



# SERVING DEFENSE AND AVIATION FOR FIVE DECADES IN 40+ COUNTRIES



AIR START UNIT



LIQUID TO REFRIGERANT COOLING SYSTEM FOR RADAR



POWER SUPPLY UNIT FOR RADAR

## MAK CONTROLS & SYSTEMS PVT. LTD.

7/41-B, Avinashi Road, Civil Aerodrome Post.  
Coimbatore-641014, India  
[info@makcontrols.com](mailto:info@makcontrols.com)

## AIR+ MAK INDUSTRIES INC.

11154 Wildwood Drive, Olive Branch,  
MS-38654, USA  
[info@airmak.com](mailto:info@airmak.com)

VISIT US



# ABOUT US

## HISTORY

MAK Controls & Systems Private Limited, Coimbatore, India was established in 1973 to specialise in manufacturing aviation ground support equipment (GSE). Over time, MAK diversified from Aircraft GSE to innovative defense projects with versatile Electrical, Electronics, Hydraulic & Pneumatic applications.

After securing a prominent position across the Asian market, Air+MAK industries Inc., USA was established in 1997 to promote MAK GSE on a global scale to cater for the American, Middle eastern and European markets.

Today, MAK across India & USA is a global corporation with product presence in 40+ countries.

MAK is now working towards further development across aviation and defense sectors through its continual R&D efforts, state-of-art technology and refined quality measures.

## CHAIRMAN

Mr. Manickam Athappa Gounder, Chairman, a distinguished engineering graduate from PSG College of Technology, Coimbatore founded MAK group of companies, pioneering India's first digital 400Hz ground power unit for aircraft applications to a specialised air starter unit for GE 90-115B engine testing, we at MAK have done it all under his erstwhile guidance and support.

Now, this legacy is successfully carried forward by Mr.Saravanan Manickam, Managing Director and led by diverse team of senior management professionals.

## OBJECTIVE

MAK Group aspires to carve a niche name in the aviation and defense sector. It aims to have major international airlines and defense organisations utilise MAK GSE and desires to partner with leading defense organisations across the world to significantly contribute towards major defense projects through unique innovation & latest technology.

## AIR MAK INDUSTRIES INC., USA

Air+MAK boasts of a advanced manufacturing set-up in Olive branch, MS to build our complete aviation GSE range that cater to commercial airlines, FOBs and numerous non -scheduled operators across American, Middle eastern and European continents.

Further, the skilled workforce that build these units also provide customer support for MAK equipment operating across the western world.

## MAK INDIA LIMITED, COIMBATORE

A paradigm shift from core engineering, MAK India limited undertakes bio projects and agricultural activities where we manufacture and supply Bio toilets, a revolution in sanitation. MIL offers mother earth, an eco-freindly waste management system like Bio-toilet using DRDO technology to create a clean and green environment.

For more details please visit [www.makbioprojects.com](http://www.makbioprojects.com)

## RESEARCH & DEVELOPMENT

All of MAK's products are conceptualised and developed in house at its Department of Scientific & Industrial Research (DSIR, GoI) recognised research & development center at Coimbatore.

R&D is the core activity at MAK. We take pride in our engineers who bring in innovation and simplify tough engineering requirements of the products with high-technological systems.

R&D efforts are focused on Automation, embedded systems, Internet of things(IoT), Power electronics & Pneumatic and hydraulics equipment.

The mechanical structure of the products are analysed and evaluated on a professional software with FEA & CFD, where data synonymous to real time operating conditions are examined. This helps ascertain material strength and effect of various stresses acting on the structure.

In short, MAK ensures safety factors surpass industrial standards considering demanding operational requirements of the products. MAK design & manufacture shelters up to 40feet for defense applications that are ready for deployment on road, rail and marine, applications as Mobile power units, communication shelters and so on..

## INFRASTRUCTURE:

MAK's modern factories are spread across 70+ acres with 17 acres of built-up area. This 740,500 sq. ft of factory space houses a special alternator manufacturing unit, design house, Research & development center, fabrication unit, painting shop, assembly bays and product testing fields across our facilities located at Coimbatore & Karur, India and Olive Branch, MS,USA.



## DESIGN:

MAK's versatile team of high-qualified designers ensure the product's design conform to stringent standards such as AHM, MIL and JSS 55555. Design principles ensure products are robust, dependable and ergonomic. Designer's efforts are aided by competent software to visualise products in their operating conditions and simulate user behavior under varied stages of operation & maintenance.

## QUALITY ASSURANCE:

Our quality testing begins right from component selection, manufacturing process regulation, stage inspection and up to final Factory acceptance testing with customers.

We have a full-scale computerised testing facility, including Environmental stress screening-Climatic test chamber, Thermal shock chamber, Vibration tester, Rain test facilities conforming to MIL standards.

## BRANCH OFFICES:

MAK's offices have been set-up across the length and breadth of India and Asia pacific region with sufficient spare parts inventory primarily to carry out AMC activities, ad-hoc servicing of MAK equipment and to take care of business activities in particular regions.

A set of 50+ engineers are always on the move across the country to ensure immediate support and service for our customers.



# GROUND SUPPORT EQUIPMENT



**60/90/140/180 kVA 400 Hz AC & 28.5V DC**



**2kW to 140kW 400 Hz AC & 28.5V DC**



**100PPM/120PPM/180PPM/250PPM/300PPM/400PPM**

## GROUND POWER UNIT

Our diesel engine/electric motor driven Ground power units comply to latest EPA regulations with low noise levels and are compact in size to avoid cluttering around aircraft.

It comes with a digital control system - touch screen panel for monitoring of operational parameters with in-built MAK RDMS - a feature rich fleet management software.

Available in Towable Trailer mounted / Truck Mounted / Self propelled configurations.

## STATIC FREQUENCY CONVERTOR

Our Static Ground power units (SGPU), is compact and movable to anywhere in the airport and ensure no clutter around the aircraft's vital areas.

Latest semi-conductor technology to ensure maximum efficiency (>95%) and low THDI (<3%) across full load cycle. Come with user friendly control panel with data logging features.

Available in Fixed / Trolley mounted / Jet bridge mounted configurations

## AIR START UNIT

Our Air start units are capable of starting aircraft engines up to GE 90, the world's most powerful commercial jet engine to date, made with screw compressors that are the most efficient in the market.

We design and manufacture Storage type air starter units as well. Auto adjusted air flow depending on aircraft requirement via digital control system and in-built MAK RDMS.

Available in Towable Trailer mounted / Truck Mounted / Self propelled configurations.

## AIR CONDITIONING UNIT



**5TR/15TR/24TR/30TR/65TR/115TR**

Our direct/electric driven Air conditioning units provide quick cooling or heating to an aircraft's cabin on ground. We manufacture ACUs for all types of aircraft.

Provide fully automated temperature control via digital control system (touch screen) and in-built MAK RDMS.

Option: Shore power transfer switch/ 28.5V DC output

Available in Towable Trailer mounted / Truck Mounted / Self propelled configurations.

## MAK 28V DC STATIC GROUND POWER UNIT



**28V SGPU 600**

Meets MIL, AHM & ARP standards

Output DC voltage independent of 10% input voltage variations

Output current limit setting is adjustable over the range of 200 to 2000 amps.

Convenience receptacle for lights, electric drill, or test instruments

## DEFENSE ACU FOR SHELTER



**3.5TR**

Designed for 3 modes of operation (ie.) Cooling, Heating, Ventilation.

Incorporated with heating coil arrangement to cater hot air requirement during cold weather operation.

Successfully tested from -20°C to +55°C operating temperature range.

Efficient cooling with minimal power consumption.

# DEFENSE POWER SYSTEMS



**AKASH POWER SYSTEM FOR INDIAN ARMY**

## ► POWER SYSTEM

MAK offers customers complete power system solutions from design, development, manufacturing and operational support for ground and marine based defence applications. Our customized power system ranges from a compact 2.5kVA unit up to 12MW containersied power supply.

These systems are made either as standalone systems or synchronised together and operate as a mini power station with AMF functionality. All Power supply units come with sound attenuated and weather proofed canopy.



**MRSAM POWER SYSTEM FOR INDIAN AIRFORCE**

MAK is proud to be part of prestigious defense projects such as [Akash](#), [Nishanth](#), [MRSAM](#), [QRSAM](#), [APU for Main battle tanks](#), [Rohini](#), [Ashwini](#) and [Arudhra](#) radars, [Agni](#), [Nirbhay](#), [Aditya](#) and much more...

## ► SALIENT FEATURES

- Sophisticated digital control system with touchscreen (MAK RDMS optional)
- Permanent magnet generator system for compact and efficient power generation
- Equipment compliant to MIL STD 461 EMI/EMC and JSS 55555 certified.
- Rugged design to operate under harsh environmental conditions, for example up to high altitudes of 4150m
- Long lasting and economic service life for decades.
- Easy & quick access to components for maintenance and servicing.



# DEFENSE COOLING SYSTEMS



## Salient features:

- Sophisticated digital control system, touchscreen (MAK RDMS optional)
- Successfully tested from -20°C to +55°C operations.
- Efficient cooling with minimal power consumption.
- Various cooling system from shelter air conditioning unit of 3.5TR to 330kW liquid cooling system for radar
- Air cooling systems from 5TR for corporate jets to 120TR for wide body commercial aircraft.

# PNEUMATIC & HYDRAULIC SYSTEMS



**HYDRAULIC SERVICING TROLLEY FOR AIRCRAFT APPLICATION**

Hydraulic servicing trolley for aircraft hydraulic systems, cargo deck loaders, hydraulic self-propulsion systems, High pressure pneumatic systems up to 5000PSI for defense application are some of our projects in this field of engineering.

MAK's HST is highly recommended to use with aircraft across the world by aircraft manufacturers.



**HIGH PRESSURE/FLOW PNEUMATIC SYSTEM**

## Salient features:

- Hydraulic servicing carts up to 350Bar (5000 PSI)
- Cargo loaders for civil and military aircraft application
- Hydraulic self-propulsion vehicles
- Pneumatic trollies up to 5000PSI

# POWER ELECTRONICS



**DUAL RECTIFIER CENTER FOR RADAR**



**50kW LIQUID COOLED RECTIFIER**



**4x10kVA ONLINE UPS**



**2x10kVA DUAL STATIC FREQUENCY CONVERTER  
HOT SWAPPABLE WITH AUTO LOAD SHARING**



**40kVA 50Hz & 400Hz, DUAL OUTPUT PCU**

The capability of power electronics to span an enormous range of applications made MAK to focus on this field with a dedicated team of engineers. Comprehensive power conditioning units (PCU), Frequency converters, AC-DC Converters, Inverters, Rectifiers, 400Hz load banks...etc are few glimpses of what we do in power electronics.

## ► SALIENT FEATURES

- Power conditioning units (PCU) for any type of generator system
- Defense grade inverters, converters and rectifiers and frequency converters
- Lithium ion batteries of LMO/LFP/LTO Liquid Cooled Rectifier
- Digital automatic voltage regulators (AVR) for MAK 400HZ Alternators and more..
- Permanent Magnet Alternator (PMA)



# HEAVY ENGINEERING



**SHELTERS - DESIGNED AND MANUFACTURED IN HOUSE**



**MILITARY GRADE TRAILERS**



**MOBILE LAUNCHER SYSTEM FOR AKASH-NG**

The AKASH-NG MLS is a trailer mounted system hauled by 6X4 Prime Mover for launching AKASH-NG missiles. The MLS houses up to six (6) Canisterised Missiles (CMs), Platform Leveling system, Elevation and Azimuth system, Launcher and Missile electronics, communication equipment, its Captive Power Supply system.

MLS has capability to be deployable as a standalone system (without prime mover and trailer) through a specially designed underframe structure. The key launcher operations and functions including missile launch are controlled by CCU which communicates with MLS through a wired/wireless communication system at a distance upto 2km away from the MLS.



**CONTROL SYSTEM FOR LIQUID TO REFRIGERANT COOLING SYSTEM**

## Digital control

MAK's strength is digital control systems. our core R&D activities in this field focuses on Embedded control system, Internet of things(IoT), SCADA/PLC implementation to our products as necessary.

### ► Salient features:

- Embedded PLC/SCADA/Lab view/MATLAB based sophisticated control systems
- Apart from MAK's own embedded control system our team is well versed with various PLC/SCADA applications.
- All weather visible MIL grade touchscreen displays with attractive GUI
- Waterproof enclosures for all weather operation
- Flexible software for up gradation/modification based on customer input



**MAK GSE MONITOR V8**



**REMOTE CONTROL UNIT FOR MRSAM**



**MAK GSE MONITOR V8**



**MAK GSE MONITOR V8**



ASSEMBLY SHOP



CLIMATIC TEST CHAMBER



## CERTIFICATIONS & ACCOLODAES

- AS 9100 Rev.D Certified company
- EN 9100:2018 Certified company
- DSIR, Govt of India recognised R&D center
- CE Certified products
- Excellent offset partner award by Israel Aerospace Industries (IAI)
- Indian Offset Partner for Boeing, IAI, RAC MiG
- Preferred vendor for IAF, Indian Navy, DRDO and Defence PSUs
- Ernst & Young entrepreneur of the year – Nominee
- CMA-Mahendra – Best Entrepreneur award

## FEW OF OUR PRESTIGIOUS CUSTOMERS

### DRDO'S LABS

- R&DE (E)
- CHES
- LRDE
- PGAD
- CVRDE
- VRDE
- DRDL
- RCI
- LASTEC
- CABS
- ADA
- ASL
- ADE.. etc
- U.S. Army
- NASA
- Indian Air force
- Indian Army
- Indian Navy
- BEL
- HAL
- BEML
- HVF
- ELTA, Israel Aerospace Industries (IAI)
- Cambodian Air force
- Brazilian Air force
- Singapore Civil Defense
- Singapore Air force
- Yemen Air force
- Honduran Air force
- BSF
- ECIL
- NAL
- TATA Advanced Systems
- L&T Defense
- Godrej and more...

## Aviation Sector

- Airbus, France
- Boeing, USA
- GE, USA
- NASA, USA
- United Airlines, USA
- American Airlines
- Million Air, USA
- Delta Air lines, USA
- Qantas, Australia
- Viva Colombia
- GOL Airlines, Argentina
- Kalitta Air, USA
- Scaled Composites, USA
- Huntington Tri-State Airport, USA
- Bombardier, Canada
- Houston aircraft international, USA
- Endeavour air, USA
- ATS, USA
- Mexicana MRO, Mexico
- SAGS, Vietnam
- Air Corridor, South Africa
- GDC, Middle East
- Florence Airport, Italy
- AVDA SPA(AOSTA), Italy
- GATE, France
- Air Asia
- Singapore Airlines
- Malaysian Airlines
- Yeti Airlines, Nepal
- Shree Air, Nepal
- Firefly, Malaysia
- Lion Air
- Air India, India
- Spicejet, India
- Indigo, India
- Go Air, India
- Trujet, India
- Blue Dart Aviation, India
- MAS-GMR, India
- Menzies Bobba, India and more.....

## ONE STOP DESIGN AND SYSTEM INTEGRATION HOUSE FOR ALL YOUR ENGINEERING NEEDS

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7/41-B, Avinashi Road, Civil Aerodrome Post,  
Coimbatore-641014, India



+91 422 4305000



+91 422 4305060



info@makcontrols.com

### AIR+MAK INDUSTRIES INC.

11154, Wildwood Drive, Olive Branch,  
MS - 38654, USA



+1 662 893 3444



info@airmak.com

### Manufacturing Facilities in India

Unit 1 and 2 - Coimbatore, Tamilnadu

Unit 3 - Karur, Tamilnadu

### BRANCH OFFICES

#### KULA LAMPUR, MALAYSIA

Phone : +601 76979147  
Email : makkul@airmak.com

#### NEW DELHI, INDIA

Phone : +91 9944418815,  
Fax : +91 11 26878504,  
Email : makdel@makcontrols.com

#### BANGALORE, INDIA

Ph: +91 9740964404  
Email: makblr@makcontrols.com

#### PUNE, INDIA

Ph: +91 9730188372  
Email : makpune@makcontrols.com

#### HYDERABAD, INDIA

Phone: +91 9701061510  
Email : makhyd@makcontrols.com

#### TINSUKIA, INDIA

Mobile: +91 9944418815,

#### CHENNAI, INDIA

Phone : +91 9944418813  
Email : makmaa@makcontrols.com

