

## **Cyber Blue Team 234 - FIRST Robotics Design Review Process - 2004**

For the past five years, Rolls-Royce engineering leadership has supported a “Design Review” for the Perry Meridian High School robotics team, Cyber Blue Team 234. (Rolls-Royce is a primary sponsor of this team.) The design review occurs about 4 weeks into the 6 week build process and is an opportunity for the students to present information on the robotics program, Cyber Blue history, the current year “challenge”, the team’s chosen strategy and the design of the team’s robot. This review is an excellent learning experience for the students as they prepare their presentations, speak to the assembled review team and learn to defend their ideas while also being open to comments from the reviewers. This review is also an opportunity for introducing others within Rolls-Royce to the FIRST program.

After the 2003 review, Cyber Blue asked the Rolls-Royce review team for comments on the review and the process. Based on that feedback, several changes and improvements were implemented to the Design Review process for 2004. Two significant changes are an increase in the number of reviews during the build process and the formation of a “Technical Advisory Committee” (TAC) that will participate in each of the reviews.

Cyber Blue has defined a process of four reviews – Concept, Preliminary Design, Detailed Design and Fabrication - based on the formal process used in many engineering organizations.

Cyber Blue has also recruited a Technical Advisory Committee (TAC) that will participate in each review. The TAC participated in the Kick-Off meeting on January 10 and will be a part of the four other reviews during the design and build process. The TAC will also be a part of the Celebration on the night before we ship. Members of the TAC are senior engineering managers from Rolls-Royce.

Three of the design reviews will be informal reviews at the high school, led by the team captains. One review, the Detailed Design Review (DDR) at the end of week 3, will be at the Rolls-Royce facility. The DDR review team will be expanded and the presentation will involve the entire Cyber Blue team. This review will be much more formal and very similar to the Critical Design Reviews the team has conducted in previous years.

Many of the questions (Exit Criteria) are consistent through all of the reviews. The intent is for the presenters to build on information at each review and make the process easy to follow for the review team.

This new approach will provide additional benefits to the team for the robot design and competition performance capability. Additionally, these reviews will introduce the team members to a staged review process similar to what is utilized at Rolls-Royce and other design and engineering corporations around the world.

The team has created a Microsoft Project build schedule for the six-week program and each design review is a significant milestone towards meeting the program goals.

Any FIRST team is invited and encouraged to adopt and adapt this process for use in their build season.

**CYBER BLUE Robotics**  
**Design Review Descriptions – 2004 Season**

**Total Program Length – 46 Days**  
**10 January – 24 February (est.)**

**1. Program Kick-Off – 10 January (Day 1 / 46)**

GOAL:

Introduce students and review panel to the 2004 Robotics Challenge.

EXIT CRITERIA:

None

**2. Concept Review – 15 January (Day 6 / 46)**

GOAL:

Gain approval of the feasibility of the robot concept(s) presented.

EXIT CRITERIA / PRESENTATION:

Presentation of multiple concepts and process to determine final selection.

Descriptions of concepts still under consideration to carry forward to next phase.

Program Schedule

Matrix of the following for evaluated concepts:

Critical Features

Critical Capabilities

Risks

Technology Requirements

Resource Requirements

**3. Preliminary Design Review – 22 January (Day 13 / 46)**

GOAL:

Gain approval of the viability of the robot concept presented.

EXIT CRITERIA / PRESENTATION:

Presentation of a fully developed single concept.

Explanation of final decisions leading to the selected concept.

Program Schedule

Description of concept selected:

Critical and Key Features

Critical and Key Capabilities

Preliminary Risk Matrix, Key Risks, Mitigation Actions

Technology Requirements

Resource Requirements

#### 4. Detailed Design Review / Critical Design Review – 29 January (Day 20 / 46)

##### GOAL:

Confirm the viability of the robot and progress of design activity

##### EXIT CRITERIA / PRESENTATION

Complete design definition.

Analytical verification of design decisions.

Safety assessment

Durability assessment

Testing plans

Program schedule

Description of robot

    Critical and Key Features

    Critical and Key Capabilities

    Updated Risk Matrix, Key Risks, Mitigation Actions

    Technology Issues

    Resource Issues

#### 5. Fabrication Review / Operational Readiness Review – 12 February (Day 34 / 46)

##### GOAL:

Confirm the viability of the robot to be constructed as designed.

Confirm the viability of the robot to perform as intended.

##### EXIT CRITERIA / PRESENTATION

Confirmation that the Requirements of FIRST have been met

Confirmation that the Requirements of Cyber Blue have been met

Robustness of design

Capabilities

Program Schedule

#### 6. Demonstration Night / Open House – 23 February (Day 45 / 46)

##### GOAL:

Demonstration of robot capabilities, driving, strategy in action.

Celebrate completion of the program

##### TAC - Auditor Comment Levels

The categories below are suggested guidelines for Technical Advisory Committee comments:

##### Level    Description

4.    **Major Concern**, Issue must be corrected prior to next review

3.    **Minor Concern**, Issue should be addressed / reviewed / planned for prior to next review

2.    **Suggestion**, Issue should be considered by team

1.    **Comments**, General statements, no actions required