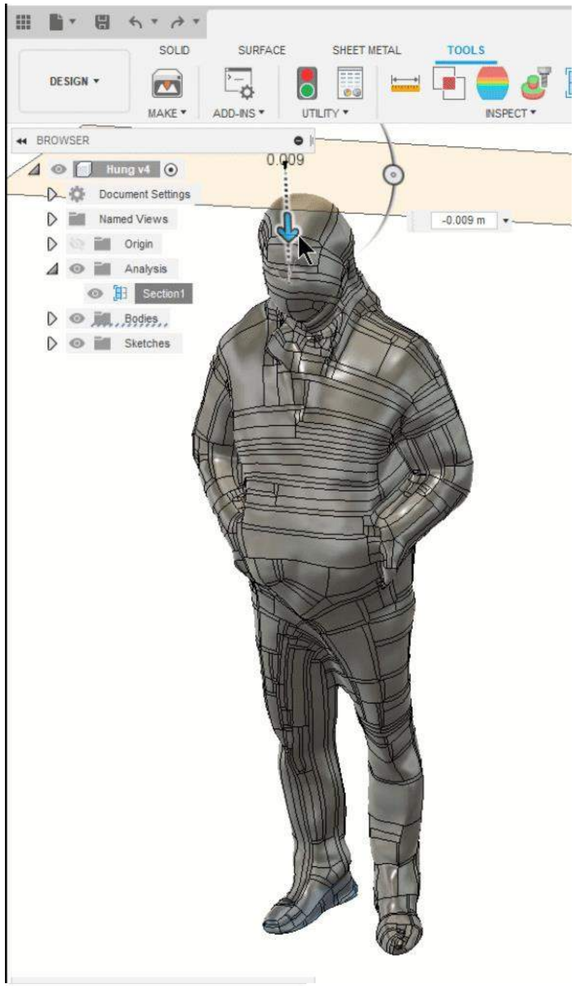
3D Scan with Faro Scanner



3D Scan with Trnio



Trnio's mesh in Fusion 360



Fusion 360 T-Spline form

Reverse Engineering Service at SolidCAD

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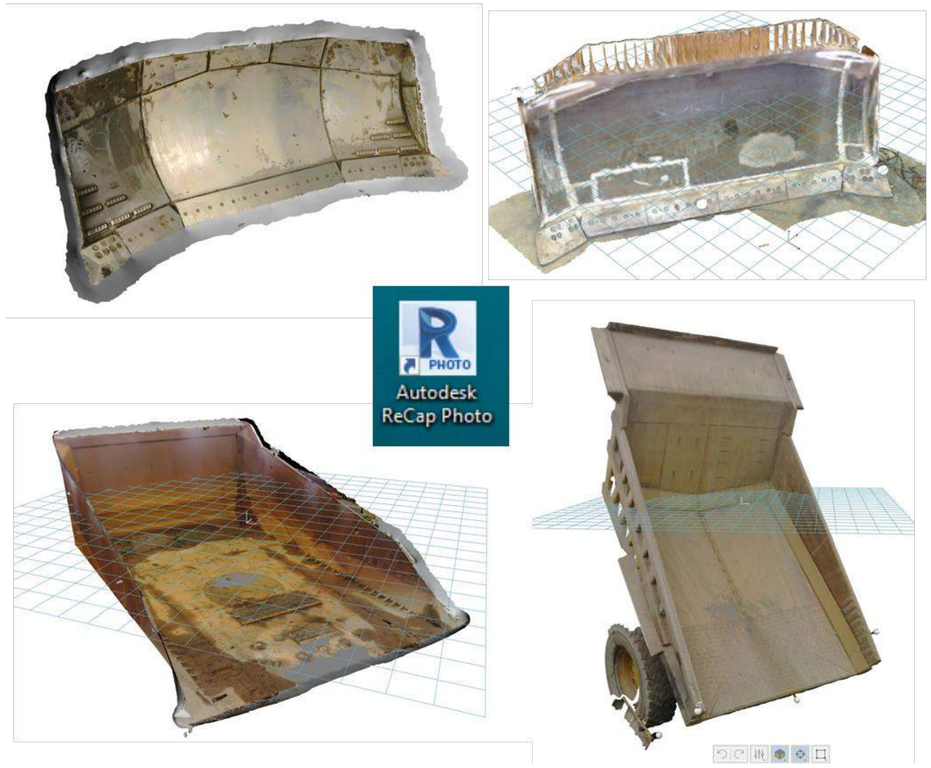
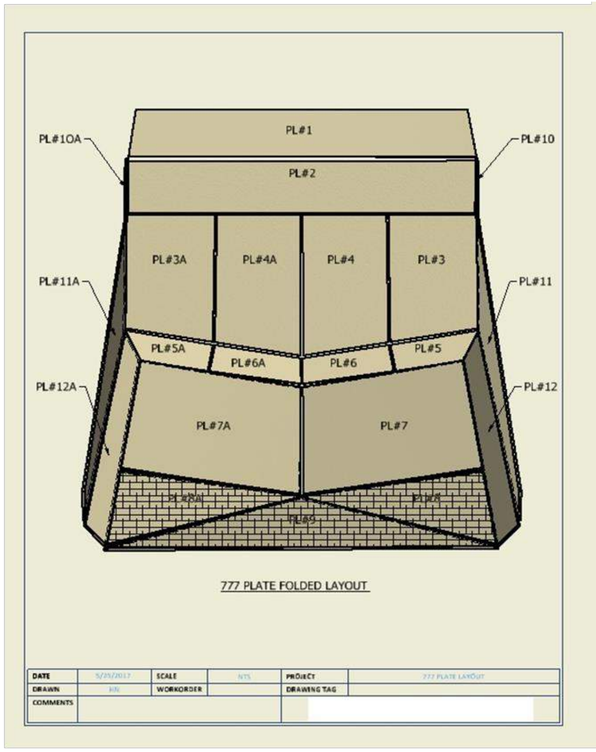
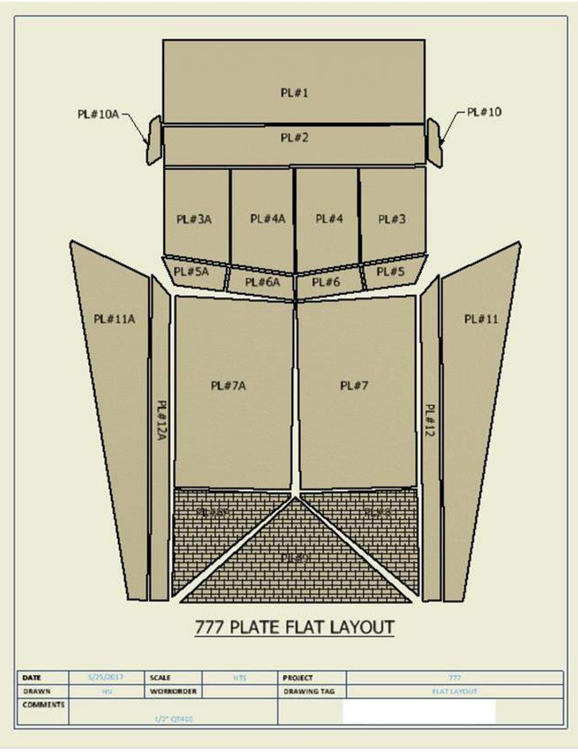
3D SCAN TO CAD

It’s a very difficult and time-consuming process. There’s no magic button for converting a 3D scan data into a usable CAD file automatically. But there is a standardized workflow that makes reverse engineering a possible process.





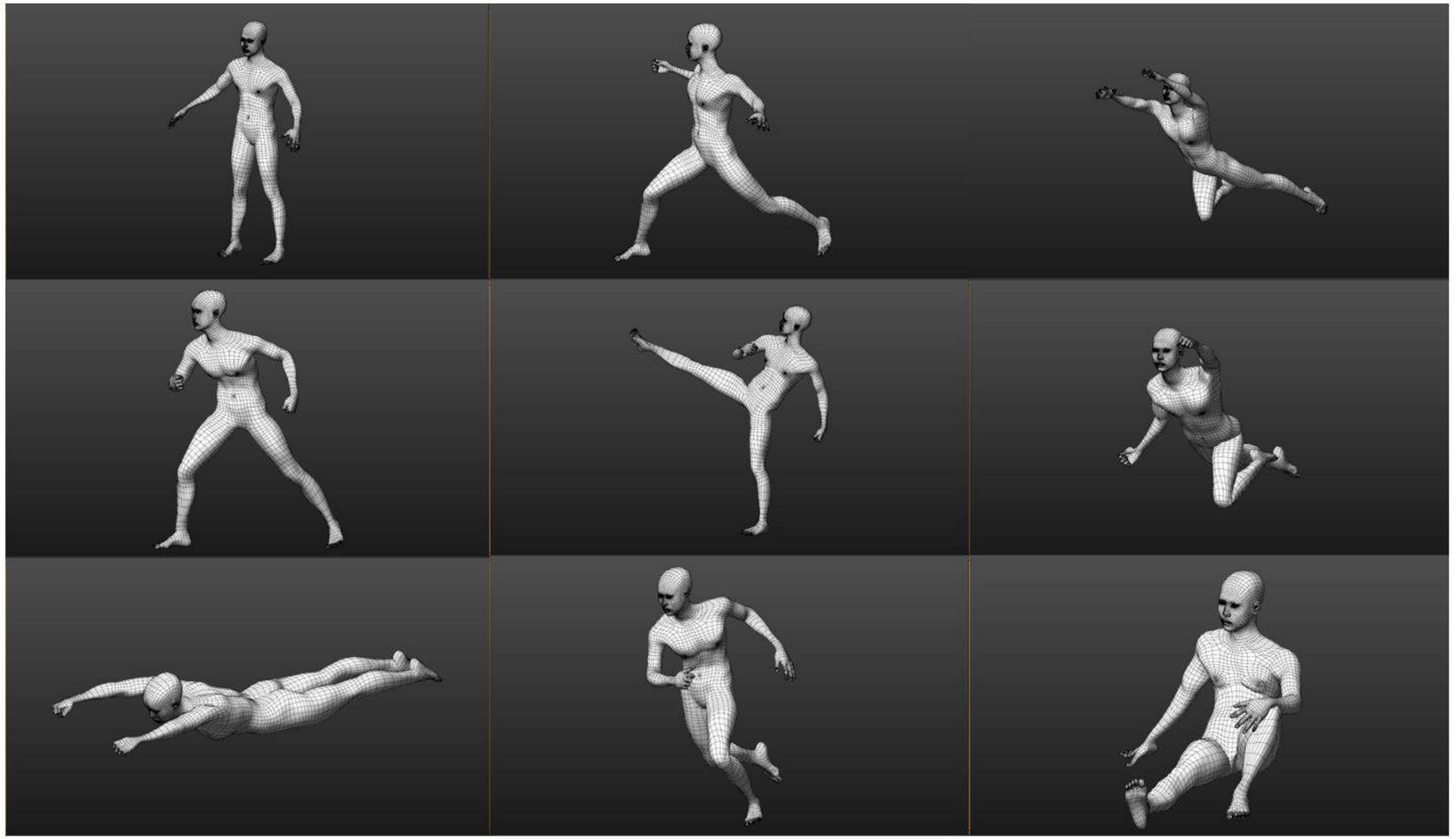


Trick: Model 3D Human Model with MakeHuman

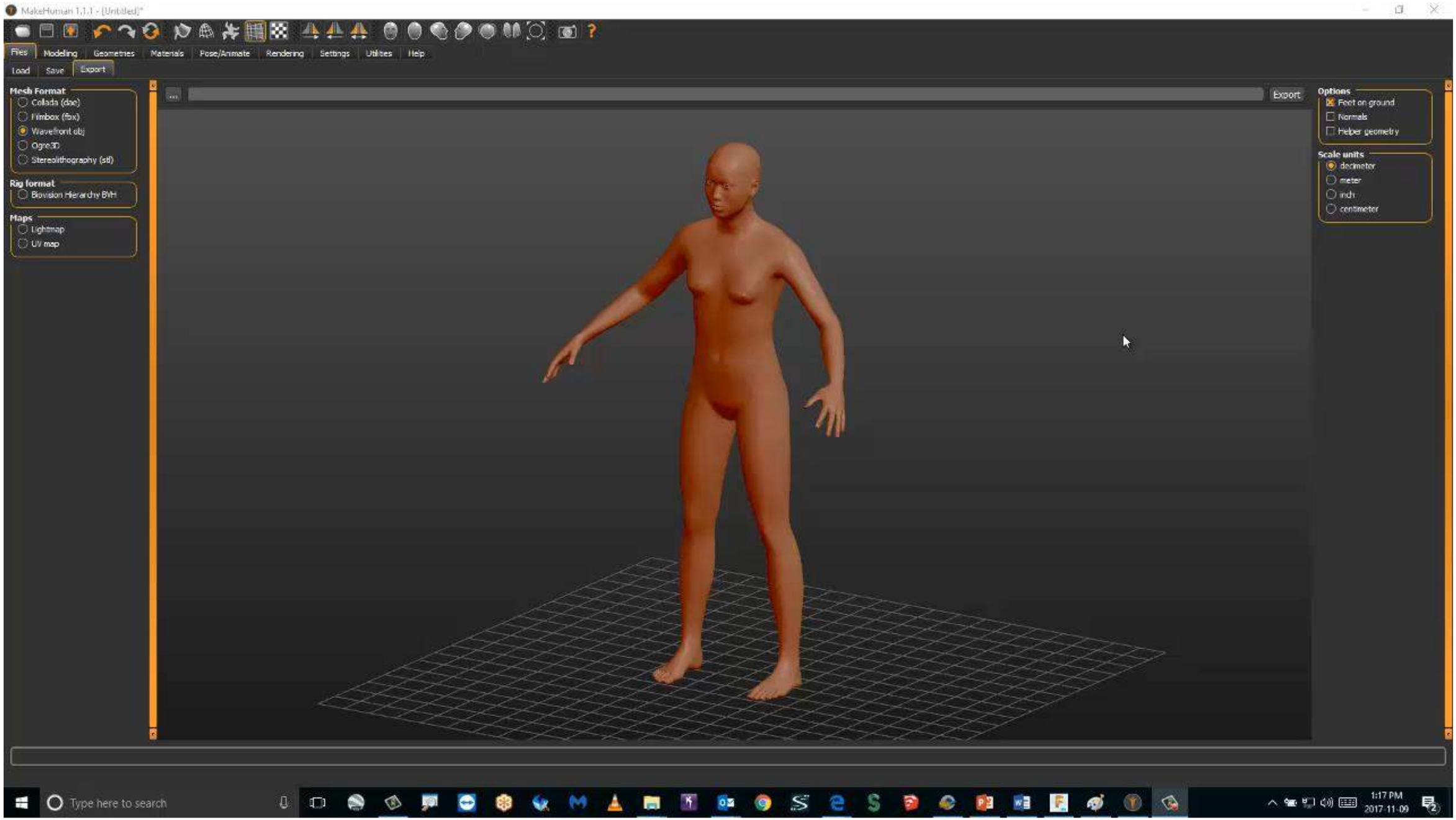
MAKEHUMAN

MakeHuman is an open source (AGPL3) tool designed to simplify the creation of virtual humans using a Graphical User Interface, also commonly referred to as a GUI. This is a specialized branch of the more general subject of 3D modelling.

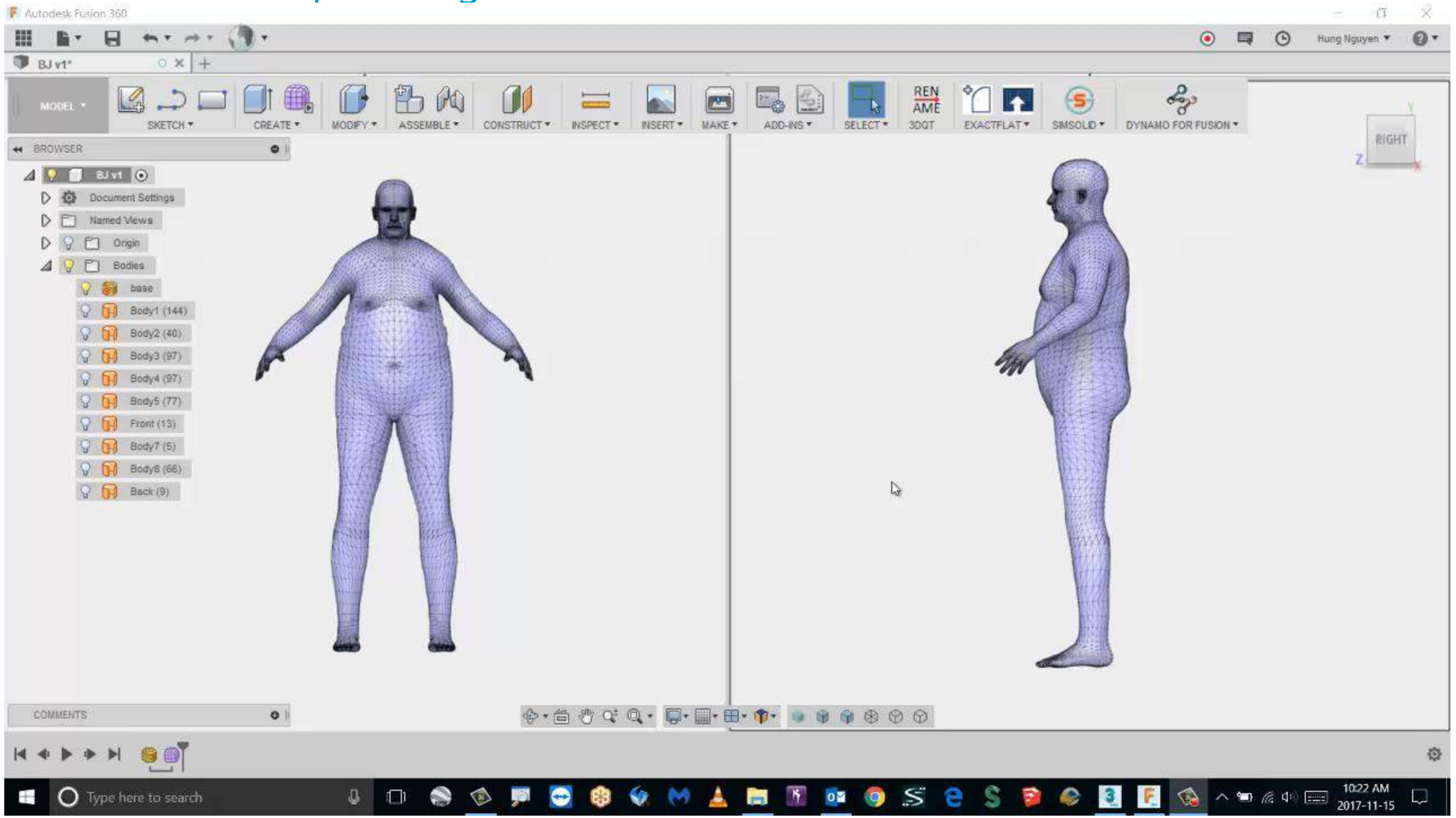
- Prototyping of realistic humanoids
- Open Source solution
- FREE



Trick: Model Human Model & Convert to Fusion 360



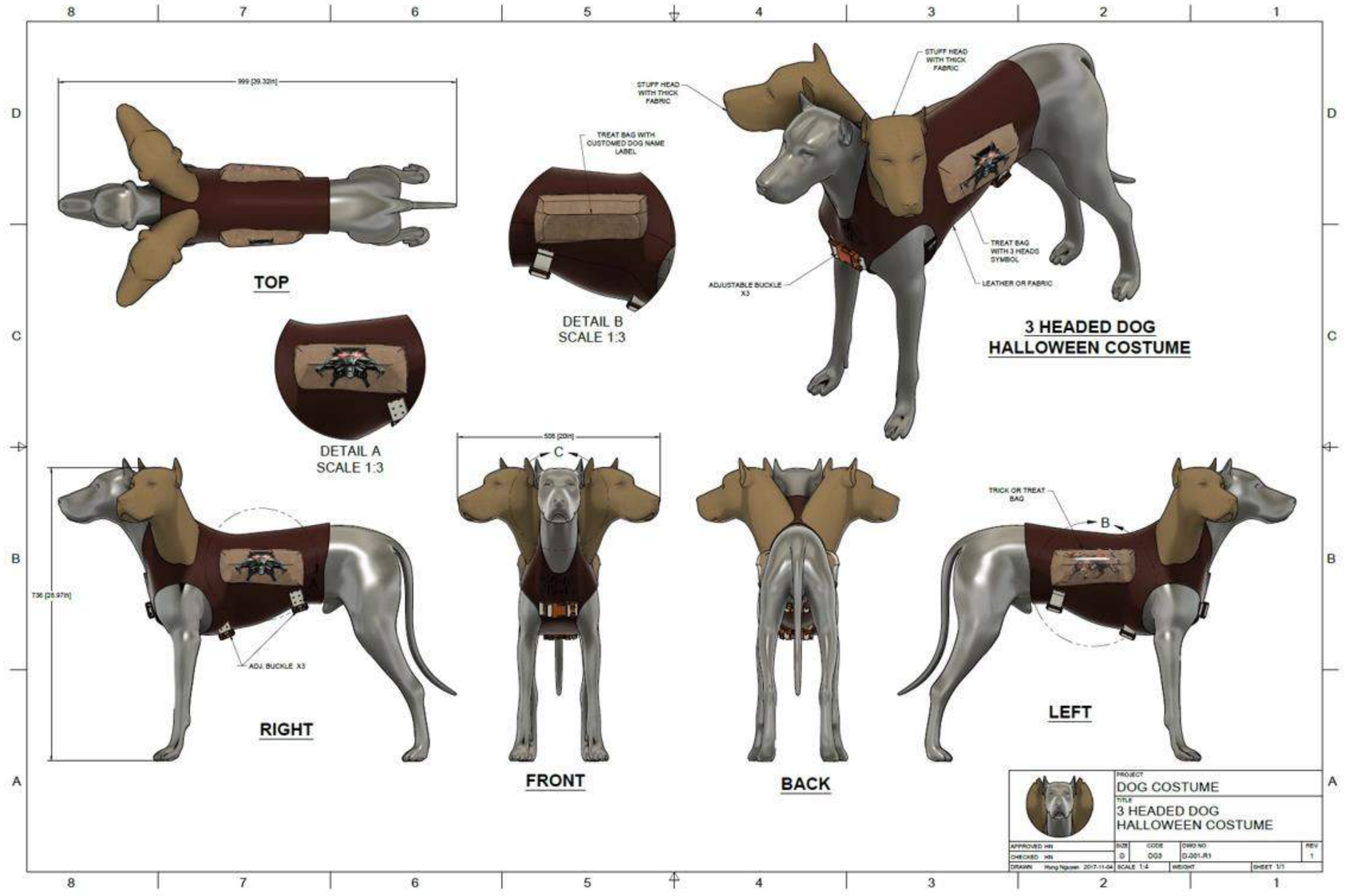
Trick: Sculpt design Textile with Fusion 360 & MakeHuman



Sculpting With Fusion 360

Sculpting in Fusion 360 is a shaping technique for:

- Carve
- Sculpture
- Cast
- Form
- Shape
- Fashion design
- Or dressing your dog with Halloween costume…



Inspired by AU 2016 class titled "***Integration of Textiles in Fusion 360***" by **Bill Dieter** – President Terrazign & **Michael Aubry** – Technology Evangelist Autodesk

Fusion 360 Freeform Techniques

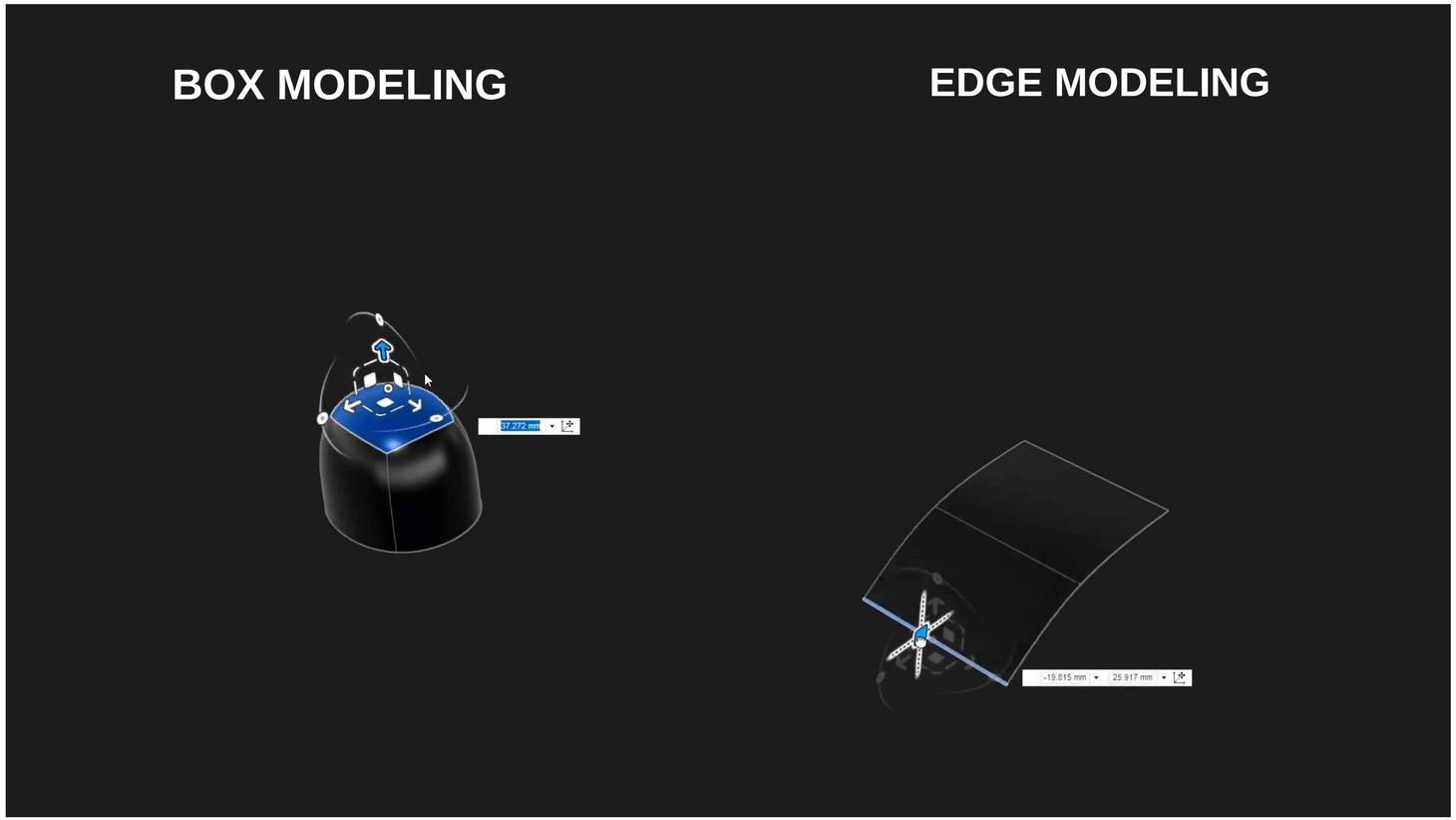
EDGE MODELING VS BOX MODELING

There are two separate modeling strategies:

- **EDGE MODELING: Extruding Edges**
- **BOX MODELING: Extruding Faces**

Both strategies produces the same result at the end and depends on Users skill.

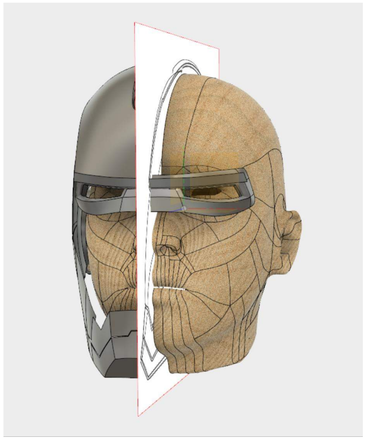
- **Edge modeling is easy, but time consuming.**
- **Box modeling is more difficult but less time.**

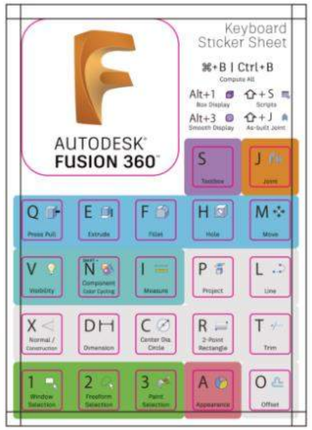


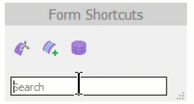
Source: Topology With T-Splines In Fusion 360 – YouTube by name notimportant

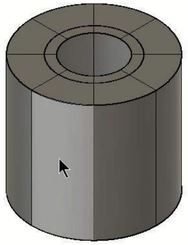
Method 1: Edge Modeling

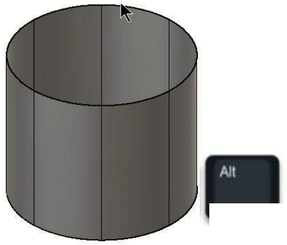
- Background images is very helpful.
- Keyboards Shortcuts.
- Use Multiple view – 2 views.
- S Key
- Alt to add edges in Sculpt
- Alt + Ctrl to add creased Faces
- Shift + Double Click
- Alter Sculpt display Mode
- Understand Components vs Bodies.

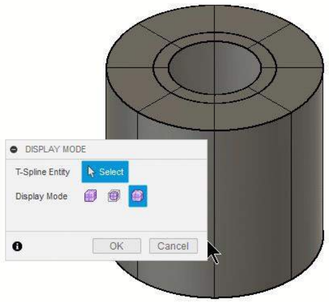


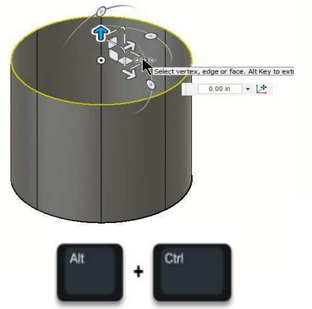




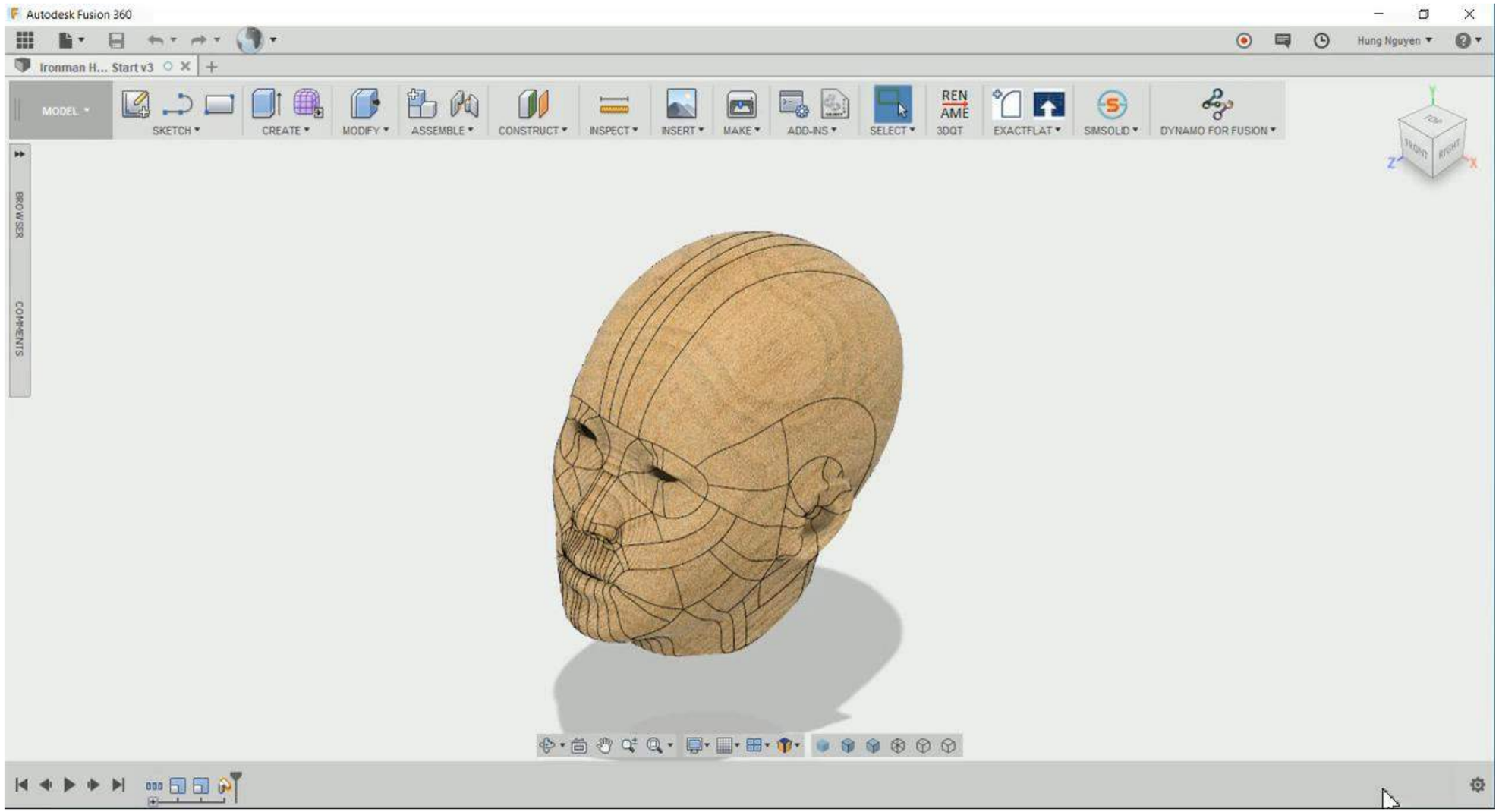




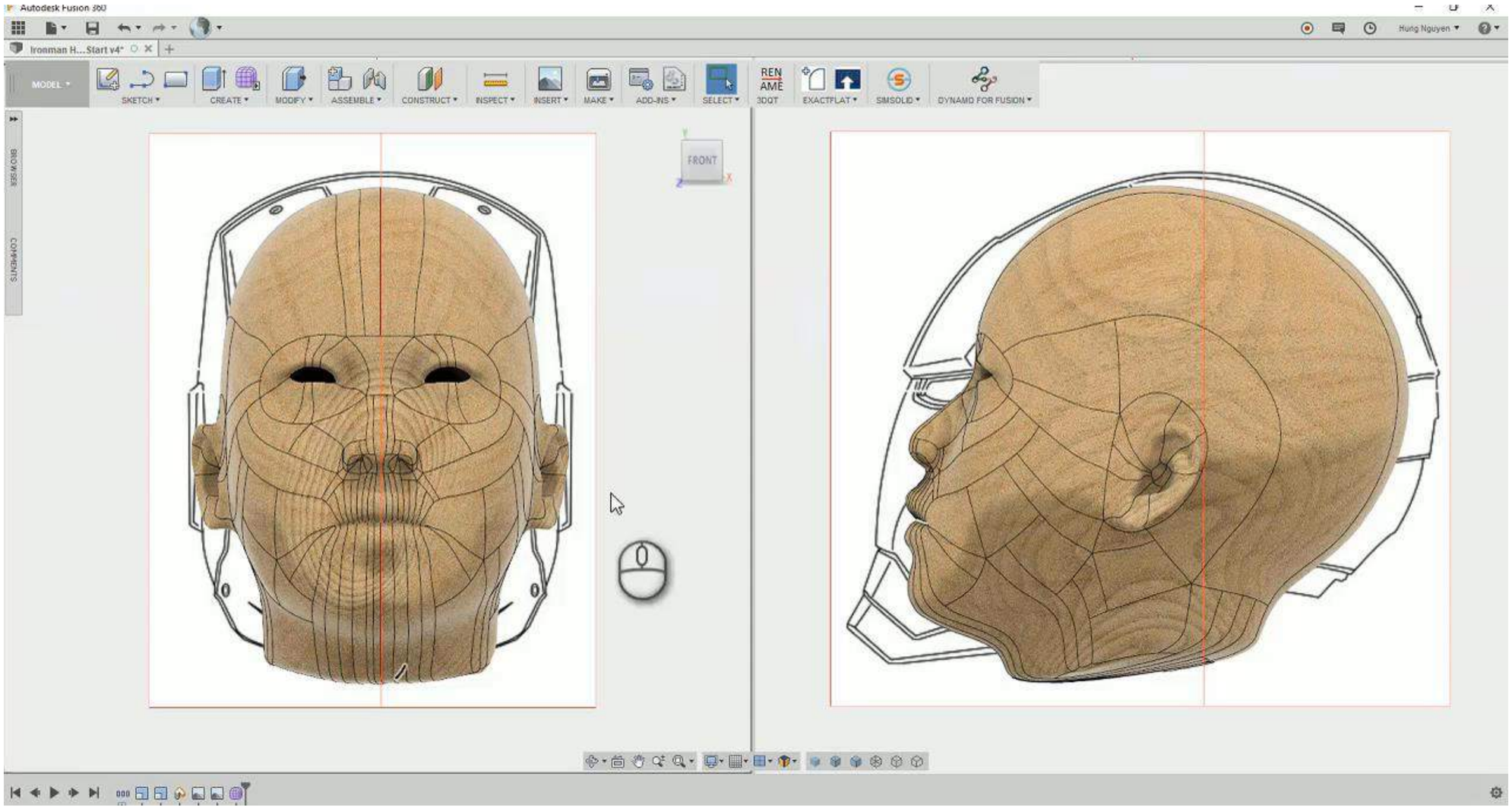




Setting Up Background Images– Edge Modeling

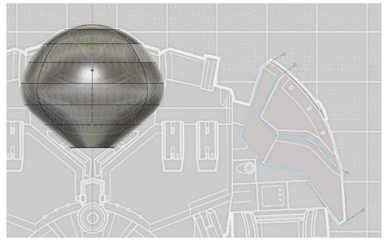


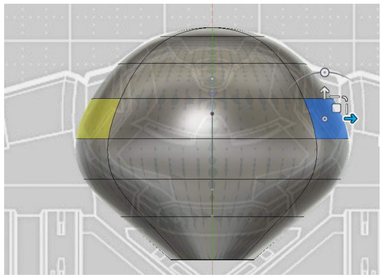
Sculpt Ironman using T-Spline – Edge Modeling

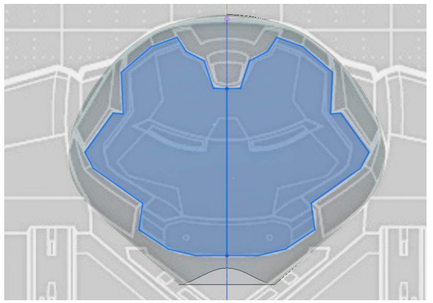


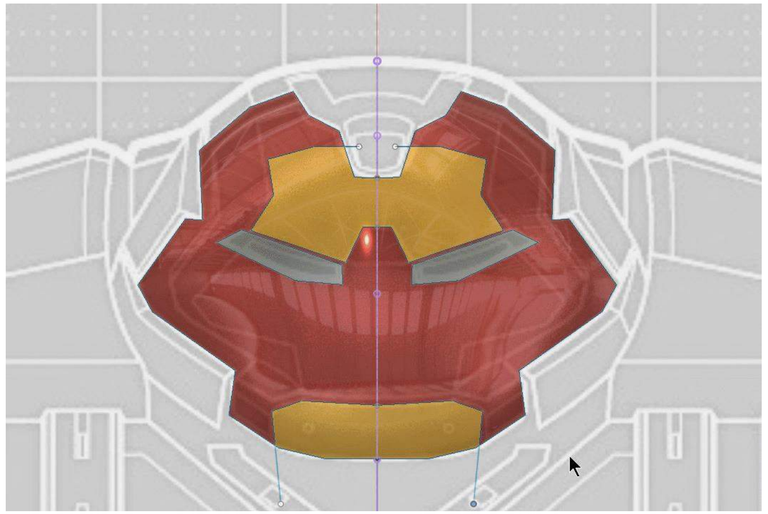
Method 2: Box Modeling

- Use Primitive Form - Sphere
- Edit Form and move faces
- Use Line sketches to split surface
- Split Surface
- Unstitch Surfaces
- Stitch Surfaces
- Thicken surfaces
- Edit sketches to adjust model
- Convert Bodies to Components.

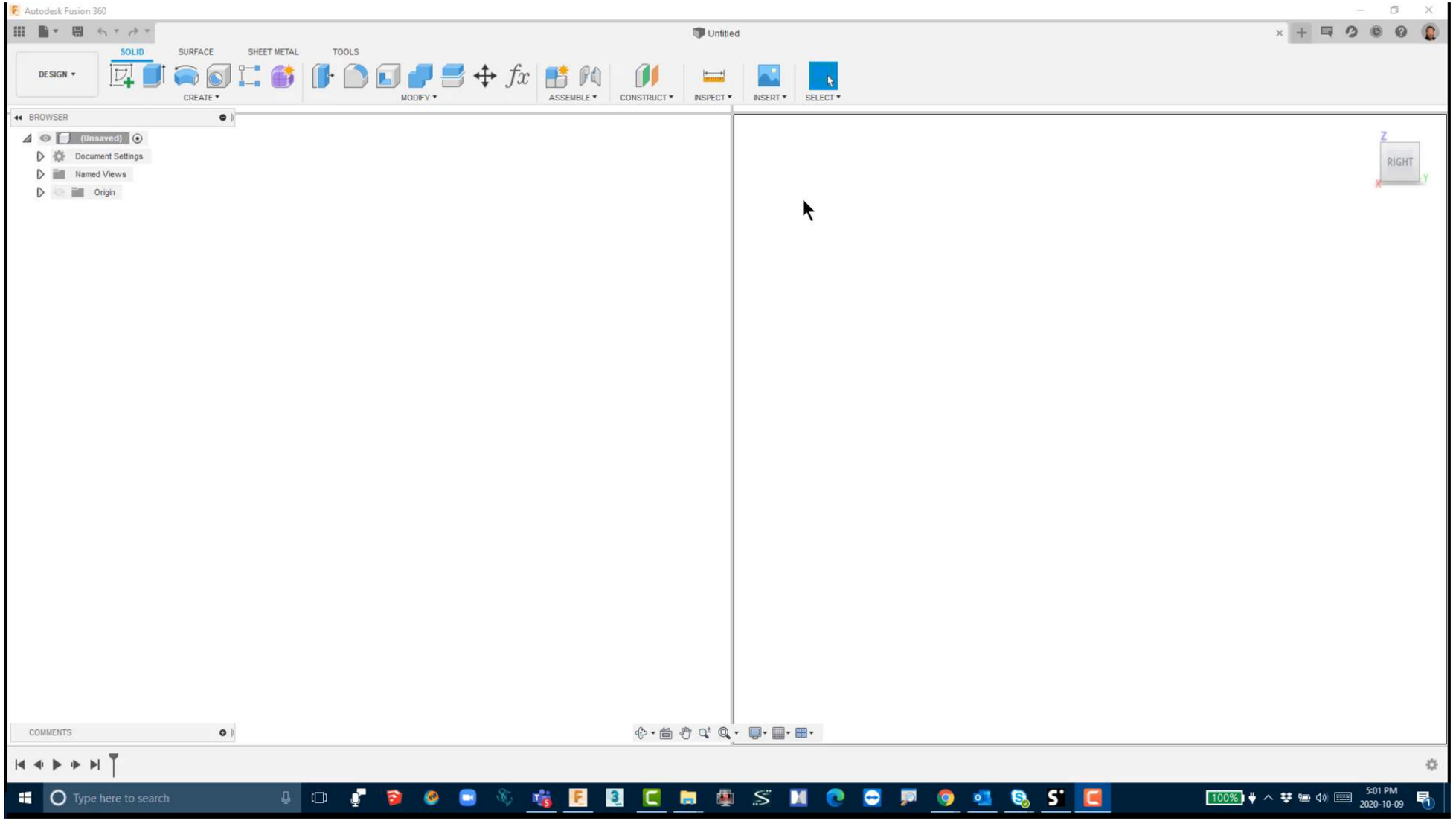








Sculpt HulkBuster using T-Spline – Box Modeling



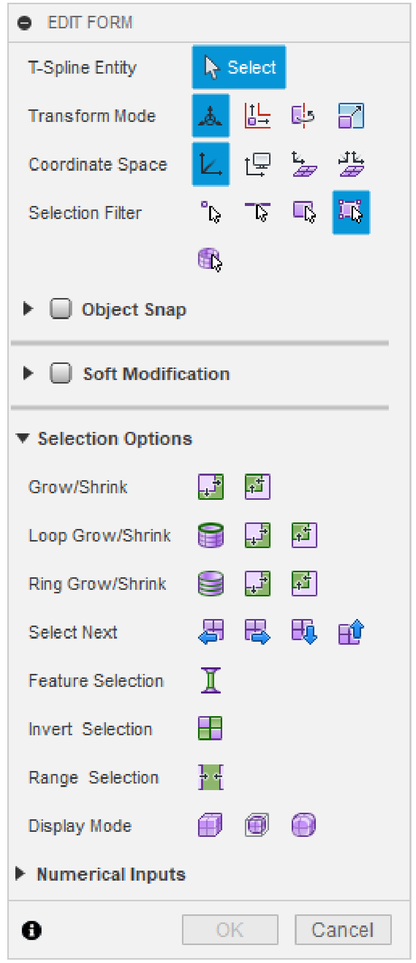
Model with Fusion 360 Freeform Tips

ESSENTIAL TOOLS

Edit Form

Selection Options

Selection Filters

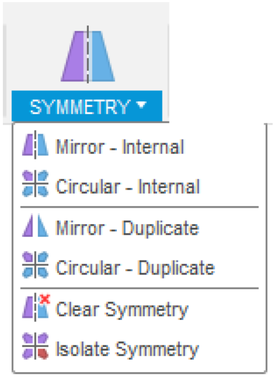


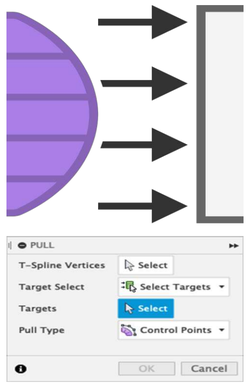
COMPLEX TOOLS

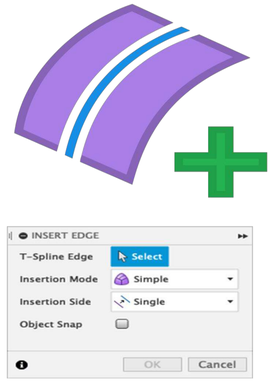
Symmetry

Pull / Match Tool

Insert Edge





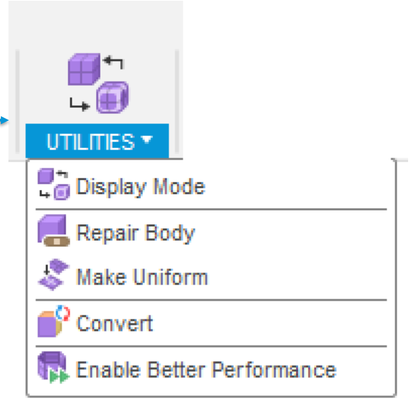


UTILITY TOOLS

Display Mode

Repair Body

Convert



Tip: Model with 3DS MAX Poly modeling

3DS MAX LOW POLY MODELING

- Polygonal modeling is the most popular.
- Poly modeling is a low-level 3D modeling and is based on the direct manipulation of the vertices, edges, and faces (polygons) of objects.

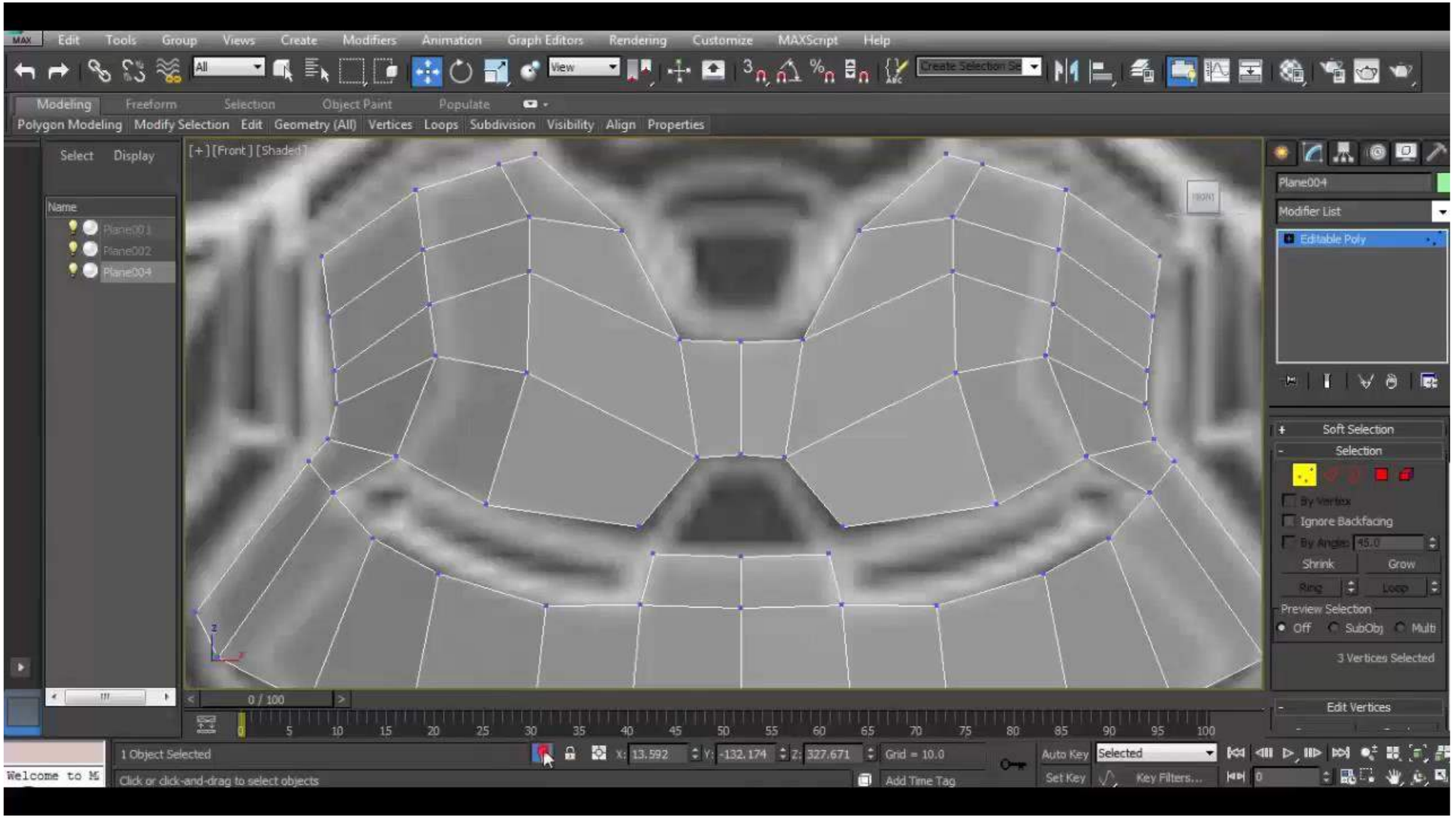
BENEFIT OF 3DS MAX LOW POLY MODELING

- Create models using as few polygons as possible: surfaces defined by several points.
- Any vertices, faces can be moved in any direction.
- No need reference to real units of measure.

POLYGON MODELING IS FOR YOU IF:

- You do not need the exact dimensions.
- You want to make a model for games, animation or rendering a picture.
- You need a high-quality artistic study of the model.

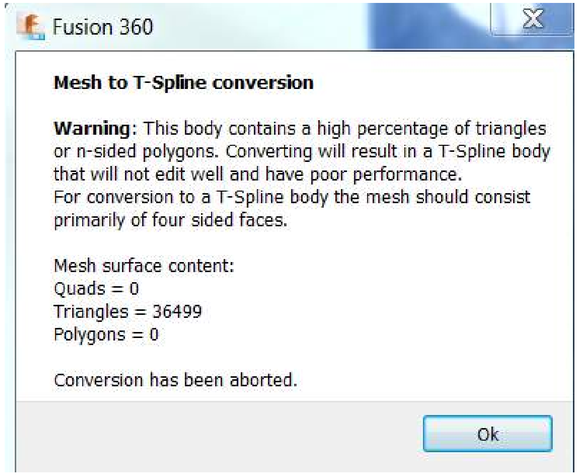
Tip: Model with 3DS MAX Poly modeling



Converting Meshes to Solids

CONVERT A MESH TO T-SPLINE IN FUSION 360

Fusion is better equipped to handle Quads as opposed to Triangles or Polygons.



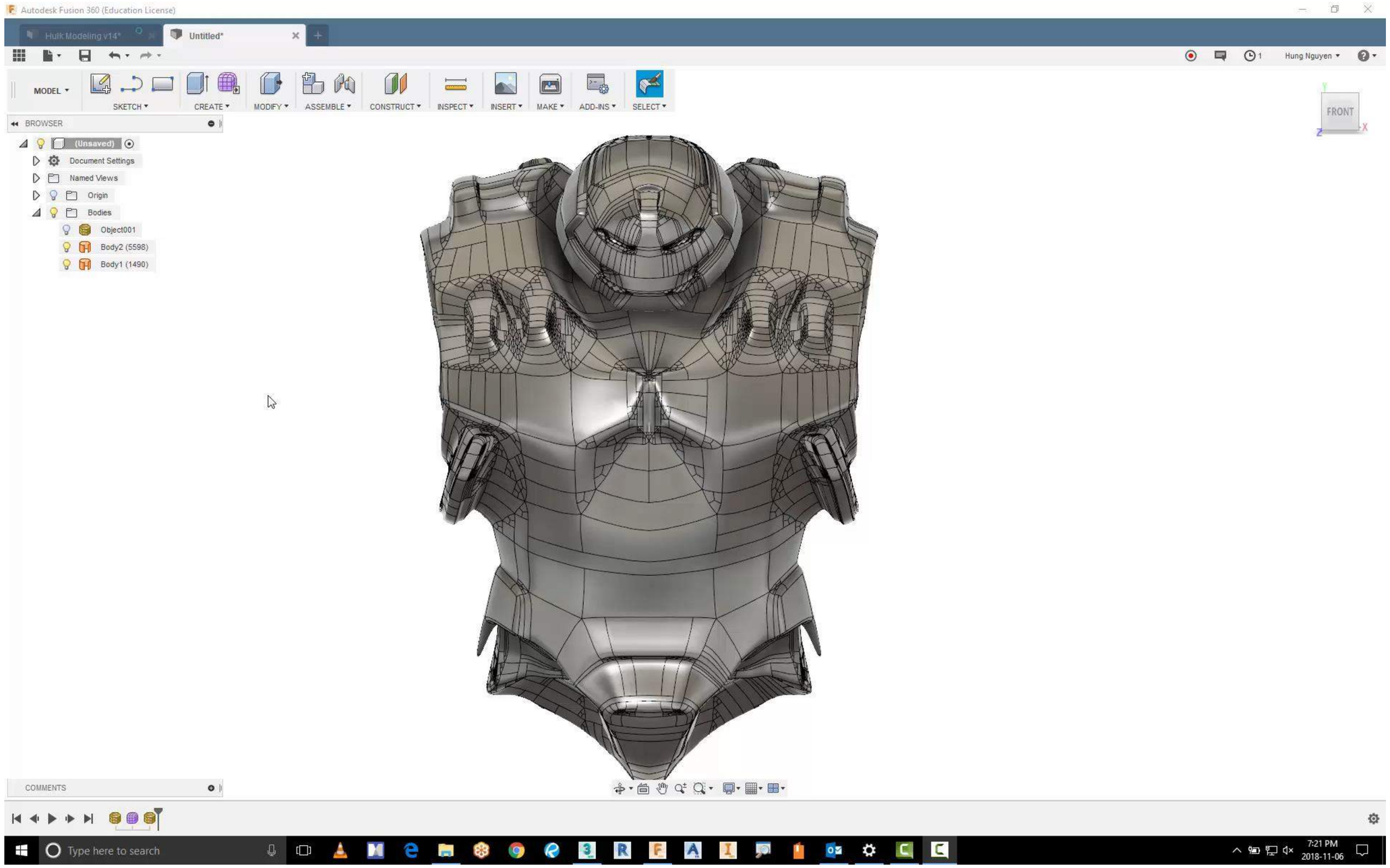
ONLY QUAD MESHES CAN CONVERTED TO T-SPLINE BODIES IN FUSION 360

- **A good rule of thumb for Fusion is to keep it around 10,000 facets.**
- **To convert mesh to T-Spline, the mesh must be Quads.**

CONVERT TRIANGULATED MESH TO EDITABLE POLY BEFORE INSERTING INTO FUSION 360

1. **Import triangulated mesh into 3DS Max**
2. **Apply Subdivide (WSM) with “Display Subdivision” turned OFF**
3. **Use “Collapse To” to Collapse the mesh**
4. **Convert the Collapse mesh to Poly mesh**
5. **Apply “Quadrify All”**
6. **Export and Insert the Quad Mesh into Fusion 360**

Tip: Converting Meshes to Surfaces

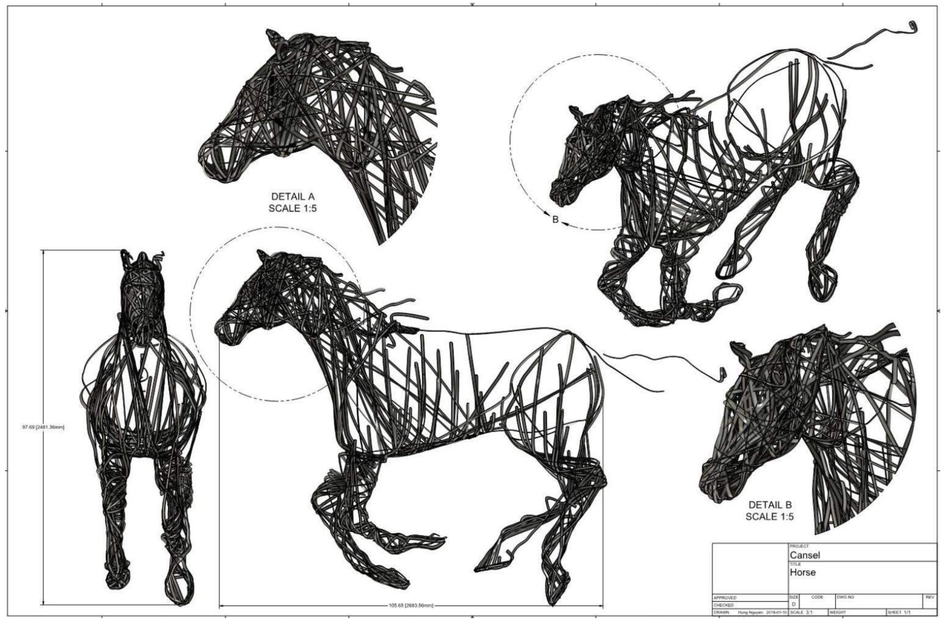


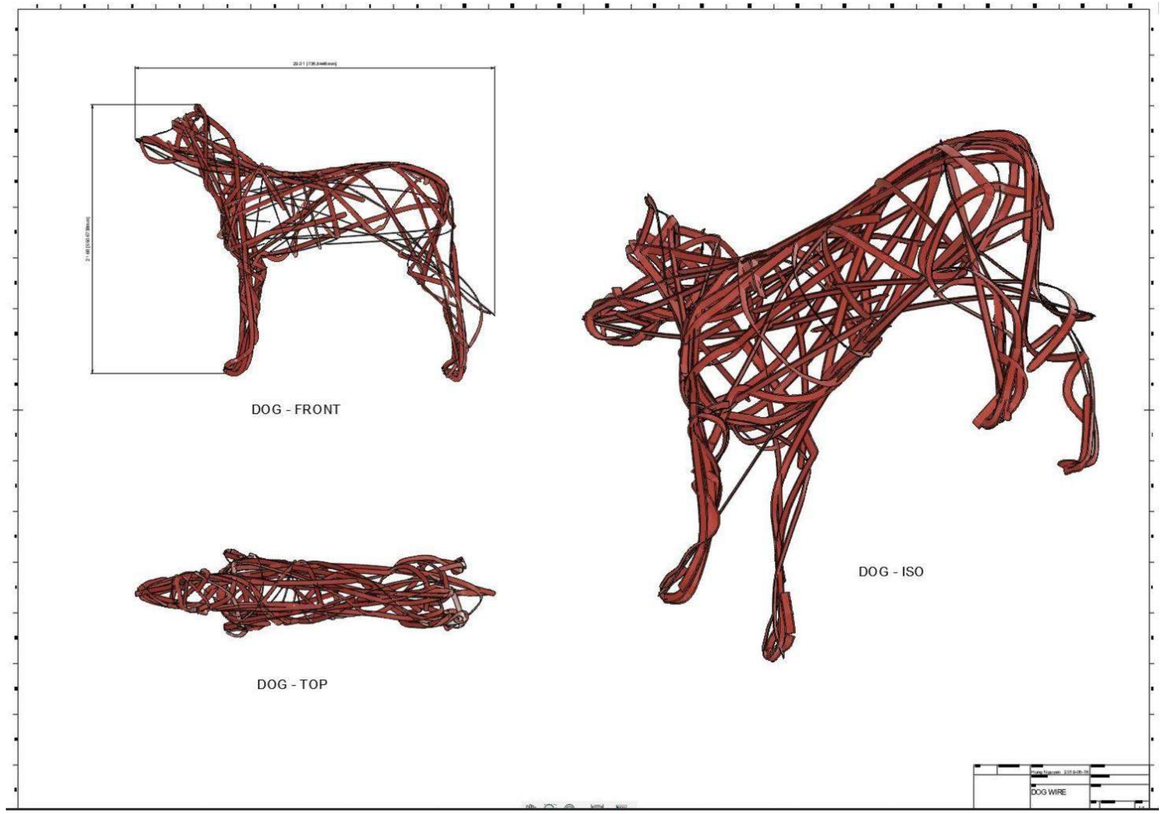
Tip: Model with 3DS MAX - MAXScript

3DS MAX MAXSCRIPT

- **Script all aspects of 3ds Max use, such as modeling, animation, materials, rendering, and so on.**

Sung Hoon Kang's Metallic Strip Animal Sculptures Radiate the Energetic Flow of Wind:
https://mymodernmet.com/kang-sung-hoon-sculptures/





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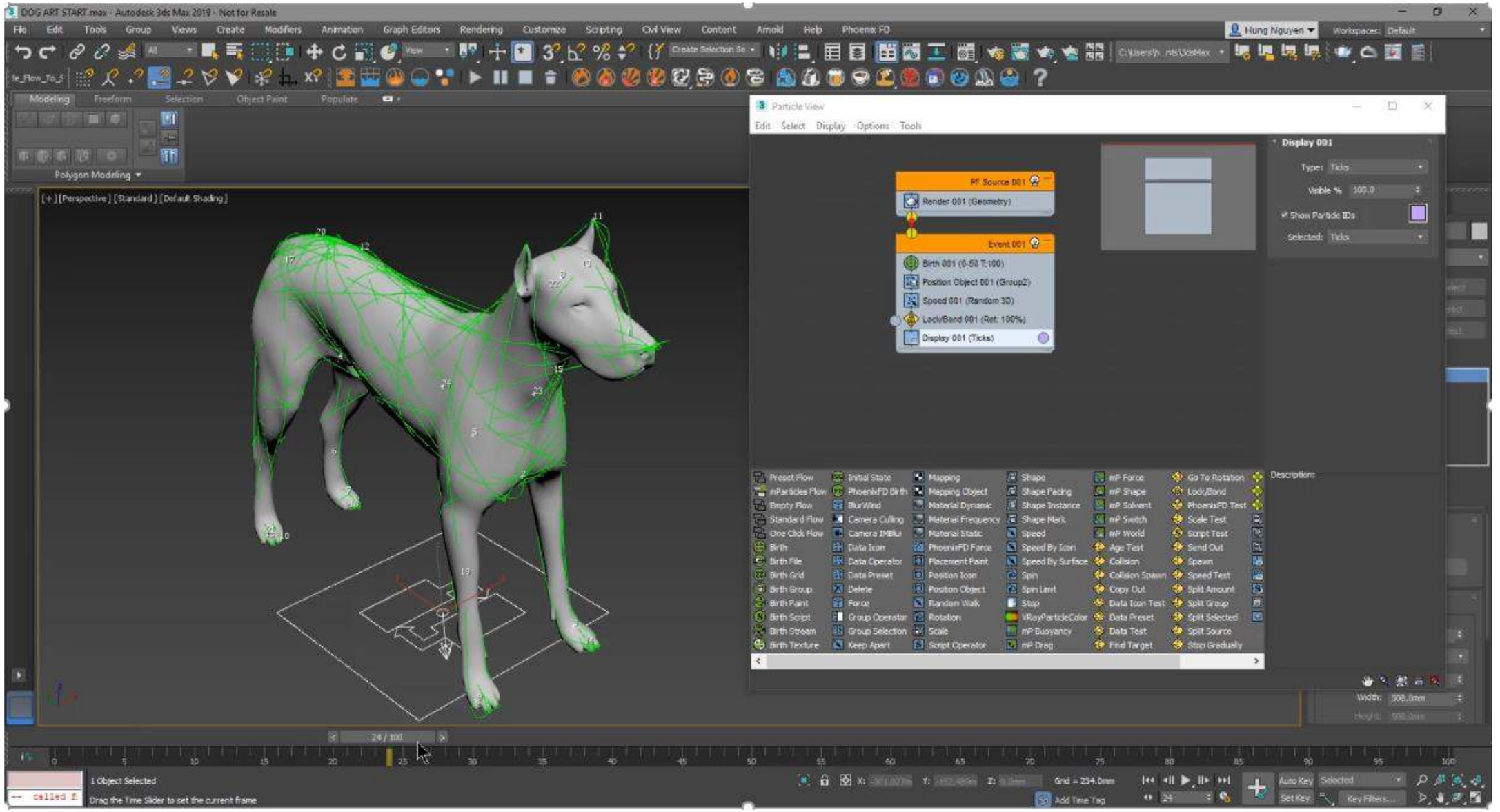
Tip: Create Metallic Strip Animal Sculptures With Fusion 360



Using 3DS MAX Particle Flow to Create Metallic Strip Animal Sculptures With Fusion 360

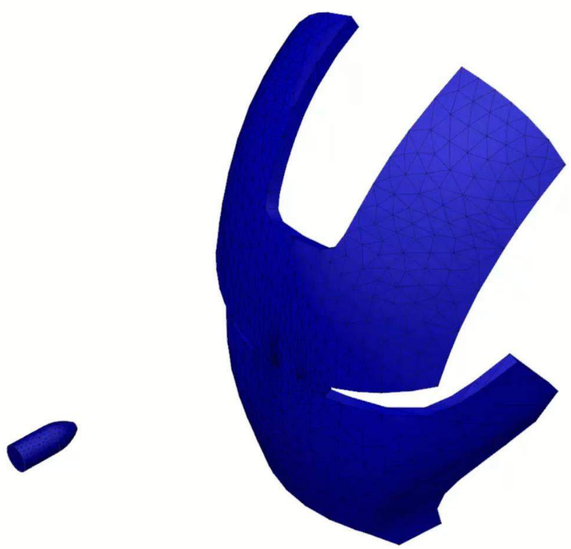
Ironman & HulkBuster on Fusion 360 Gallery

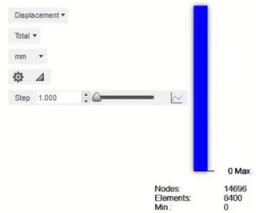
IRONMAN SUITE WAS MADE FOR COMIC CONFERENCE, SAN DIEGO

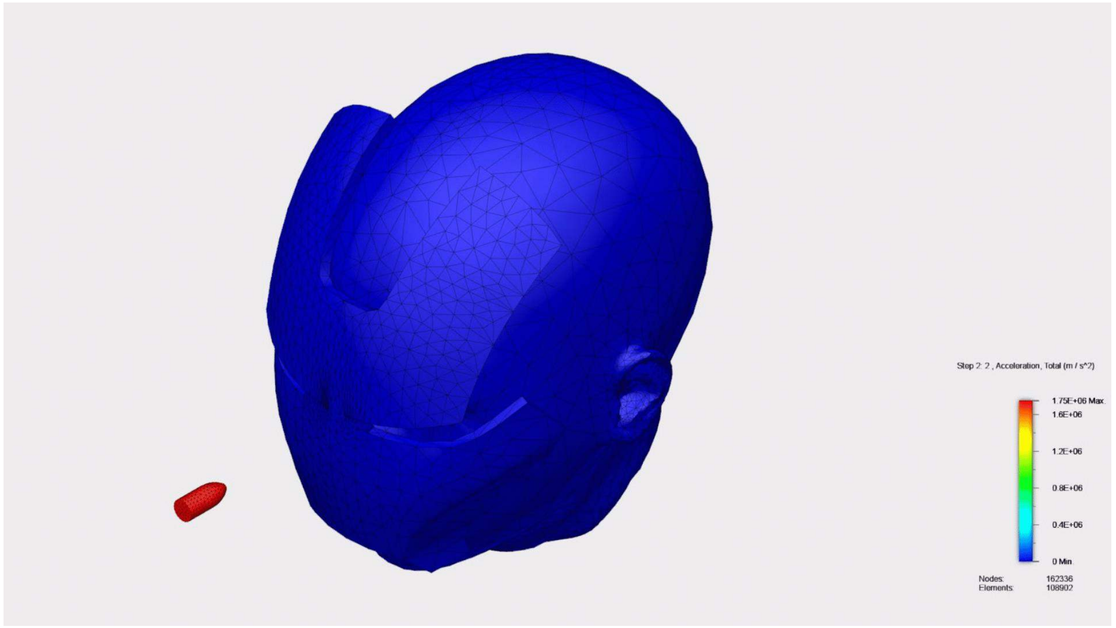
HULK BUSTER ARM IS UNDER STUDY AND DEVELOPMENT

Tip: The Best of Fusion 360

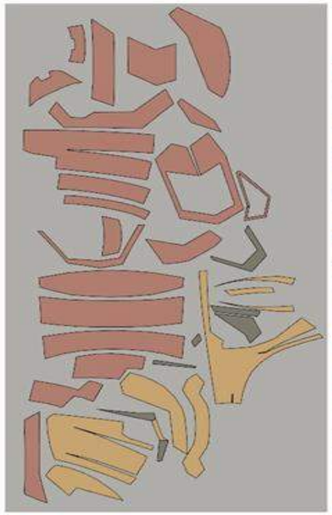
DO NOT STOP AT MODELLING …**SIMULATE** AND **MAKE** IT!



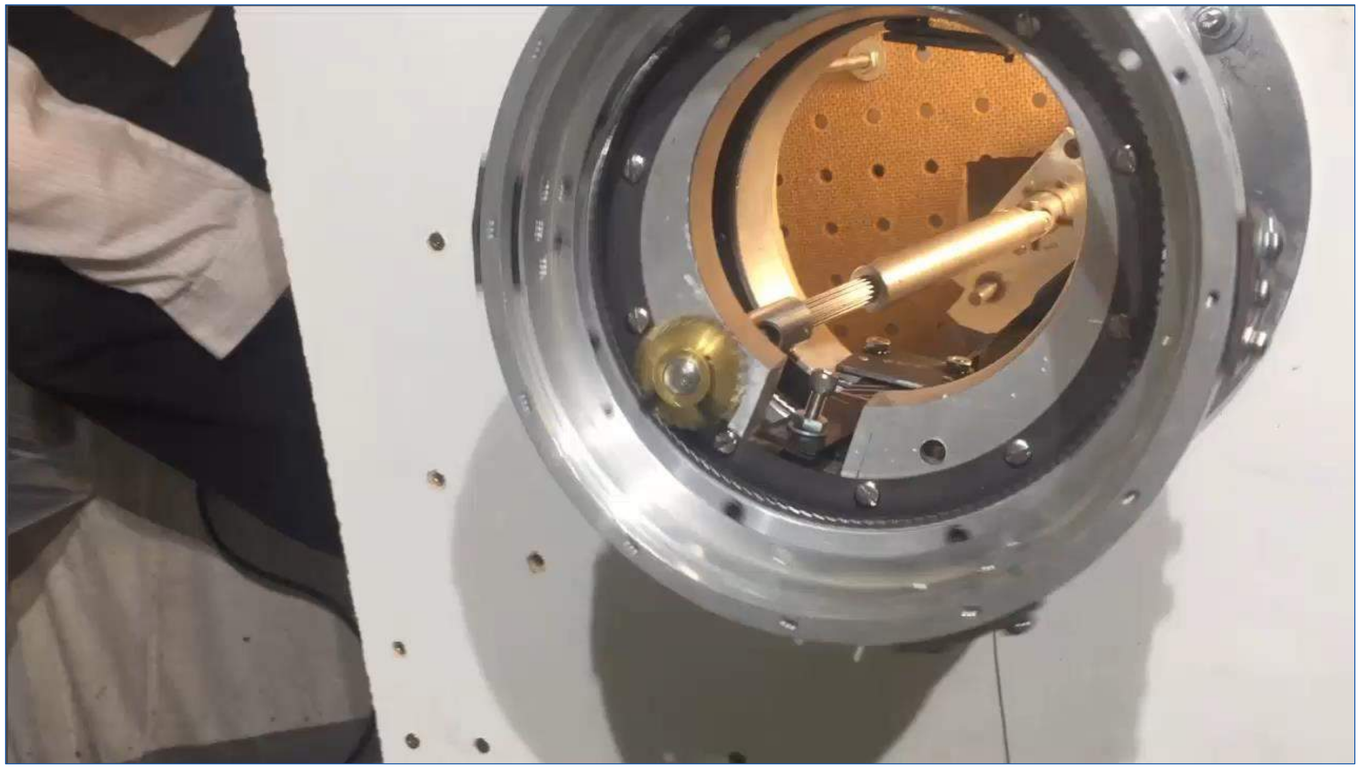


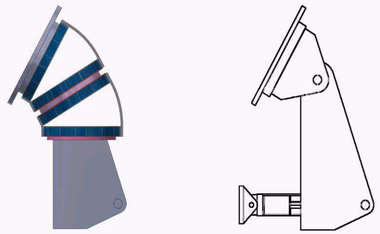


- Design
- Simulate
- Make



Prototype of HulkBuster Arm - Under Development





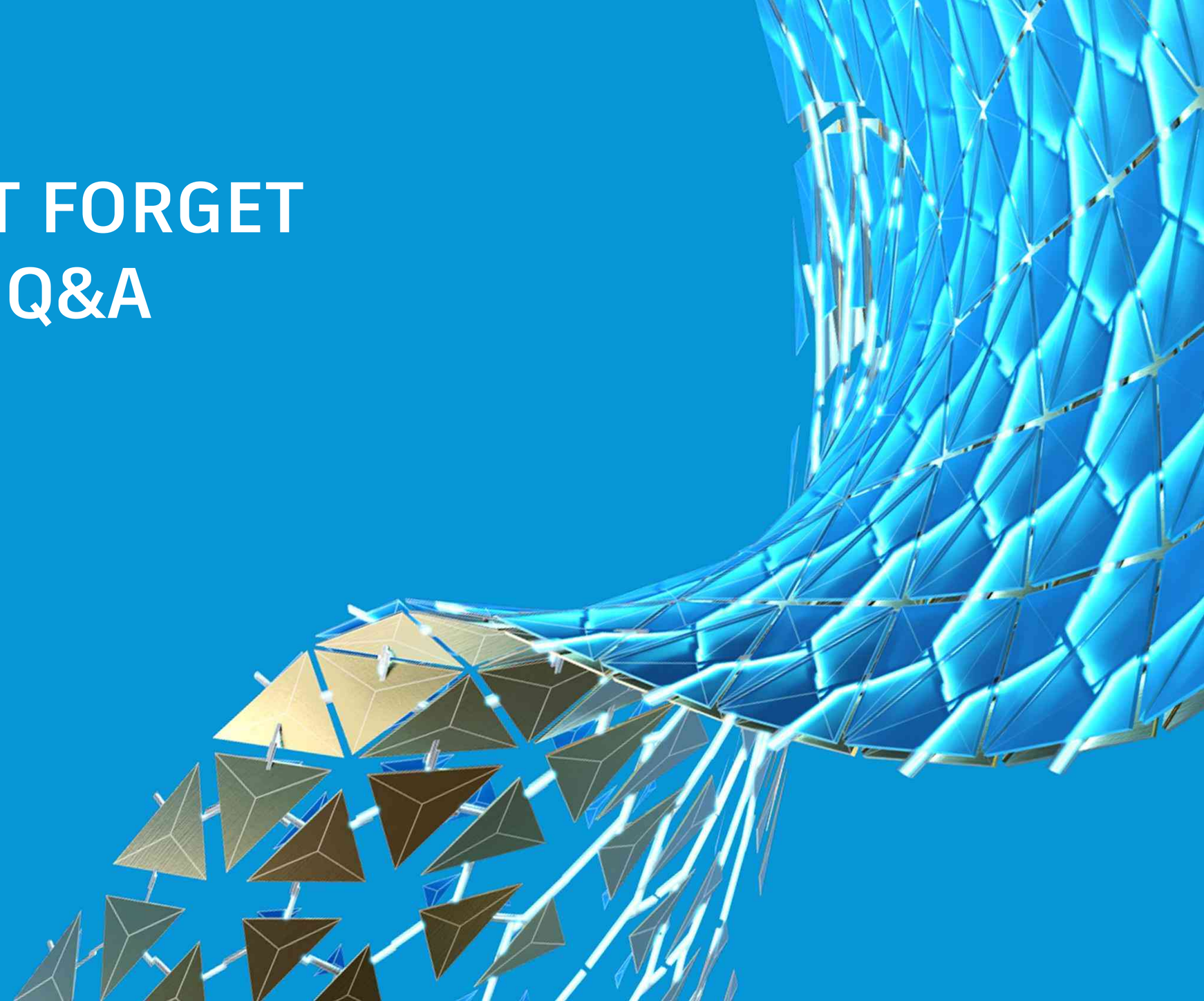
Prototype of Hulkbuster arm is under development using patented "**Rotatable Envelope Modules**". **REM** was invented by **Adam Bakir** and co founder **Najib Jomha** with the assistance of designer **Earl Gifford.** The company is focused on the development of this articulated joint mechanism that can be used for robotic wrist arm assemblies along with other industrial specific applications

Tip: Fusion 360 + 3DS Max – Best of Both World

DO NOT STOP AT MODELLING …**MAKE** THEM **MOVE & DANCE**

- Fusion 360 Animate Joints
- Character Rigging in 3ds Max

PLEASE DON’T FORGET TO JOIN OUR Q&A SESSION



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