Requirements Sheet

Team Number ____

Product Type:  \textit{Acrobatic bike}

\textbf{1. Market Description}

This bicycle is to be designed for the mass consumer market. The expected sales volume is 100,000 per year. Affordability, excellent performance/cost ratio and light weight are most important to be successful in this market.

\textbf{2. Requirements}

\begin{itemize}
  \item \textbf{Manufacturing Cost (C):} \quad C \leq 10.4 \text{ $ /part}
  \item \textbf{Performance (}\delta_1, \delta_2, f_1:\text{)}
    \begin{itemize}
      \item Displacement $\delta_1 \leq 0.063 \text{ mm}$
      \item Displacement $\delta_2 \leq 0.010 \text{ mm}$
      \item First natural frequency $f_1 \geq 360 \text{ Hz}$
    \end{itemize}
  \item \textbf{Mass (m):} \quad m \leq 0.16 \text{ lbs}
  \item \textbf{Surface Quality (Q):} \quad Q \geq 5
  \item \textbf{Load Case (F):} \quad F_1 = 100 \text{ lbs} / F_2 = 100 \text{ lbs} / F_3 = 100 \text{ lbs}
\end{itemize}

The part has to conform to the interface requirements and geometrical boundary conditions shown on page 2 of this document. This requirement cannot be waived.

\textbf{3. Priorities}

Structural performance is the first priority for this product. Next, the customer cares about light-weighting (low mass) and thirdly, manufacturing cost should be as low as possible. These priorities are shown in the Ishii-matrix below:

\begin{center}
\begin{tabular}{|c|c|c|c|}
  \hline
  \textbf{Attribute} & \textbf{Constrain} & \textbf{Optimize} & \textbf{Accept} \\
  \hline
  Cost & \checkmark & & \checkmark \\
  Performance & & \checkmark & \\
  Mass & & & \checkmark \\
  \hline
\end{tabular}
\end{center}

Modifications to these requirements have to be negotiated with Management.
No forbidden zone for your team

Dimensions

Design freedom: ± 0.800

45°

4.750

3.000

0.500

0.500

0.500

0.500

4 × φ 0.406

3.500

4.000

Configuration

Laser displacement sensors

Manufacturing cost

Mass

Forbidden zone

Applied loads

F₁

F₂

F₃

Measured displacements δ₁

δ₂