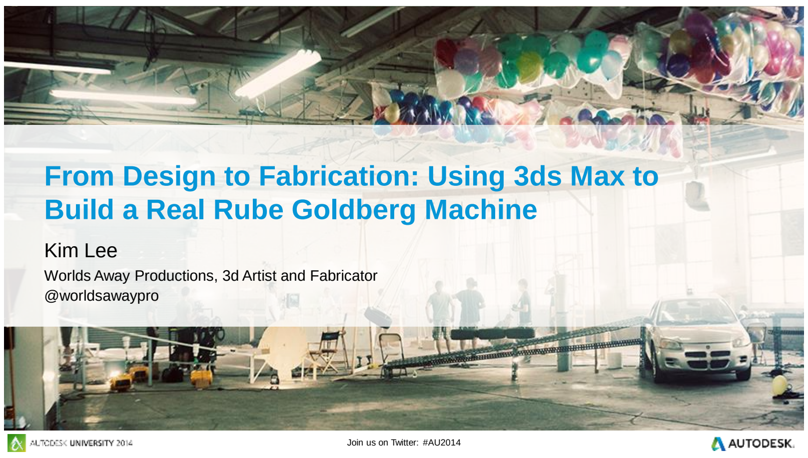


From Design to Fabrication: Using 3ds Max to Build a Real Rube Goldberg Machine

Kim Lee
Worlds Away Productions, 3d Artist and Fabricator
@worldsawaypro

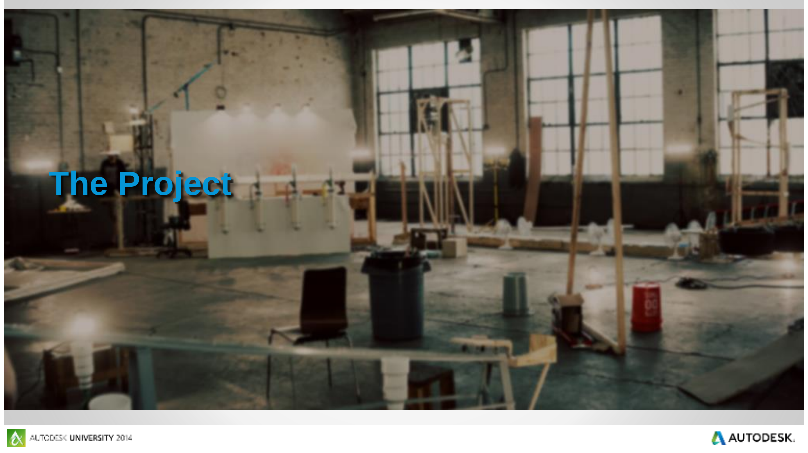
Class summary

In this class we will examine how 3ds Max was used during the previsualization, design and fabrication phases of the Panasonic Toughpad "The Ultimate Torture Test" video.

Key learning objectives

At the end of this class, you will be able to:

- Discover how to apply tools traditionally used for VFX to Mechanical Design
- See how MassFX can be used as a quick solution for working out mechanical designs
- See how various features in 3ds Max can be used to create quicker previsualizations
- Understand how rigging tools in 3ds Max can be used to help design working mechanical assemblies



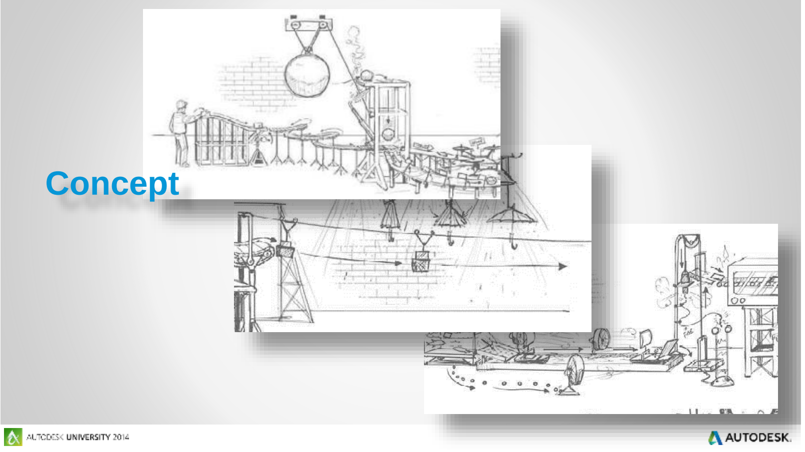
The Project

The Creative Challenge

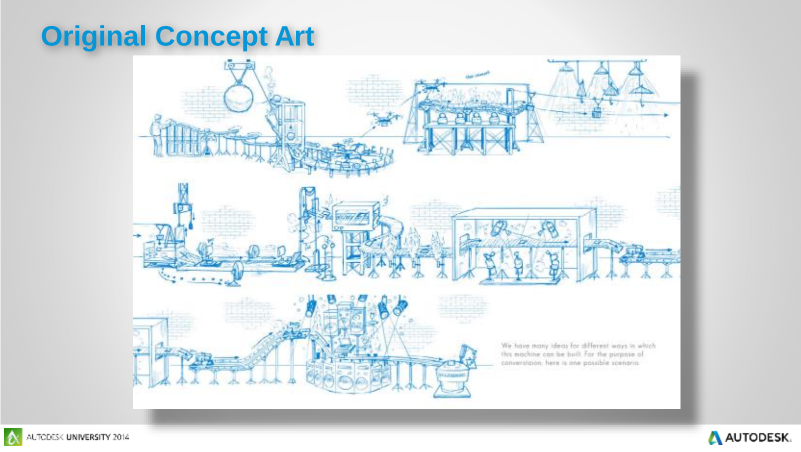
To create a viral video that highlights the key points of ruggedness of the new Panasonic Toughpad in the context of a whimsical testing grounds inspired by Rube Goldberg machines.

The Logistical/Technical Challenge

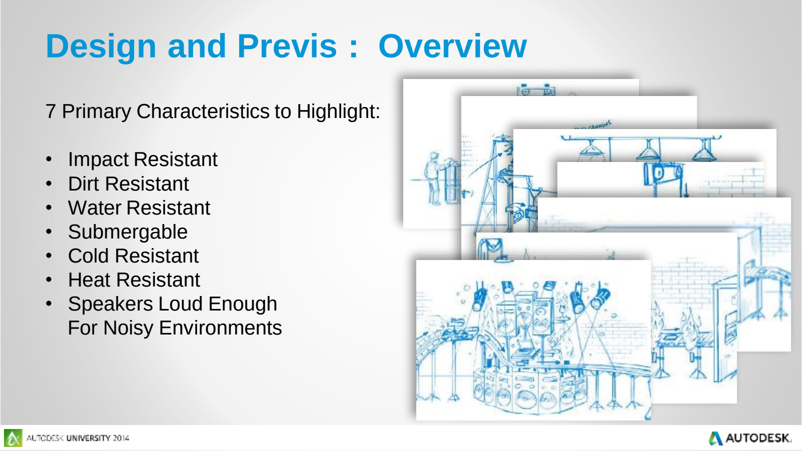
5 weeks schedule from project award to shooting
No location established at time of award
Concepts for all torture tests not yet approved by client
Not technically a "Rube Goldberg Machine"
….actually harder



Concept



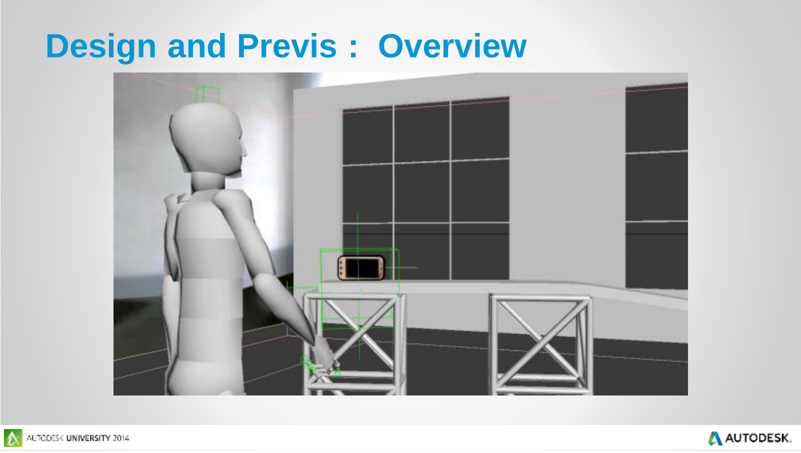
Original Concept Art



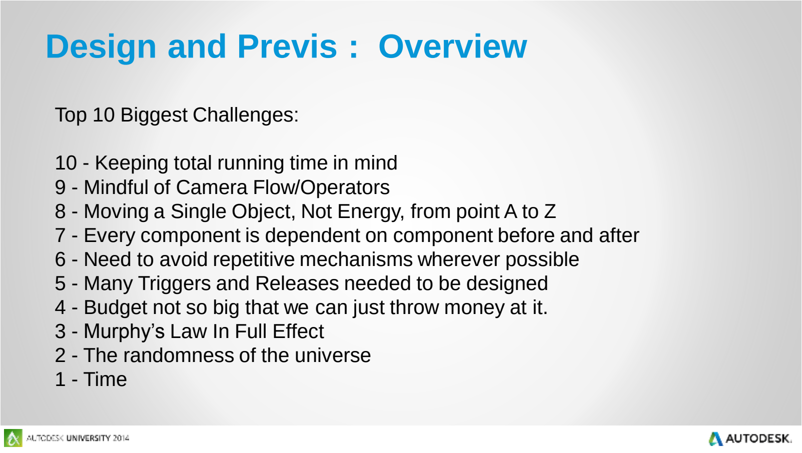
Design and Previs : Overview

7 Primary Characteristics to Highlight:

- Impact Resistant
- Dirt Resistant
- Water Resistant
- Submergable
- Cold Resistant
- Heat Resistant
- Speakers Loud Enough For Noisy Environments



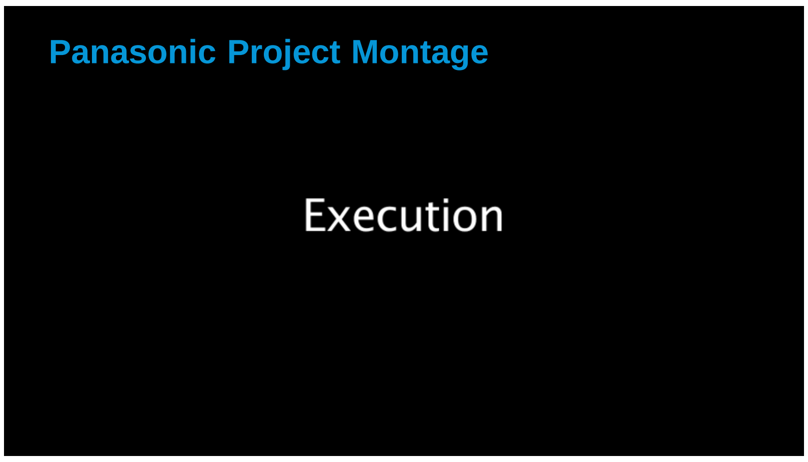
Design and Previs : Overview



Design and Previs : Overview

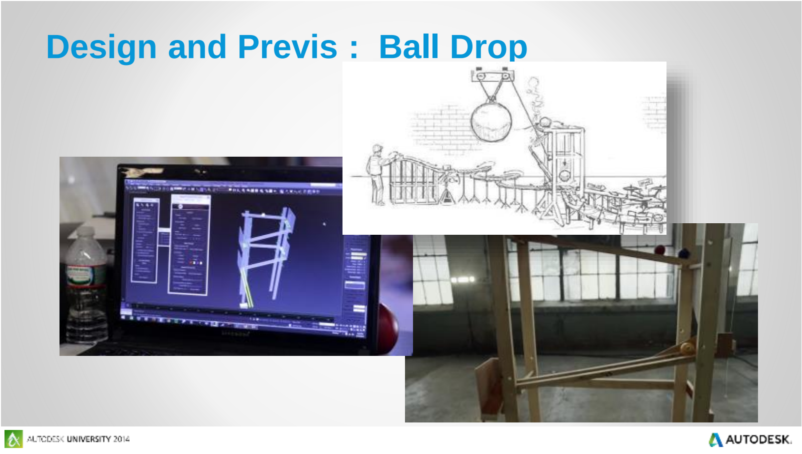
Top 10 Biggest Challenges:

10 - Keeping total running time in mind
9 - Mindful of Camera Flow/Operators
8 - Moving a Single Object, Not Energy, from point A to Z
7 - Every component is dependent on component before and after
6 - Need to avoid repetitive mechanisms wherever possible
5 - Many Triggers and Releases needed to be designed
4 - Budget not so big that we can just throw money at it.
3 - Murphy’s Law In Full Effect
2 - The randomness of the universe
1 - Time

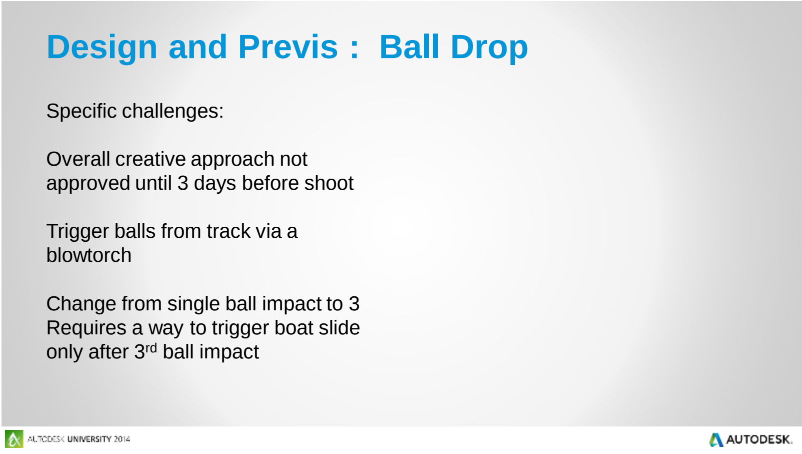


Panasonic Project Montage

Execution



Design and Previs : Ball Drop



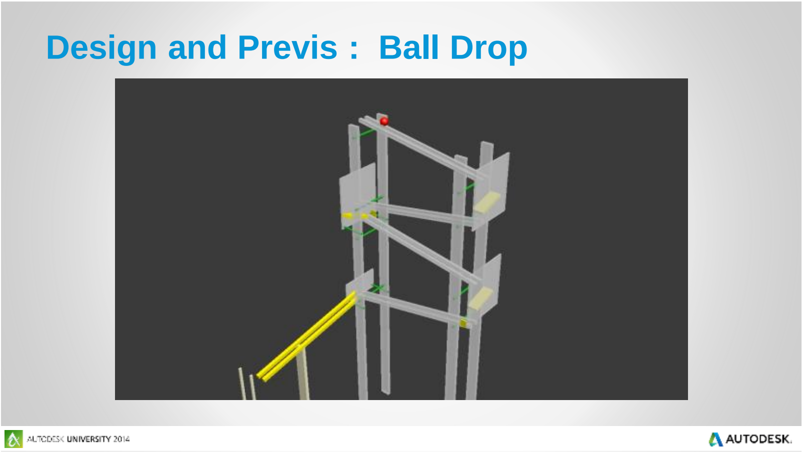
Design and Previs : Ball Drop

Specific challenges:

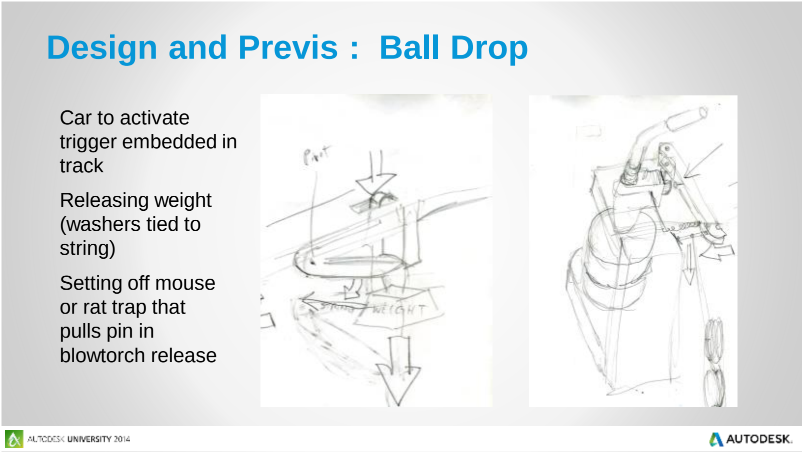
Overall creative approach not approved until 3 days before shoot

Trigger balls from track via a blowtorch

Change from single ball impact to 3
Requires a way to trigger boat slide only after 3rd ball impact



Design and Previs : Ball Drop

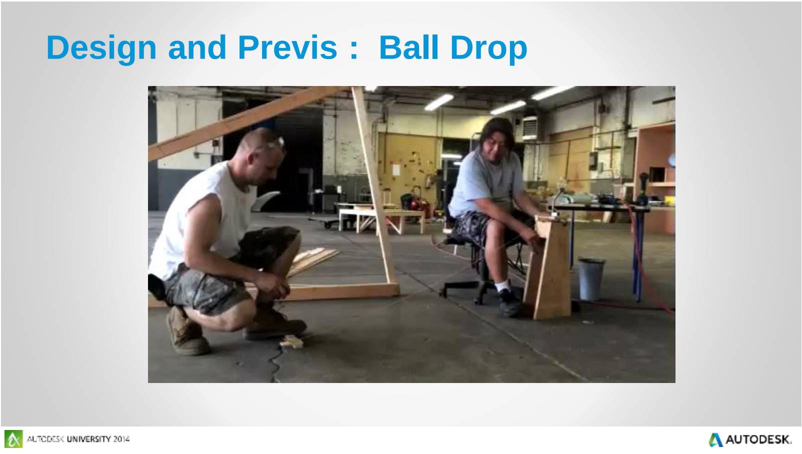


Design and Previs : Ball Drop

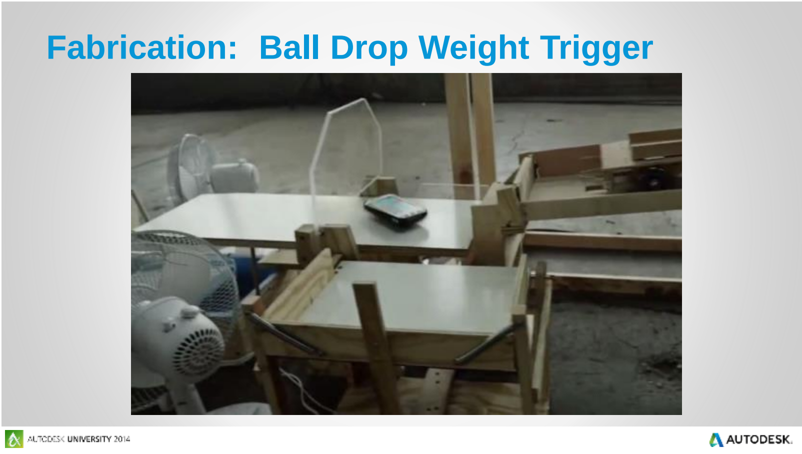
Car to activate trigger embedded in track

Releasing weight (washers tied to string)

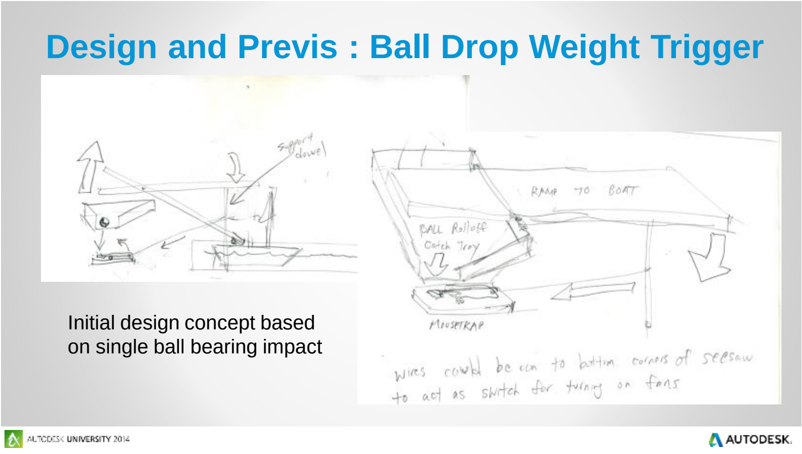
Setting off mouse or rat trap that pulls pin in blowtorch release



Design and Previs : Ball Drop



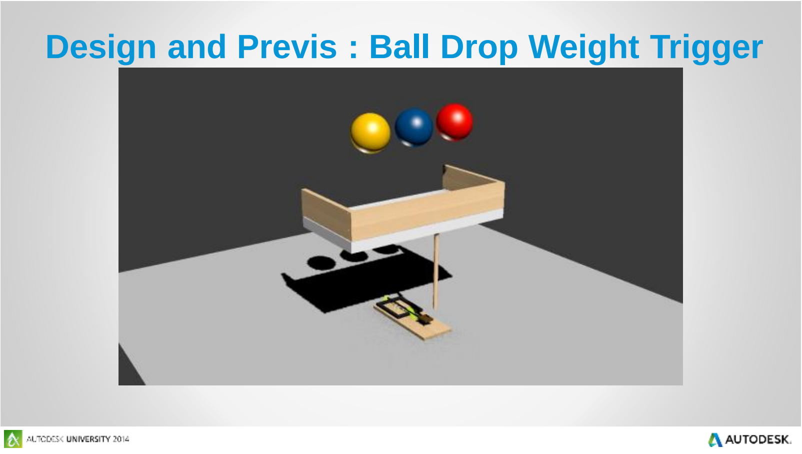
Fabrication: Ball Drop Weight Trigger



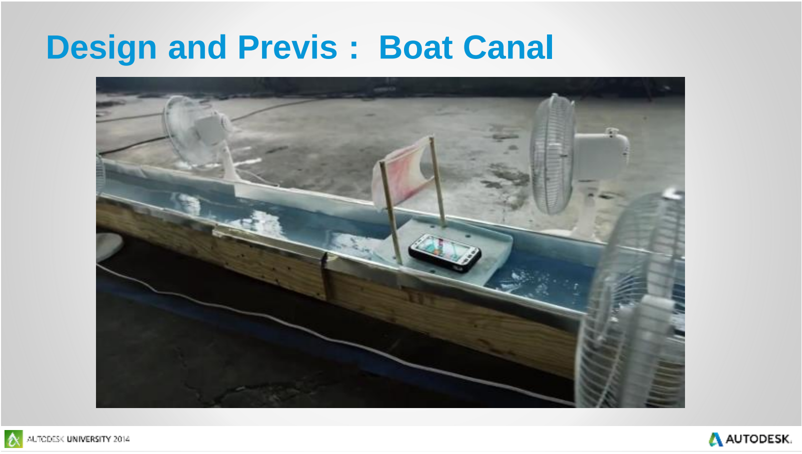
Design and Previs : Ball Drop Weight Trigger

Initial design concept based
on single ball bearing impact

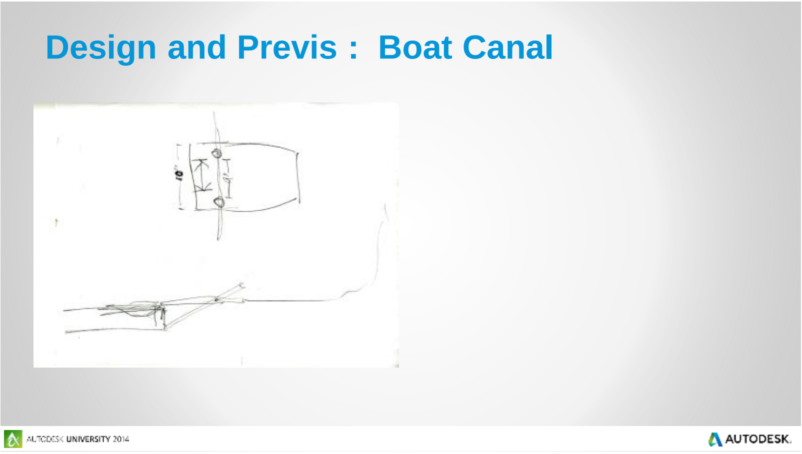
wires could be run to bottom corners of seesaw to act as switch for turning on fans



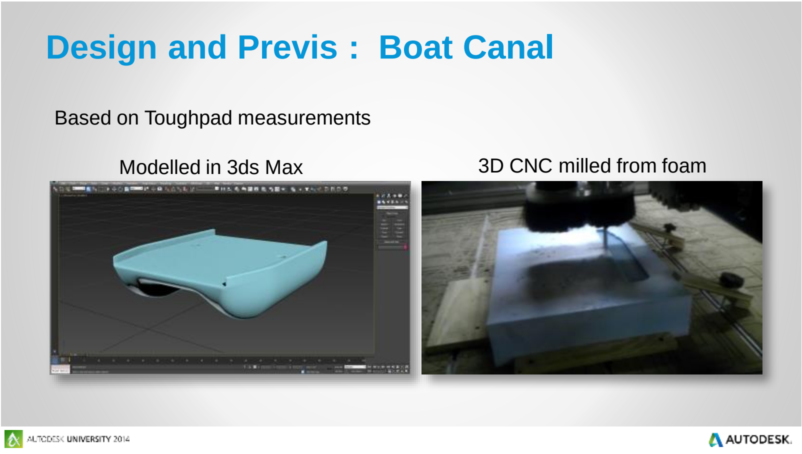
Design and Previs : Ball Drop Weight Trigger



Design and Previs : Boat Canal



Design and Previs : Boat Canal

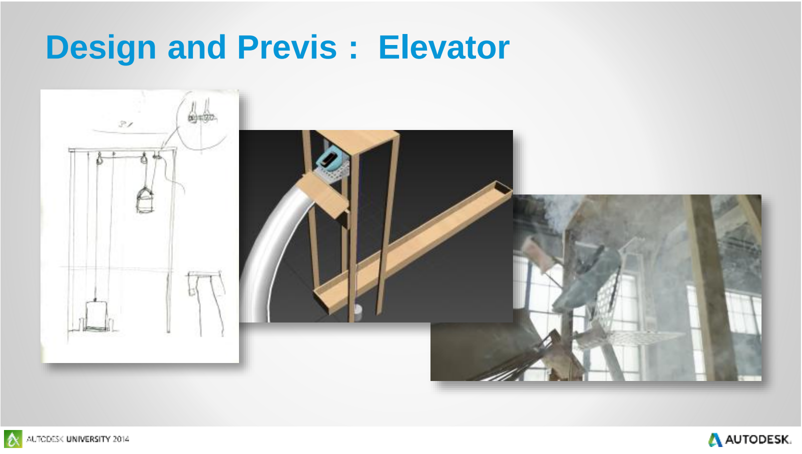


Design and Previs : Boat Canal

Based on Toughpad measurements

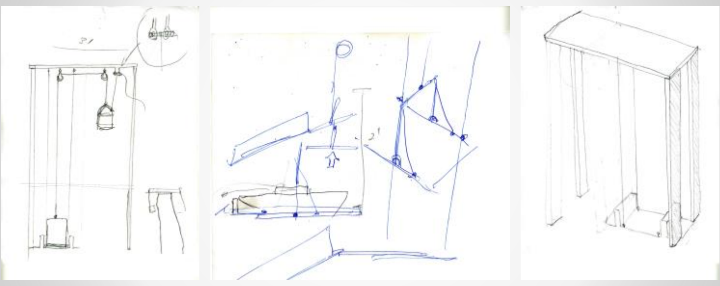
Modelled in 3ds Max

3D CNC milled from foam

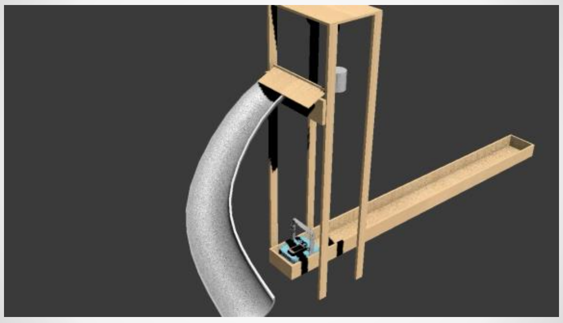


Design and Previs : Elevator

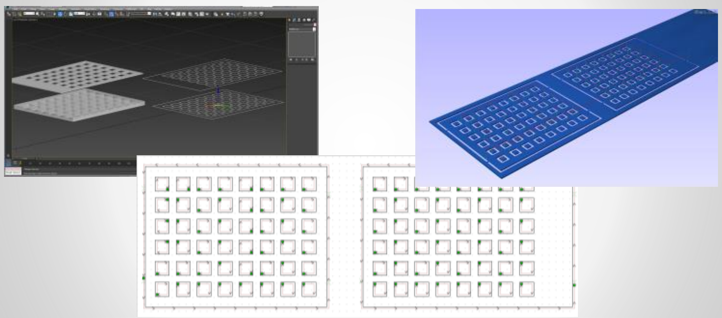
Design and Previs : Elevator



Design and Previs : Elevator



Fabrication: Elevator



Fabrication: Elevator

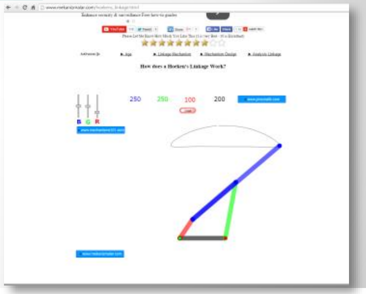
Design and Previs : Hoeken Conveyor

Design and Previs : Hoeken Conveyor

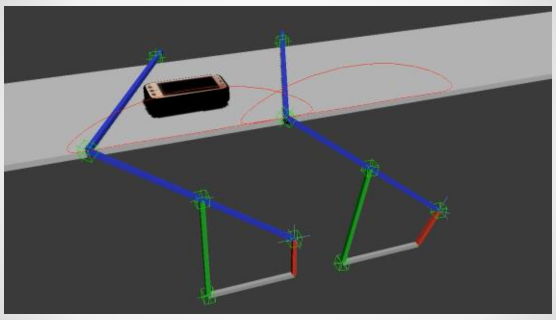
Challenge: How to execute linear motion without always using traditional conveyor belts and look interesting

Design and Previs : Hoeken Conveyor

Solution: Comb the internet until you find http://www.mekanizmalar.com/



Design and Previs : Hoeken Conveyor



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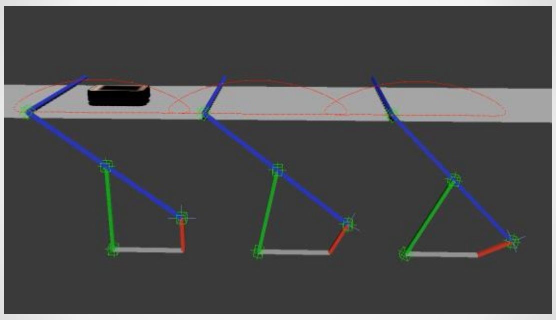
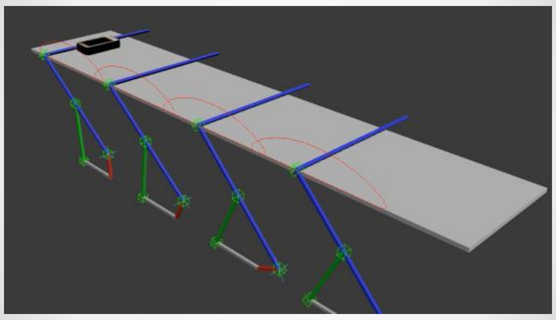


Design and Previs : Hoeken Conveyor



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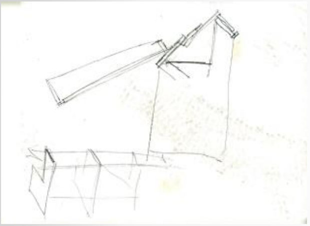
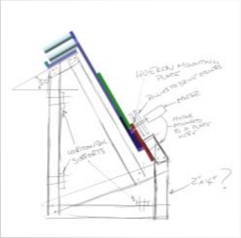
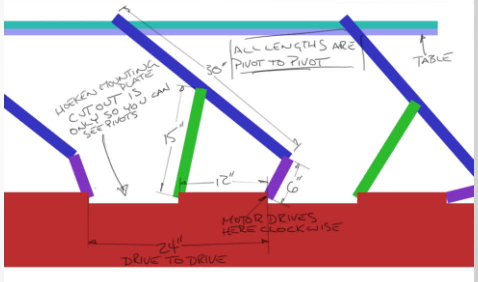


Design and Previs : Hoeken Conveyor





Fabrication: Hoeken Conveyor

Derive measurements for full scale execution from previs

Fabricate linkages on CNC machine from splines extracted from previs

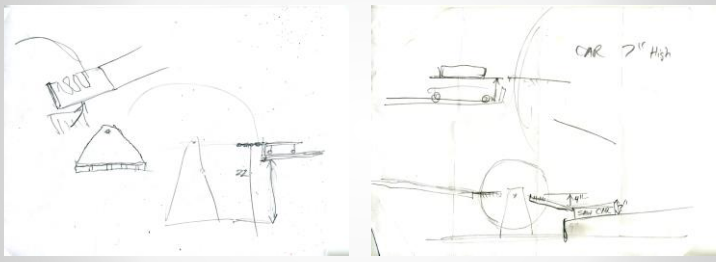
Source drive components from McMaster Carr
- Sprockets
- Chains
- Bushings
- Collars

Put it all together and pray

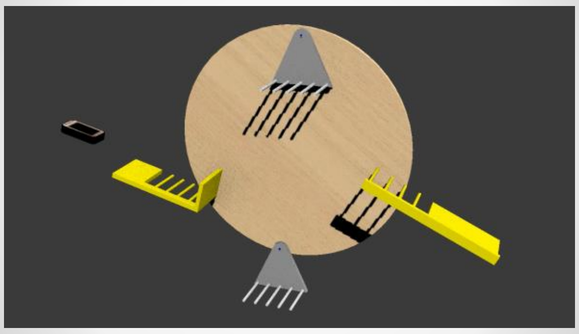
Fabrication : Hoeken Conveyor

Design and Previs : Ferris Wheel

Design and Previs : Ferris Wheel



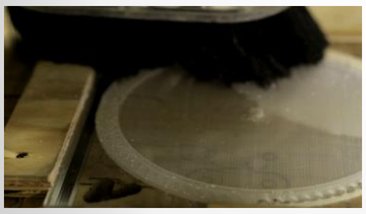
Design and Previs : Ferris Wheel



Fabrication: Ferris Wheel

Design and Previs : Last Minute Tweaks

Custom Step Down Chain Sprocket - Freezer Conveyor
Step Down Gearing - Ferris Wheel
Mechanical Start Button



Final Piece

Thank You and Credits

Worlds Away Productions

Kai Lee – Production Designer
Kim Lee – Art Director/Previs Artist
Ales Brodsky – Lead Fabricator
Eric Fisher - Fabricator
Victor Barroso - Fabricator
Zack Freedman – Air Cannons/Electronics
Steve Cohen – Drone Specialist

Damaris Cozza – Props
Kathryn Vega – Props
Ruddy Heredia – Art Assistant
Sean Hechler – Art Assistant
Linda Albert - Art Assistant
Calvin Wong – Art Assistant

Thank You and Credits

Shilo

Anthony Furlong – Director
Cary Flaum – Executive Producer/Head of Production
Robert Berman – Head of Production - East
Tom Nifenecker – Line Producer

Kevin Kim – Behind the Scenes Photo/Video

Thank You and Credits

SIGMA
Diane deCastro – V.P., Sr. Account Director
Kelly Mastrojohn – Sr. Account Executive
Genevieve Gigi – Agency Producer
Tim Stapleton – Creative Director
Nik Nikolov – Creative Director
Skye Leith – Video Production Director
Jose Aguirre – Video Editor
Matt Reinheimer – Audio Engineer

PANASONIC
Marca Armstrong – Vice President, Marketing
Jayme Cunningham – Marketing Manager

Session Feedback

- Via the Survey Stations, email or mobile device
- AU 2015 passes given out each day!
- Best to do it right after the session
- Instructors see results in real-time

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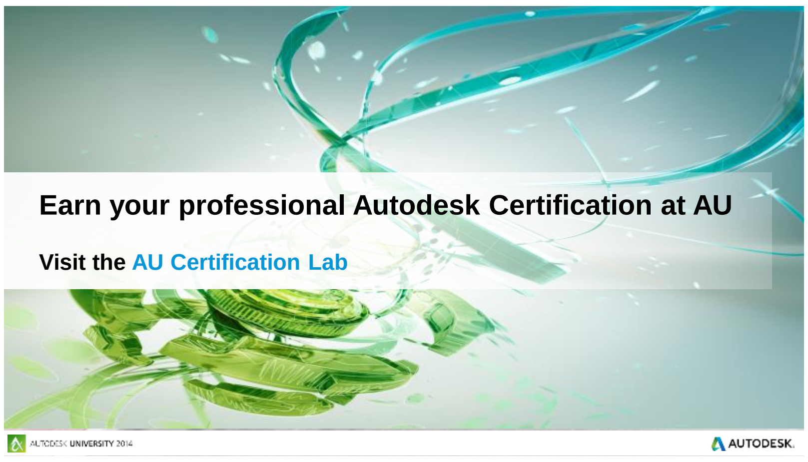

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