

Aircraft Arrestor Barrier



About us:

Neometrix Defence Celebrating 20 Years of Excellence! For the past two decades, Neometrix Defence has maintained its position as a premier provider of advanced test benches and rigs.

Our accreditation by the Directorate General of Aeronautical Quality Assurance, India (DGAQA) and Defence Research & Development Organization, India (DRDO) underscores our commitment to upholding the highest international defence industry standards.

Counting the Indian Air Force/Army/Navy, Ministry of Defence, Hindustan Aeronautical Limited, and DRDO among our esteemed clientele, we are recognized for delivering state-of-the-art solutions and unwavering performance reliability.

Strengths & Capabilities:

Neometrix Defence is a powerhouse of engineering brilliance, proudly serving every Indian Air Force station and partnering with the Indian Army, Navy, Railways, BARC, NPCIL, and ISRO. With a team of over 100 elite engineers and visionary founders from IIT Kanpur and IIT Delhi, we harness cutting-edge technology to set the gold standard in mechanical engineering.

We Don't Just Meet Industry Demands – We Define Them!



- We have established our presence in all Air Force stations across India. With the Indian Air Force as our leading customer, we are dedicated to upholding the highest standards of excellence in the aerospace industry.
- Our extensive clientele extends beyond the defence industry, including projects with the Indian Army, Navy, Railways, BARC, NPCIL, ISRO, and more. In essence, we excel in all aspects of mechanical engineering!
- Our team comprises over 100 graduate engineers, supported by a cutting-edge manufacturing site equipped with state-of-the-art machinery, enabling us to meet the highest Engineering standards.
- The founders of our company are distinguished graduates from IIT Kanpur and IIT Delhi, bringing extensive expertise and a wealth of engineering knowledge to Neometrix Defence.

Table of contents

Sr No.	Description	Page no.
1	Introduction	1
2	Purpose & Application	2
3	Key features	3
4	Technical Specifications	4
5	System Components & Architecture	5
6	Installation & Maintenance	5
7	Operational Workflow	5-6
8	Safety, Compliance & Quality	6

Introduction:

The Aircraft Arrestor Barrier System (AABS) serves as a vital last line of defense on military runways, engineered specifically to arrest combat and support aircraft that overrun or execute an aborted take-off at high speed. In such emergencies—whether due to brake failure, engine flame-out, or pilot decision—the AABS must engage within fractions of a second, dissipating kinetic energy equivalent to tens of megajoules and bringing a 6–40 ton aircraft safely to a stop within a few hundred meters. Its rapid response is achieved through precision-tuned mechanical and hydraulic components that react the moment the aircraft's tailhook or fuselage net is engaged.

There are two primary arrestment configurations:

1. Net-Type (Multi-Element Net Assembly, MENA):
 - A high-tensile synthetic net is stretched across a pair of motorized stanchions. Upon impact, the net envelops the aircraft's fuselage, distributing deceleration forces evenly across its structure. This method is especially effective for aircraft without a tailhook or those landing at oblique angles, as the net conforms to varying contours and absorbs energy through controlled deformation of the mesh.
2. Pendant-Type:
 - A steel wire-rope pendant is suspended in the aircraft's path and designed to engage directly with the aircraft's tailhook. As the aircraft advances, the pendant feeds into a drum-type energy absorber, where hydraulic damping and frictional elements convert kinetic energy into heat. The pendant system excels in scenarios where precise hook engagement and minimal rebound are critical—such as carrier-style landings or rapid-deployment airfields.

Each variant is scaled to two weight classes: 6–20 ton (light fighters, trainers, UAVs) and 20–40 ton (heavy fighters, transport and AWACS platforms). Customizable net mesh size, pendant rope diameter, and absorber calibration ensure that deceleration profiles meet stringent safety margins—typically limiting g-loads to under 4 g for airframe integrity and occupant survivability. Integrated into the runway's engineered safety zone, the AABS complements other systems like EMAS beds, offering a compact footprint and rapid reset capability that keeps high-tempo air operations flowing with minimal disruption.



Purpose & Applications:

The Aircraft Arrestor Barrier System (AABS) offers versatile deployment across a range of operational scenarios, each demanding rapid, reliable deceleration of high-energy aircraft:

1. Frontline Combat Air Bases

In active combat zones, the margin for error is razor-thin. Fighters conducting high-speed approaches or emergency aborted take-offs risk runway overruns, which can result in severe airframe damage or loss of life. The AABS at these bases is configured for maximum responsiveness—stanchions and nets stand ready 24/7, with ATC-triggered remote activation and instantaneous mechanical engagement. Its ability to arrest a 20-ton fighter jet traveling at over 200 knots within a few hundred meters provides commanders with critical confidence in runway safety, even under the stress of combat operations.

2. Training Airfields

Flight training introduces a spectrum of pilot experience levels and aircraft types, from lightweight trainers to light-attack platforms. Here, AABS delivers an invaluable safety net: its net-type assembly accommodates off-centre landings and varied approach profiles, minimizing the risk of structural overload on student-flown aircraft. Fully automated deceleration thresholds safeguard inexperienced pilots by ensuring consistent arrestment forces, while rapid reset allows continuous sortie cycles without lengthy downtime—essential for high-tempo training schedules.

3. Runway Maintenance & Resurfacing

During runway rehabilitation or repaving, one end of the strip may be temporarily closed or shortened, reducing available stopping distance. A portable AABS module can be quickly installed in the shortened safety zone, providing emergency arrestment protection without the need for permanent civil works. Lightweight stanchion bases bolt into prefabricated anchors.

4. Carrier Deck Simulation & Shore-Based Trials

Naval aviation demands precise tailhook engagement and controlled deceleration akin to shipborne arresting systems. Land-based AABS configured with pendant-type modules allows carrier pilots and deck crews to rehearse launch/recovery cycles ashore. Pendant wire diameters, drum-brake damping rates, and g-load limits are calibrated to mimic a carrier's arresting gear, enabling realistic training without the expense or weather-constraints of sea trials. This shore-based fidelity enhances pilot proficiency and operational readiness for carrier deployments.

Key Features:

Dual Arrestment Modes

- Net-type (MENA) envelops fuselage
- Pendant-type engages tail-hook
- Covers 6–20 t and 20–40 t classes

Multi-Mode Control

- Remote (ATC/RCP) activation
 - Local Main Control Panel (MCP)
 - Manual crank override (no power)
- Rapid Reset
 - One-button electric tape rewind
 - Full cycle in ≤ 10 minutes
 - Automated Operation
 - Pre-set brake pressure, net tension & descent rate
 - Consistent arrestment with minimal input
 - Redundant Power
 - Primary 440 VAC, 3-phase
 - Backup 48 V DC battery
 - Manual mechanical fallback
 - Smooth, Safe Deployment
 - Nitrogen-damped stanchions
 - Leaf-springs & rubber pads prevent shock
 - Rugged Durability
 - Heat-treated steel tape with corrosion protection
 - Sealed heavy-duty sheave bearings
 - IP65 control enclosures
 - Standards Compliance
 - MIL-STD-3000 certified
 - ICAO Annex 14 compliant
 - Factory and field acceptance tested

Technical Specifications:

Parameter	Specification
Arresting Method	Net-type (MENA) or Pendant-type
Aircraft Weight Classes	6–20 ton; 20–40 ton
Power Supply	440 VAC, 50 Hz, 3-phase; 48 V DC logic
Shock Absorber	Nitrogen-filled; tuned damping
Purchase Tape	Heat-treated steel tape; precision-machined drum
Retrieval Drive	Electric motor; push-button reset
Sheave Bearings	Sealed, high-load capacity
Operating Temperature	-20 °C to +60 °C (thermostat-controlled heater)
Re-arm Time	≤ 10 minutes
Control Panels	ATC (A1889), Multi-Purpose, and Mimic Panels
Emergency-Stop Response	< 0.5 s from activation
Foundation Footprint	Custom concrete pad per site survey



System Components & Architecture:

- Stanchion & Deployment Frame: Gear-driven stanchions with rear-limit switch and nitrogen-damped smooth descent
- Energy Absorber Module: Steel purchase-tape drum with hydraulic damping to convert kinetic energy to heat
- Sheave & Guide Assembly: Sealed roller-bearing sheaves route tape to reduce bending fatigue and wear
- Tape Retrieval System: High-torque electric rewind motor with one-button reset, built-in diagnostics LEDs

Control & Mimic Panels:

- ATC Panel (A1889): Relay-driven net/pendant control, EMG-STOP, status indicators
- Multi-Purpose Panel: SMPS, MCBs, isolator, thermostat-controlled heater
- Mimic Panel: Real-time LED/meter display of tape tension and stanchion position

Installation & Maintenance

- Site Prep & Civil Works: Dismantle existing AABS; excavate and remove old foundations; pour reinforced concrete pads.
- Equipment Fit-Out: Install stanchions, absorber modules, sheave posts; trench and lay power/control cabling; mount control panels.
- Commissioning: Perform functional tests in Automatic, Manual and Remote modes; validate emergency-stop response and tape retrieval cycle.

Maintenance Schedule:

- Bi-annual: Lubricate all sheave bearings
- Annual: Refill nitrogen in shock absorbers
- Triennial: Conduct full-load dynamic arrestment testing

Operational Workflow

- Setup: Position and level stanchions; connect power and control circuits
- Deployment: Activate net or pendant via MCP/RCP; monitor status indicators
- Arrestment: Aircraft engages barrier; energy absorber dissipates load
- Retrieval: Press reset; system rewinds tape and returns stanchions to standby
- Data Logging: Integrated diagnostics with manual log entry

Safety, Compliance & Quality:

- Over-Pressure Relief: Safety valves on absorbers and accumulators, proof-tested
- Automatic Interlocks: Shutdown on low oil, over-temperature, or over-pressure
- Manual Override: Hand-crank and hydraulic pump for emergency lowering
- Quality Standards: ISO 9001, MIL-STD-3000, ICAO Annex 14
- Traceability: Serialized components; QA/QC logs; radiographic weld inspection
- Warranty & Support: 3-year standard warranty; AMC options; 24-hr response SLA

