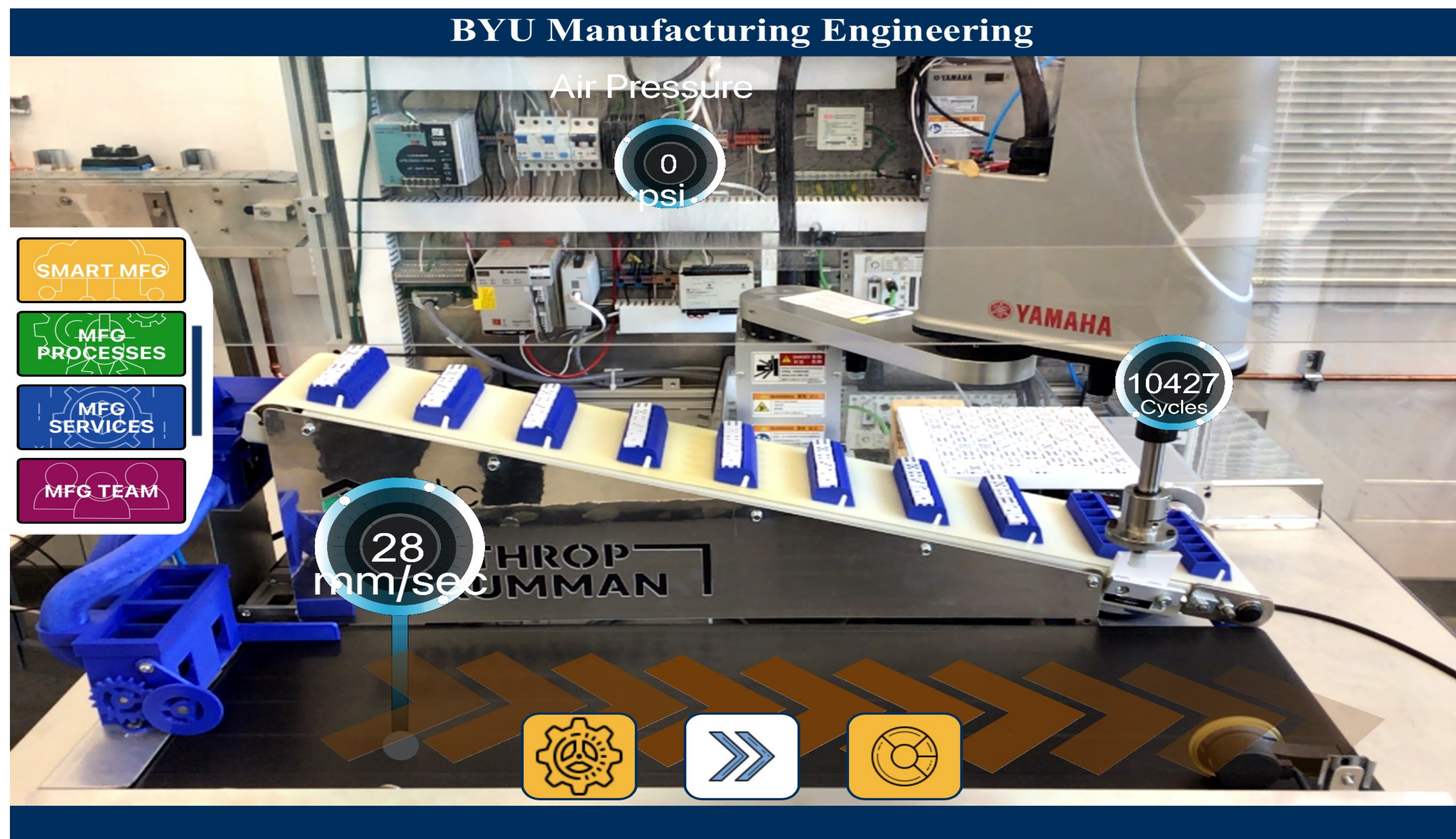


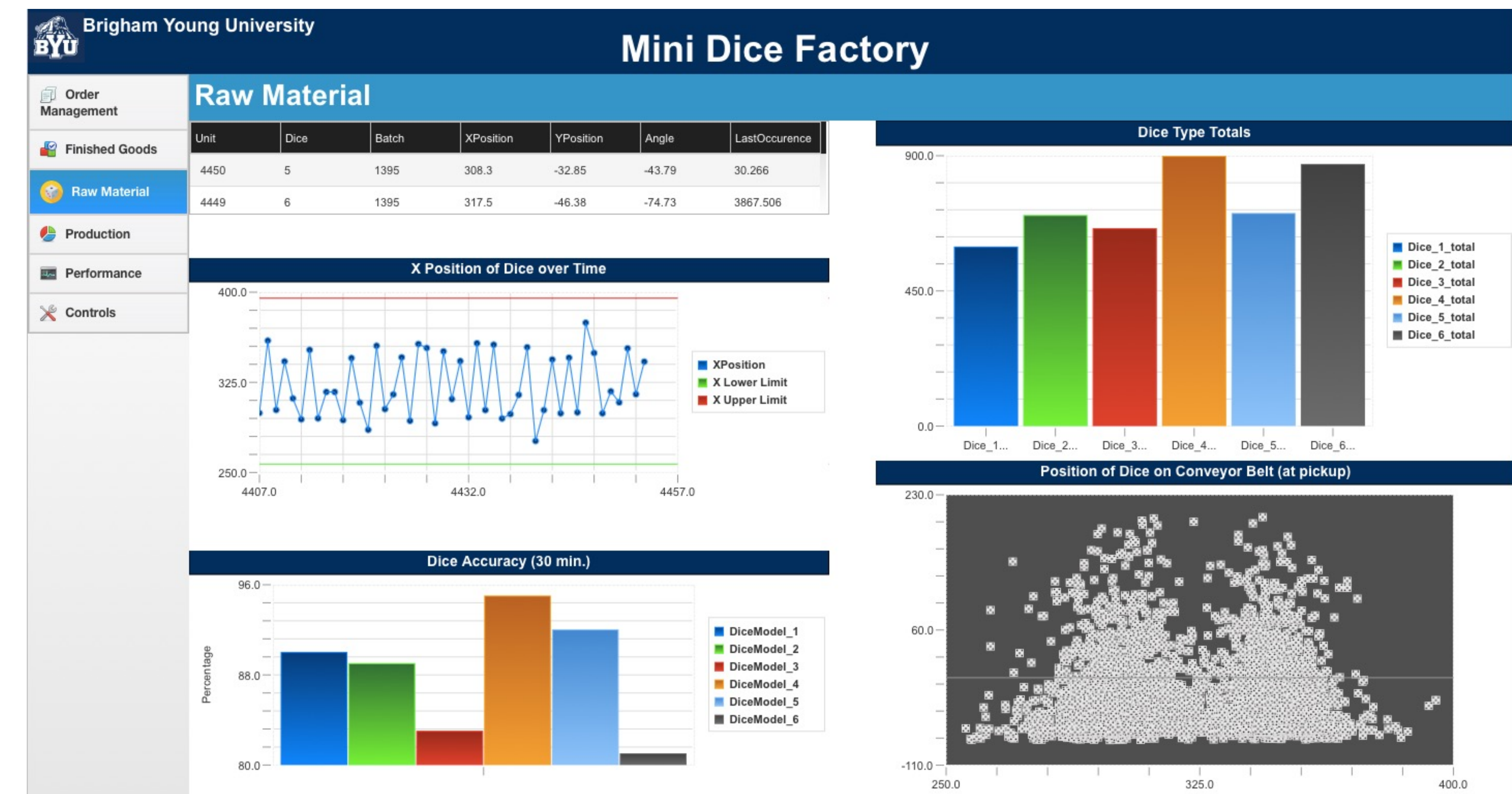
Background

One of the difficulties in advancing smart manufacturing research is the ability to implement and test smart manufacturing strategies on physical equipment. We have built a fully connected smart factory test bed at BYU with the purpose of being able to test and validate smart manufacturing technologies and strategies. With this smart factory test bed, we can advance research in smart manufacturing concepts and technologies such as The Industrial Internet of Things (IIoT), Big Data and Analytics, Horizontal and vertical system integration, Simulation, Cloud computing, Autonomous Robots, and Augmented Reality (AR).



Smart Manufacturing Implementations

- We have created an industrial internet of things environment.
- We have explored connectivity and visibility and the ability to display live factory data.
- The smart factory test bed has been used to demonstrate augmented reality experiences using Vuforia, including live data overlaid on physical equipment (as shown above) and maintenance walkthroughs.
- We have conducted digital twin research using discrete event simulation software. The digital twin simulates future events based on current parameters and live data.



Key Design Features

- Built with industrial equipment to mimic an actual factory setting.
- Autonomous system which allows for easy data collection and proper resource allocation.
- Fast cycle time allows for large amounts of data to be generated in a short amount of time.
- The factory can run independently for an undetermined amount of time.

Future Research Plans

With a fully connected factory, we have plans of performing research with a focus towards predictive analytics. We will perform predictions using Thingworx Analytics and the previously collected factory data. We also have plans for creating a close-loop analytics system where the system equipment will rely on analytics to make decisions rather than people.

Summary

A test bed factory with high production volume and low process time is highly beneficial because it allows for streamlined smart factory research. It has already proven to be beneficial in advancing smart manufacturing research and we hope to use it to further quantify the value of industry 4.0.