

# BANDBEESTEN: THE LEGACY GOES ON

## TEAM ENCORE:

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# PROBLEM STATEMENT

- Continuous improvement of Bandbeesten motorized piano.
- Design and manufacture twenty sousaphone stands for the University of Idaho marching band.



# SOUSAPHONE STAND NEEDS

- Reduce wear on sousaphones during down time in performance
- Provide secure resting place for instruments



# INITIAL PROTOTYPES

- Pros:
  - Sturdy design
  - Easy to assemble
- Cons:
  - Narrow base and support arms
  - Low quality



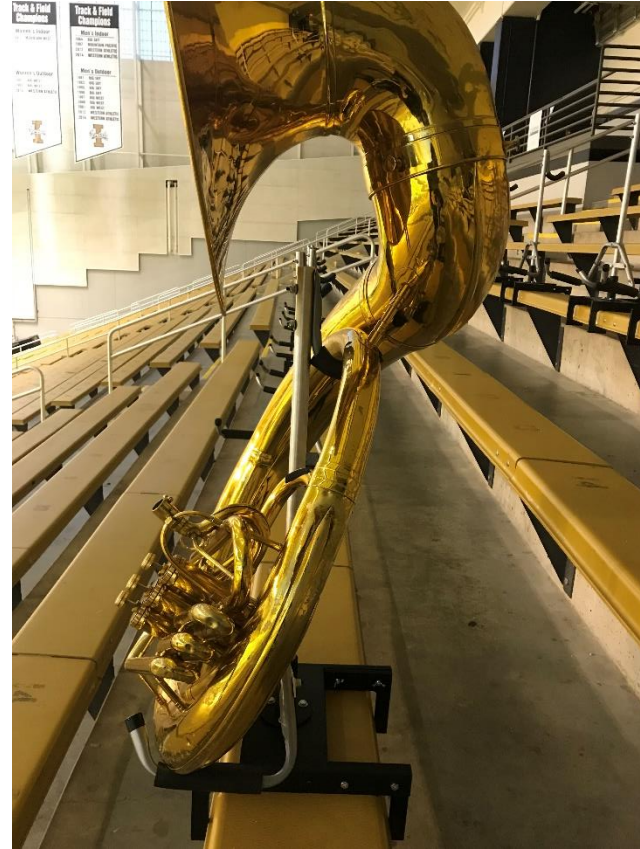
# FINAL DESIGN

- Key Features:
  - Padding on all contact points
  - Thumb screws for easy installation
  - Polished Aluminum
  - Sturdy base and hold on bleachers
  - Set screw to remove top of stand from base





# FINAL DESIGN



# PRODUCTION

- Created twenty sousaphone stands:
  - Laser cut wooden clamps
  - CNC milled cross members
  - CNC drilled holes in bars
  - Bent twenty padded arms
  - Painted bases black
  - Counter drilled bases and bolted flanges

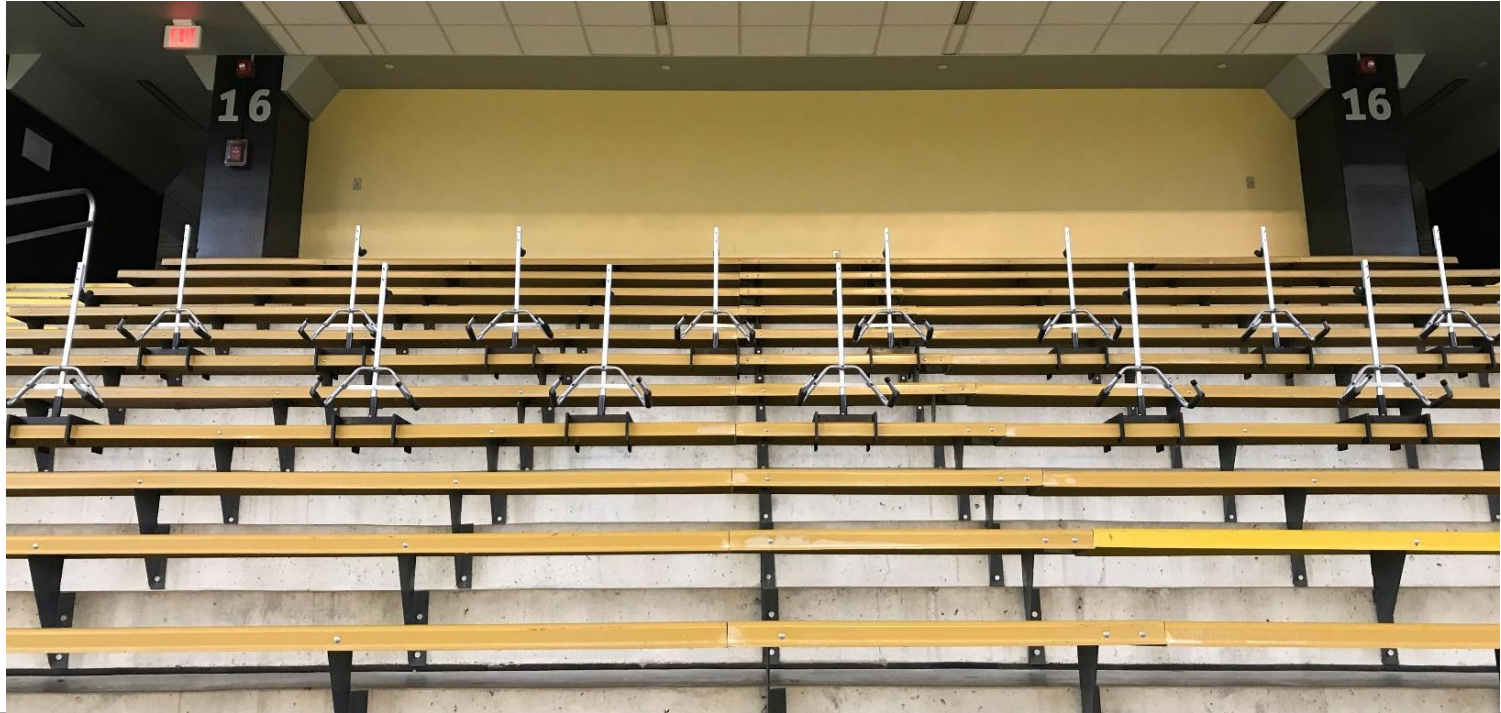


# PRODUCTION





# DELIVERY TO MARCHING BAND



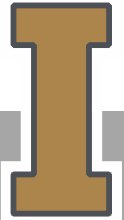
# PIANO CHANGES

- Added lights to the “I” on lid of piano
- Wired switches for motor drivers
- Re-wired and soldered connections



# HALFTIME SHOW

- Performed in 3 football game halftime shows:
- 1<sup>st</sup> show: Oct. 7<sup>th</sup> (Homecoming)
- 2<sup>nd</sup> show: Oct 14<sup>th</sup>
- 3<sup>rd</sup> show: Oct. 28<sup>th</sup> (Dads weekend)



# DFMEA: PIANO

Description of component, subsystem, or function	Symptom (what?)	Effect (so what)	Failure mode (why?)	Probability of failure	Severity of effect	Risk priority	Remedial action	Probability of failure after action	Severity of effect after action	Risk Priority
Bandbeesten Piano Startup	Connecting the controller.	Piano wont function.	Arduino switch is left off on actual box.	5	4	20	Label the switch on the outside of box with off and	1	4	4
			Not all positions are hit on the controller calibration.	5	4	20	Make sure the joysticks on the controller hit every point by moving them as fast as possible in all	2	4	8
			Arduino swithch on piano is in the off position.	5	4	20	Create a Piano startup checklist with all the steps in order to start the paino.	1	2	2
Bandbeesten Piano Maintenance	Motor drivers are not tight.	Piano doesn't spin smoothly and is jerky.	The chain slips on the sprocket causing the piano to jerk.	3	3	9	Check all the chains before each performance/p practice and remove link if needed.	2	3	6
			Bolts on each driver are not tight.	4	3	12	Tighten all bolts on each motor driver before each use.	1	2	2
			The bolts are not checked after each practice or performance	4	4	16	Have a log to make sure that bolts are checked before and after every use.	1	3	3



# WORKING WITH MARCHING BAND

- Showmanship is really important
- The show must go on
- Practice makes perfect
- Great tradition
- Strive for even better next year

