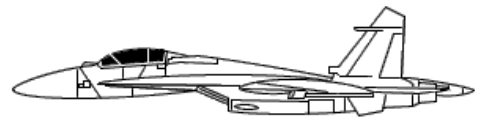
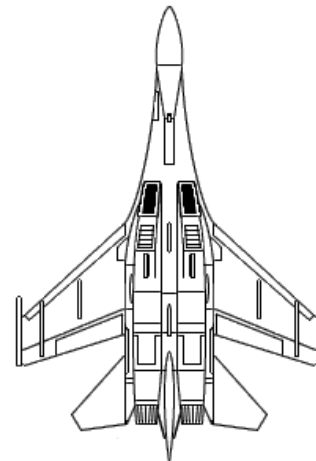


SUKHOI SU-30 TRIM PAD ANCHOR SYSTEM

Ir. Dr. TUAN SUHAIMI BIN SALLEH
MAKMAL PENYELIDIKAN MEKANIKAL
CREaTE



TUDM Sukhoi SU-30

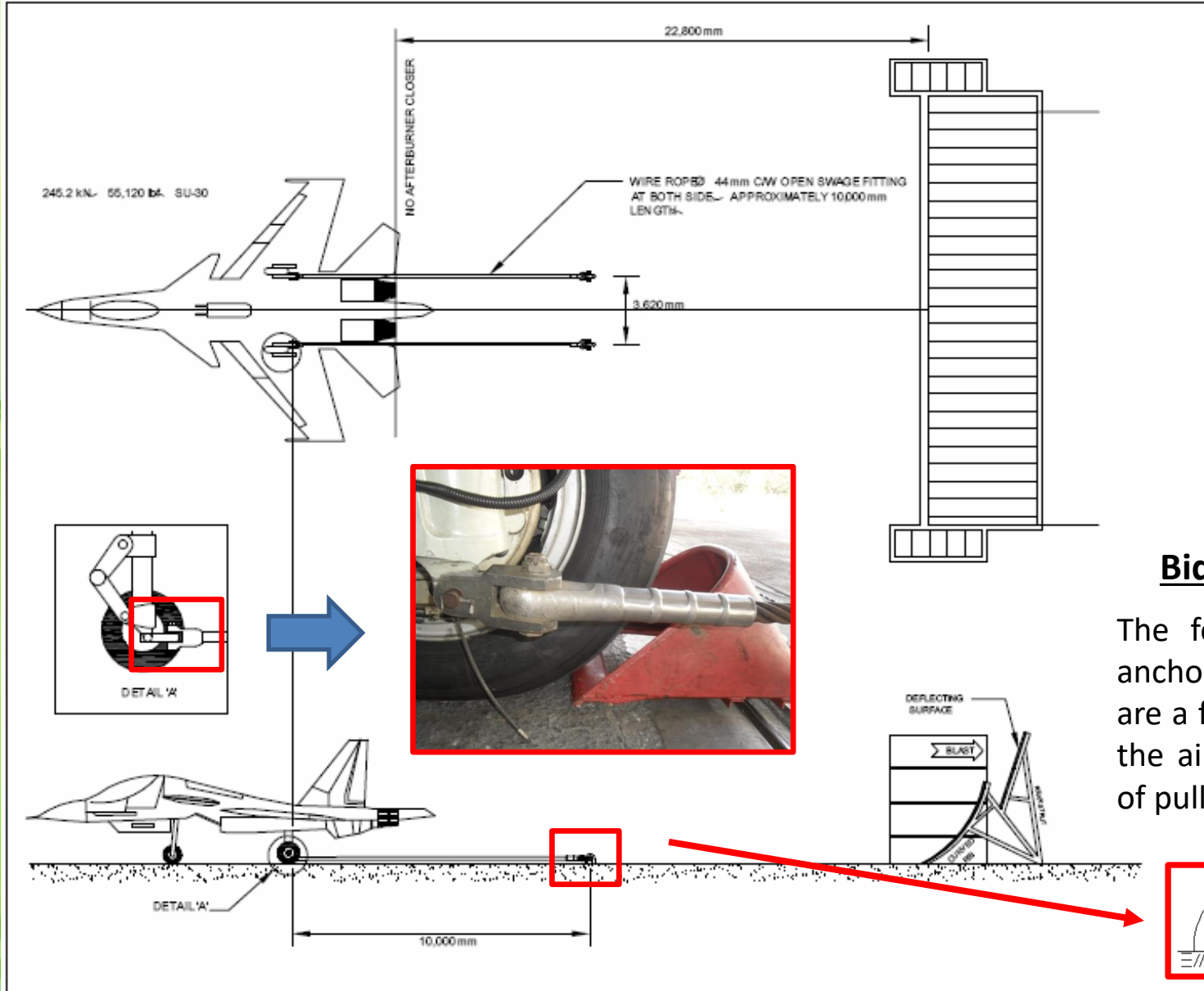


- ✓ Power plant: 2 units Saturn AL-31Fs afterburning low-bypass turbofan engines; each rated at **12,500 kgf (123 kN, 27,550 lbf)** of full afterburning thrust.
- ✓ Speed: Mach 2 (1,350 km/h speed at low altitude, and a 230 m/s climbing rate).

TRIM PAD ANCHOR DESCRIPTION

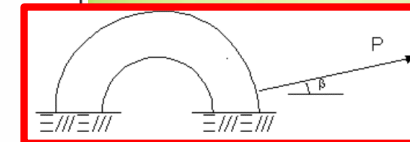
A thrust-resisting structure constructed by embedding a steel anchor block trim pad into a large reinforced concrete block tied to the surrounding anchor concrete slab, and used to constrain fighter aircraft during power checks and routine engine maintenance procedures.

TRIM PAD VIEW

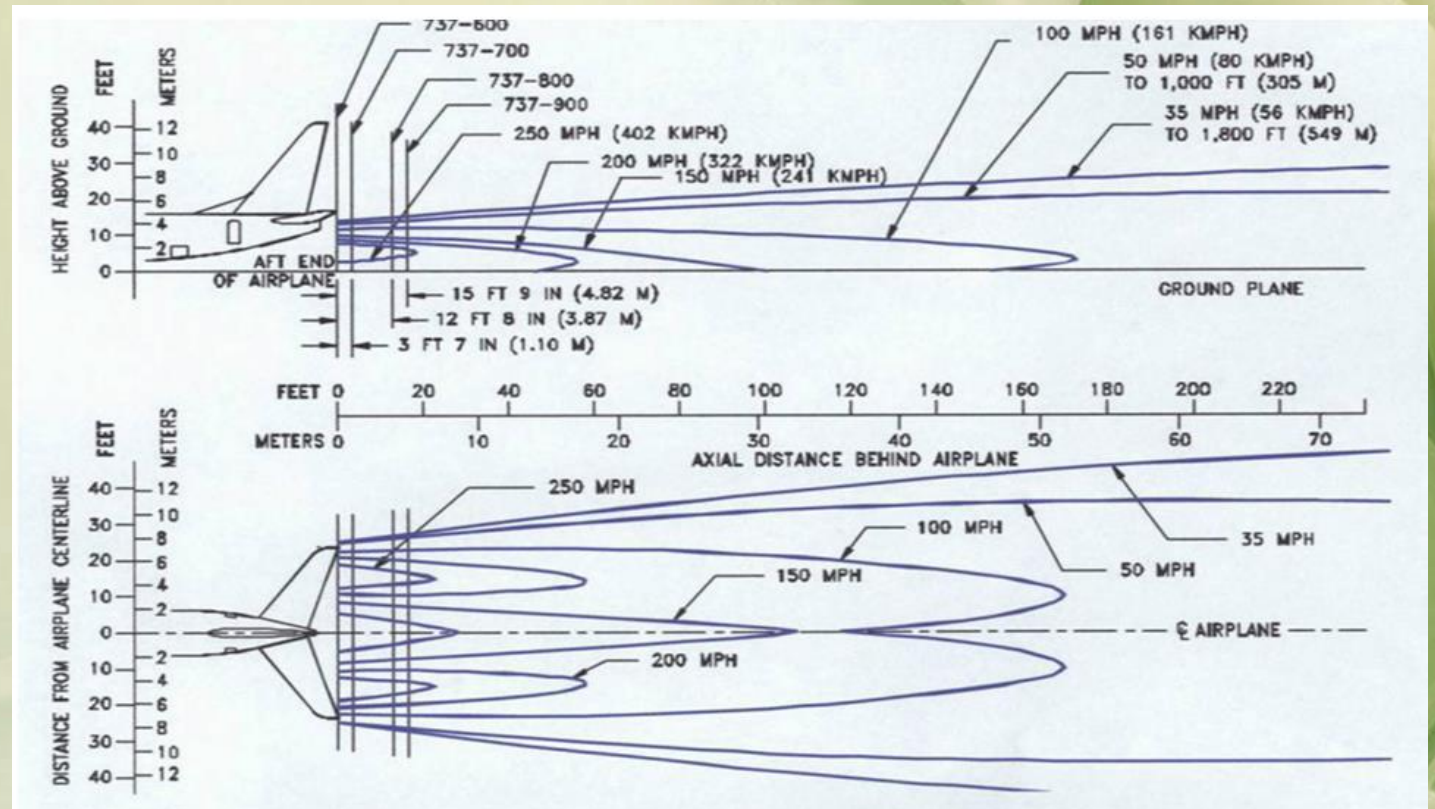
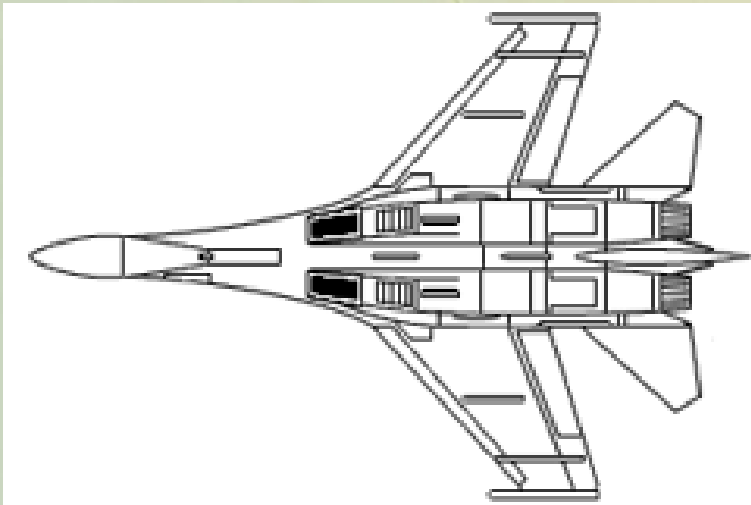


Bidirectional Anchor

The forces imposed on the anchor block by the aircraft are a function of the thrust of the aircraft and the direction of pull on the anchor.



SUKHOI ENGINE THRUST



60km/hr

GROUND IDLE THRUST

80km/hr

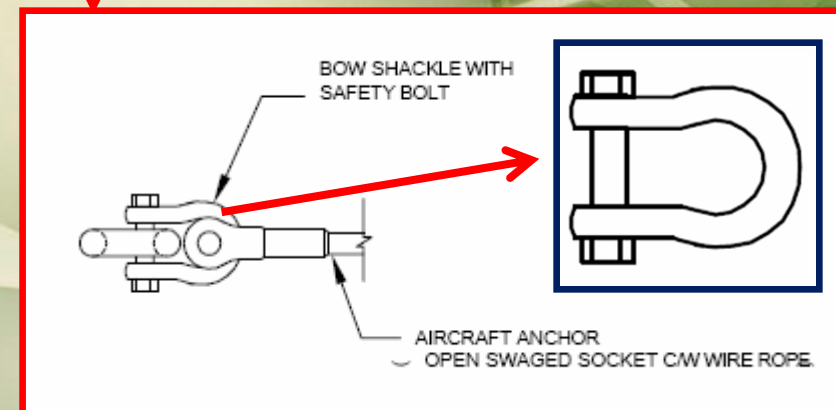
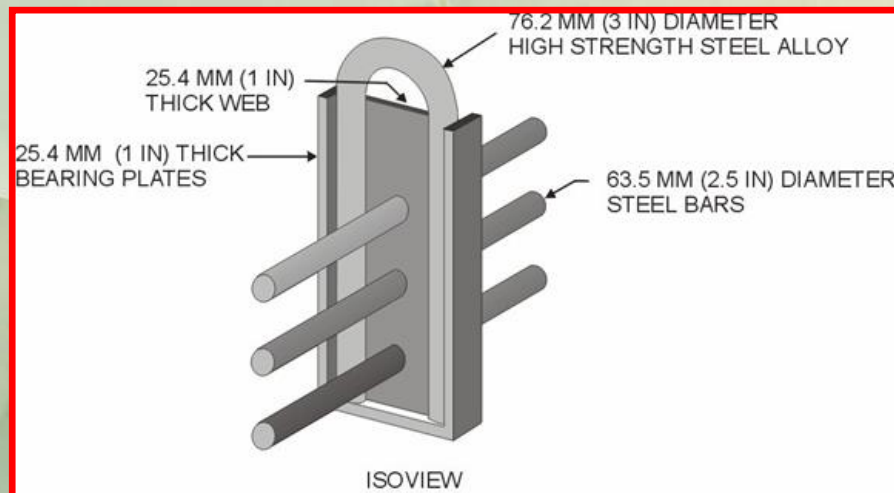
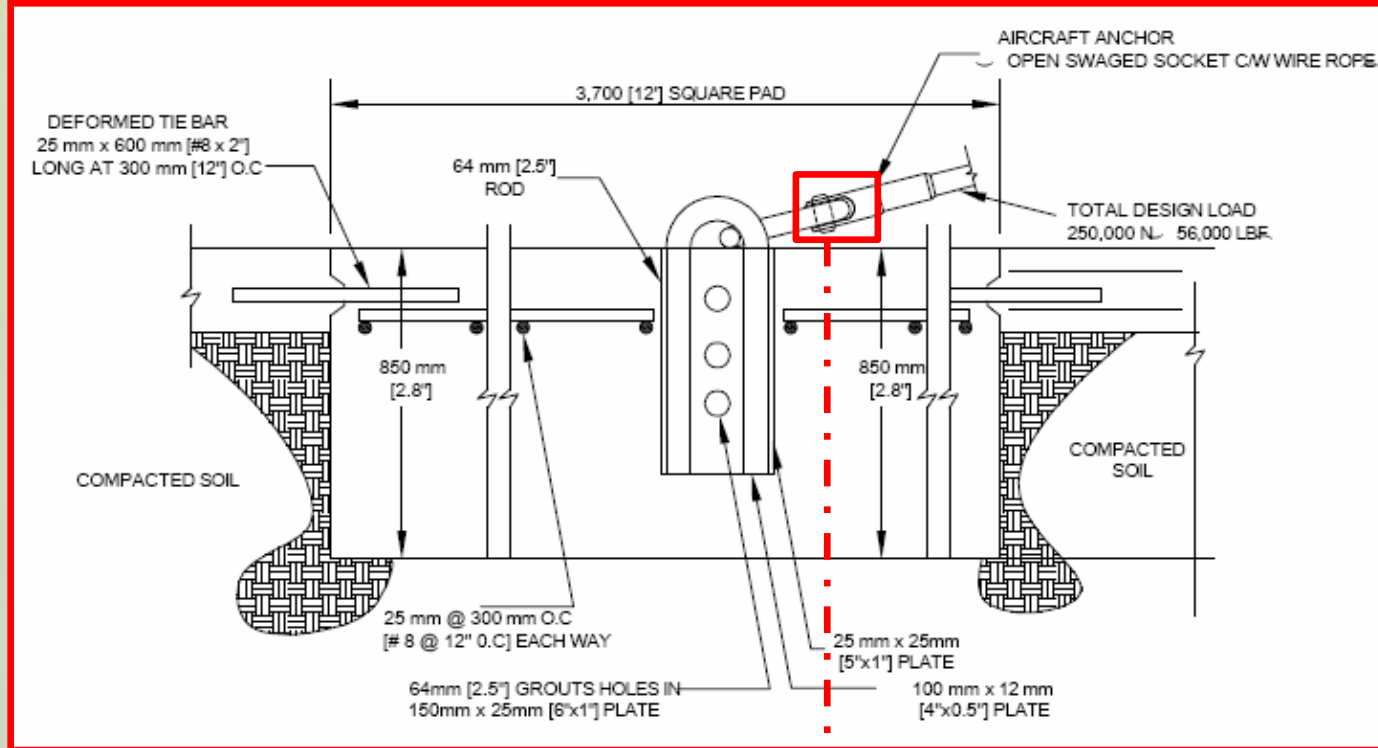
BREAKAWAY THRUST

322km/hr

TAKE OFF THRUST

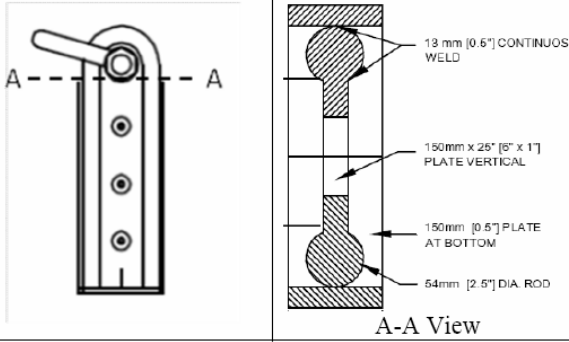
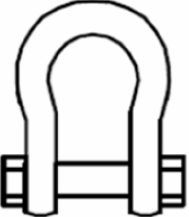
The maximum forces imposed on the anchor block by the aircraft are at the thrust during take off or full afterburning thrust

ANCHOR BLOCK CONSTRUCTION



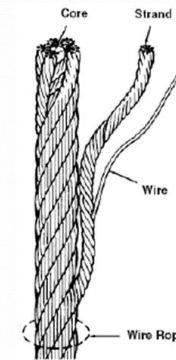
COMPONENTS AND TYPE OF TEST

Table 1. Trim pad parts details

Parts	Figure
1 Anchor Components High strength alloys comply with ASTM 588 for all parts High-quality full-penetration welds	 A-A View
2 Connecting Hardware a) Shackle From high strength alloy steel for bodies, bolts and pins with Working Load Limit (WLL) of not less than 40 ton	

b) Wire rope

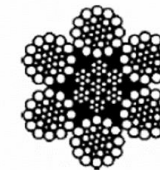
6 x 37 cross laid wire rope IWRC type with Minimum Breaking Strength Net 133 Tons and comply with ASTM A1023 Standard. Tensile Test ASTM A931, EN 10218-1



c) Swage Fitting

Boom Pendants type (Open Forged Wage Socket) 100% of the wire rope's rated breaking strength and verified in accordance with ASTM E8/E8M

Wire Rope



IWRC Type

Open Forged Wage Socket



Table 2. Parts' Test Type

Parts	Test Type
Connecting Hardware	Shear Bearing Tensile Yielding
Steel Anchor Components	Shear Bending
Concrete Anchor Block	Bearing
Concrete Slabs	Compression Buckling
Steel-Concrete Interface	Pullout (shear)
Anchor-Slab Interface	Rotational (shear)

TRIM PAD MATERIAL AND CHARACTERISTIC

Characteristics of the high-strength alloys used are:

- **Yield strength of at least 344 MPa (50,000 psi).**
- **The ability to be curved to the design radius without losing strength.**
- **Compatibility with concrete.**
- **Corrosion resistance in an environment with high salt concentration**
- **No change in engineering properties up to 537 °C**
- **Good fatigue characteristics**

CONCLUSION REMARK

Involvement with other Mechanical Engineering aspects is very important for a Mechanical Engineer in JKR in order to develop competency, new knowledge and creativity.

*The trim pad anchor system (includes a jet blast deflector) was an in-house design project for the Sukhoi – SU30 maintenance base at Pangkalan Udara TUDM Gong Kedak, Terengganu.