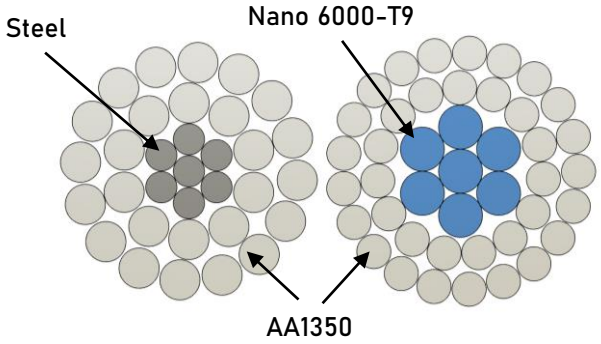
CABLE Conductor Manufacturing Prize

Submission Title: Ultra-High Strength/Highly Conductive Al Alloys



Application example: replacing the high-strength steel core in popular overhead conductor Drake ACSR, achieving the same strength-to-weight ratio with a 19% drop in electrical resistance

Material	Tensile Strength (MPa)	Specific Strength (MPa*cm^3/g)	Electrical Conductivity (%IACS)
Galvanized high-strength steel	1,240	175	6
Nano 6000-T9	515	189	48

Nano 6000-T9 wire samples

Team:

- Team Name: NanoAL Lightning
- Primary Submitter Name: Josh Dorn
- City and State: Ashland, MA
- Member Names:
  - Nhon Vo
  - Will Miney
  - Farrrah Farhadi

Description of Material:

- Nano 6000-T9 aluminum alloy wire has a tuned composition and modified thermo-mechanical processing method that provides strength and conductivity properties outperforming commercial aluminum conductor alloys
- Enables higher-performing overhead conductor designs
- Global Market Size: $665 million
- Contest 3: Beat a Conductor System!

Fabrication Approach:

- Traditional industrial wire manufacturing equipment utilized in a modified sequence:
  - Continuous alloy rod casting
  - Heat treatment
  - Wire drawing
- This path, designated the T9-temper, produces a particularly microstructure that achieves high strength and high conductivity

Potential Impact:

- Capable of replacing the steel core in ACSR overhead conductors, providing a 19% decrease in total conductor resistance
- Could reduce transmission losses due to material resistance by 40 million MWh, a power generation cost savings of $1.2 Billion annually
- Could reduce CO_2 emissions by 15 million tons annually, 0.3% of total US emissions