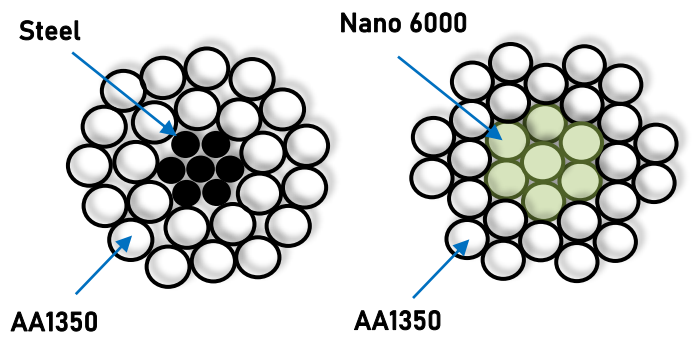




Ultra-high strength and highly conductive aluminum alloys for performance conductor



Example: same strength-to-weight ratio, ~22% increase in electrical conductivity if high-strength steel is replaced by Nano 6000 in this popular conductor design

	Tensile Strength (MPa)	Specific strength (MPa.cc/g)	Electrical Conductivity (%IACS)
Galvanized high-strength steel	1,400	175	6
Nano 6000	500	185	48



Team:

- **Team name:** NanoAl Lightning
- **Primary submitter name:** NanoAl LLC
- **City:** Ashland, MA
- **Submission title:** Ultra-high strength and highly conductive aluminum alloys for performance conductor

Description of Material:

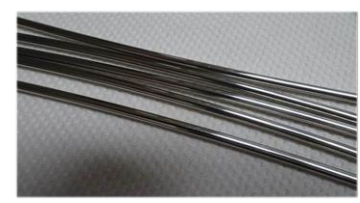
- Nano 6000 is a 6000-series based aluminum alloy, with modified chemistry at hundreds of ppm level and optimized thermo-mechanical processing
- Nano 6000 is specially designed to achieve ultra-high strength, with higher specific strength than galvanized high-strength steel utilized in overhead conductor core
- Nano 6000 maintains a very good electrical conductivity
- Nano 6000 potentially replaces high-strength steel core to significantly boost conductivity of overhead conductors

Fabrication Approach:

Traditional manufacturing equipment, but with specialized processing sequence:

- Aluminum rod casting
- Heat treatment
- Wire drawing
- Conductor stranding

Highly scalability and affordable



Potential Impact:

- Transmission and distribution losses due to material resistance is about \$20 billions per year in the US alone
- More conductive conductors save cost, conduct more power to more homes and businesses
- Stronger conductors reduce number of towers and save cost
- Improved efficiency in transmission and distribution means reducing CO₂ emissions at power plants