Introduction
The annual NASA Robotic Mining Challenge tasks teams with building robots capable of traversing and mining simulated Martian terrain. The competition goal is to utilize automation and sensing alongside mechanical systems to harvest icy regolith (gravel) from beneath the planet surface.

The senior team is focusing on building a chassis that can efficiently support and integrate the three subsystems: movement, digging, and electrical.

Design Strategies
Utilize computer simulation and analysis to guide the core chassis design and the integration of the entire system.

Utilize advanced material manufacturing, including composites and 3D printing, to reach desired strength/weight ratios and manufacturing timelines.

Subsystems
The resulting chassis consists of a welded unibody constructed from Aluminum 6061-T6 square tubing. The geometry and material choice lends itself to a lightweight and rigid platform for sub assembly components to perform their necessary functions.

The digging conveyor actuation is driven by pins attached to guide plates. The material delivery conveyor is supported by the diagonal cross beam and the material is held by acrylic windows and a fabric divider.

Chassis Details

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<th>Critical Results</th>
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<tr>
<td>Goal</td>
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<tr>
<td>Weight</td>
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<td>Strength</td>
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Conclusion
The chassis design met our critical specs for weight and strength performance, and through the utilization of computer modeling the design was able to meet integration needs on schedule.

Methods
Research
We met with industry and did extensive research into advanced materials, specifically carbon fiber, determining analysis and manufacturing methods and materials that would aid in achieving optimal strength/weight ratios.

It was determined that carbon fiber was a desirable material, but beyond the scope of this year’s bot.

Digital Design
CAD modeling was used extensively in systems engineering efforts to integrate and design subsystems to best meet reciprocal design needs.

FEA Modeling and Testing
FEA was utilized to verify and optimize design changes before manufacturing and physical testing.

Research Hand-Off
USR competes in the Robotic Mining Challenge annually. While the CF chassis design was abandoned due to time constraints, the research and design will be provided to the club for future utilization.