

Robot Design Track

9:00AM – 9:45AM

FRC 234 "Cyber Blue" Design Process - Seven Stages for Continuous Development
Presenter: Chris Fultz, Rolls-Royce, FRC234

An effective design process is an ongoing activity that is focused on continuous learning and improvement. Over the past several years, Cyber Blue has developed a process that is based on methods used by major engineering firms and drives continuous improvements into each new design.

The process follows seven basic stages. The design of the next robot actually begins as soon as the current competition season ends. The team begins with Lessons Learned, which then creates opportunities for Innovation and Learning. These both happen in the off-season. When the new game challenge is announced, the team begins Concept Development, then Preliminary Design. A formal Design Review completes the next step of Final / Critical Design. The robot is then completed in the Product Realization phase, followed by In Service (Competition) activity. Following the final competition, another Lessons Learned activity is completed and the process repeats.

Attendees will take away knowledge on the value of Continuous Development and utilization of a formalized design process. The presentation will include details on each step as well as recent design examples and lessons from the team.

10:00AM – 10:45AM

FRC Drive Systems
Presenter: Ken Stafford, WPI Robotics Resource Center, FRC190

This session will feature a review of drive systems commonly used by FRC teams. Included will be the ramifications of the various designs on turning center, traction, and stability along with other pros and cons as they apply to a variety of teams and their available resources.

11:00AM – 11:45AM

Belts & Belt Drives
Presenter: Eric Bjork, Gates Corporation

Belt drives are a great power transmission substitute for roller chain and can offer many advantages to the design and functionality of the system which is goes on. Essentially maintenance free, synchronous belt drives do not require any lubrication or other special dressings to prolong the life of the drive, and also helps with the cleanliness of the drive (no grease). When paired with aluminum sprockets, belt drives weigh less than a comparable roller chain drive. Also with the close fit of the tooth/groove engagement, the backlash is minimized which increases the responsiveness of the drive. This presentation will discuss the advantages and disadvantages with using a synchronous belt drive as a power transmission means on your robot.

12:00PM – 1:00PM

Strategies for Effective Conceptual Modeling, Assembly Planning and FMEA with CAD
Presenters: Scott Morris and Jordan Cox

PTC Using concepts from PTC's Hands on Workshop series, you will learn how to quickly and easily use 2D and 3D CAD techniques to create functioning concept models without worrying about the details of what's in the Kit of Parts. Being able to move quickly and make early design decisions can have a significant impact on your team's success and meeting the design requirements for your robot. You'll pick up some great tips on creating assembly and manufacturing plans to make sure everyone involved knows how your design is put together and what components it's using. We'll also cover how to create a Failure Mode and Effects Analysis (FMEA) report to ensure you have all the bases covered going into competition.

Controlling Your Robot Track

9:00AM

Kinect for FIRST Robotics
Presenter: Alfred Thompson, Microsoft

This presentation discusses the architecture of the Kinect with respect to the FRC controller for 2012.

10:00AM – 1:00PM

FRC Control System and Programming
Presenters: National Instruments, WPI, Texas Instruments

This session will focus on strategies for successful robot programming for FRC robots. A review of new features available to teams will be provided, along with specific programming examples in both LabVIEW and JAVA.