

1. **Research Title:** Advanced Structural Concepts for lighter and low cost Aircrafts
2. **Individual Sponsor:**
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3. **Academic Area/Field and Education Level:** Aerospace or Mechanical Engineering (MS or Ph.D. level).
4. **Objectives:** Explore and evolve innovative structural design and fabrication concepts focusing on agility, capability, and affordability for aerospace structures
5. **Description:** Modern aircraft has one of the most efficient aerodynamic shapes ever using advanced tools such as CFD. Aircraft structures and materials technologies have also developed over a hundred years since the first flight, but five or six decades old technologies are still widely used for substructure construction, which is composed of orthogonal structures such as spars, ribs, longerons, or bulkheads. These technologies could not meet endurance requirements due to heavy weight. For the last couple of decades, unitized structure and composite material based structure have demonstrated great potential to balance competing performance and cost requirements in aircraft design and in some instances, attain performance beyond traditional capabilities. AFRL is interested in exploring advanced structural technologies that enable light weight and low cost structure. Research opportunities exist in advanced structural concept design, low cost manufacturing, and design for assembly, maintenance, and repair. The topics of research include but are not limited to: (1) Structural optimization using topology optimization; (2) Innovative structural concept (e.g., morphing / reconfigurable mechanism or structure, bio-inspired structure, tensegrity structures, etc) ; (3) Multi-functional structures (e.g. antenna integrated structure, battery integrated structure, etc); (4) Design for manufacturing/assembly; (5) Advanced prototyping (e.g., continuous fiber composite, automated fiber placement, additive manufacturing, smart tools, etc) ; (6) Low cost manufacturing; (7) Enabling materials and actuators (e.g. flexible/corrugated materials, meta materials, smart materials, novel hybrid compact actuators); and more.
6. **Research Classification/Restrictions:** None.
7. **Eligible Research Institutions:** All DAGSI Universities.