The following document includes the design and finite element analysis for a bicycle frame design. A summary of the design methodology is to concentrate on performance and mass, while accepting the cost. The first version of the bicycle frame is shown below:

**CAD Drawing:**

![CAD Drawing](image)

**FEA Analysis Results:**
- Displacement at Handlebars: 0.21mm (Req. 0.063mm)
- Displacement at Seat: 0.014mm (Req 0.01mm)
- Frequency (1st fundamental mode): $2.41 \times 10^2$ Hz (360Hz)
- Mass: 0.14lbs (Req. 0.16lbs)
- Maximum Stress: 80Mpa (Max yield: 275Mpa)

**Screenshot of FEA Analysis:**

![Screenshot of FEA Analysis](image)