OBJECTIVE: A robust physical configuration and manufacturing source for engineered synthetic floor boards (aka. decking) for Army Heavy Trailers, as well as any trailer that uses wood planking for deck-boards.

DESCRIPTION: Currently, Army heavy trailers primarily use the critically endangered rain-forest wood apitong. Problem to be solved is the frequent and costly redecking of Army heavy trailers.

Decking is an often overlooked integrated structural element of Tactical Trailers. Worldwide, approximately 16,500 DoD military trailers (in both production & sustainment) are decked nearly exclusively in $65M of Apitong, which is an increasingly rare and critically endangered East-Asian tropical rainforest hardwood (i.e. price is rising). Apitong is the only known endangered species actively harvested from nature for DoD use. Apitong has a field service life of only 8 years due to its susceptibility to rot and insect attack, requiring replacement up to 5 times over a 40 year lifecycle, resulting in wasteful utilization of a foreign endangered resource, downtime in addition to ‘random’ board replacement as damage occurs in addition to soldier labor time and incidentals such as corrosion repair and spot painting. An estimated lifecycle cost of $15K to $25K per trailer (in today’s dollars @ $5K each in material and labor to re-deck every 8 to 10 years, leading to a life-cycle potential cost-avoidance for all trailers of >$400 million).

Performance Requirements:
• Sustained load-bearing of payload (5400 lb/ft² est. for contact patch 7,500 lb / 200 in sq.) on 24” spaced crossmembers (3” top flange) without permanent deformation. Inherent stiffness shall not allow sag (deflection) under load of more than 1/4” between crossmembers. Ref Drawing 12624740 M871A3 Semitrailer Floor Boards.
• Resistant to standard automotive fluids including JP-8 and similar diesels, MoGas, motor oil, trans, brake and hydraulic fluid, gear lube, battery acid and caustics. Resist weathering – solar: UV and ozone, thermal -40 to +130F. Ref MIL-STD-810.
• Anti-mold & fungal growth inhibitors such as MicroBan ® or BioBlock ® shall be incorporated. Insect immune – example worst case Formosan termite infestation.
• Fastener req’ts and corrosion cause/isolation req’ts shall be selected for service life longevity.
• Saw and drill using standard wood working tools.
• Able to drive nails into and remove with minimal damage, holes reparable with caulk. Alternative std. fasteners may be acceptable.
• Maintenance-free except for repair of incidental damage.
• Fire-resistant, self-ext. ‘UL94-HB’/MIL-PRF-32518.
• Desired service life: 25 years or longer, with minimal maintenance (life of trailer).
• Color shall be a deep brown to a weathered gray.

PHASE I: Evaluate multi-disciplinary ‘states-of-the-art’ and develop a detailed plan for composite, metal, polymeric or hybrid material trailer flooring board prototype for fabrication and testing in a relevant environment. Prior (market) research (TACOM Study – 2000) found no suitable commercially available products – use this study for a baseline. Use modeling to determine loads to be borne – MRAP Buffalo, M-113 as payloads. Buffalo front wheel is heaviest-case: 7,500 lbs over 200 in² = 5400 lb/ft². Determine design feasibility of concept. Explore other load situations such as impact and rock/gravel rollover.

PHASE II: Design a demonstrator configuration for the M-871A3 22.5 ton trailer, fabricate representative samples of candidate materiel configurations and conduct testing. Testing shall include at a minimum: static load, fatigue loading, accelerated weathering, surface coefficient of friction, simulate damage tolerance to include nailing of cribbing, hammer strikes, rock/gravel roll-overs, fluid immunity (MoGas, diesel, other vehicular fluids and caustics) and fire resistance. Best performer(s) shall be selected for demonstration project: Deliverable will be approx. 1000 linear feet, to redeck six M870A3 heavy trailers for testing.

PHASE III DUAL-USE APPLICATIONS: Commercialization shall entail full rate production of the selected configuration. Potential Phase
III military applications include M871A3 trailer (Ref. TACOM Drawing 126247025 22.5 ton); also include M872A3 & A4 34 ton and M172 22 ton. Commercial equivalent trailers of any uncovered size from tandem axle 10 ton for a backhoe to a 50 ton multi-axle lowboys for the oversize excavators and off-road dump trucks. Covered semi-trailers are also included, with reduced flooring thickness.

**REFERENCES:**

1. DTIC Publication "Trailer Decking Technology Study" Trailer Research and Development Contract No. DAAE07-99-C-S016, November 30, 2000
   - Reference Document
2. TACOM Drawing 12624740 M871A3 Semitrailer Floor Boards
   - Reference Document
   - Reference Document
4. MIL-STD-810 Military Test Methods: Environmental Engineering Considerations
5. MIL-PRF-32518 Interior Vehicle Human Factors Including Smoke and Toxicity
   - Reference Document
6. Composite Deck MTVR Trailer (Uploaded in SITIS 01/09/2020)
   - Reference Document
7. M172A1 Floor Boards (Uploaded in SITIS 01/09/2020)
   - Reference Document
8. 18410A REV S MAIN FRAME M872A3 (Uploaded in SITIS 01/09/2020)
   - Reference Document
9. 18410A REV S MAIN FRAME M872A3 (Uploaded in SITIS 01/09/2020)
   - Reference Document
10. Trailer Deck Profiles and Dimensions (Uploaded int SITIS 01/23/2020)
    - Reference Document

**KEYWORDS:** Composite, Wood, Decking, Flooring, Trailer