



Beyond Radar

# COMPANY PROFILE

World leader in next-generation surveillance and flight tracking





## OUR COMPANY

ERA a.s. is the pioneer and world leader in next-generation surveillance and flight tracking solutions with proven **multilateration** and **ADS-B (Automatic Dependent Surveillance - Broadcast)** technologies. ERA's systems are installed around the globe ensuring safety and efficiency at some of the largest and busiest airports.

## OUR HISTORY

ERA's unrivalled technological history dates back to 1963, when the founders began developing passive surveillance systems for Tesla in the Czech Republic.

The founders established their own company, ERA, in 1994 to manufacture and supply Czech Army, Air Traffic Control (ATC) authorities and other customers with professional electronic equipment, specifically using active and passive radar techniques.

While the founders of ERA began developing multilateration technology decades ago as a proven defence surveillance solution, the company began using multilateration for civil applications in 1995, and made ATC history when they deployed the world's first surface and wide area multilateration applications, commissioned in 1999 and 2002 respectively.

## OUR CUSTOMERS

ERA has over 100 installations for air traffic management and military customers in 57 countries throughout Europe, the U.S., the Middle East, Africa, South America and Asia Pacific.

ERA has extensive proven experience in the production and successful timely delivery of multilateration systems and has been selected for the majority of the world's recent competitive procurements for multilateration and ADS-B systems, including Auckland, Beijing, Singapore, Oslo, Turkey and Namibia.



### Basic Data

#### Business:

Military surveillance and reconnaissance systems,  
Surveillance systems for Air Traffic Management

#### Legal form:

Joint-stock company  
Founded: 1994

#### Registered office:

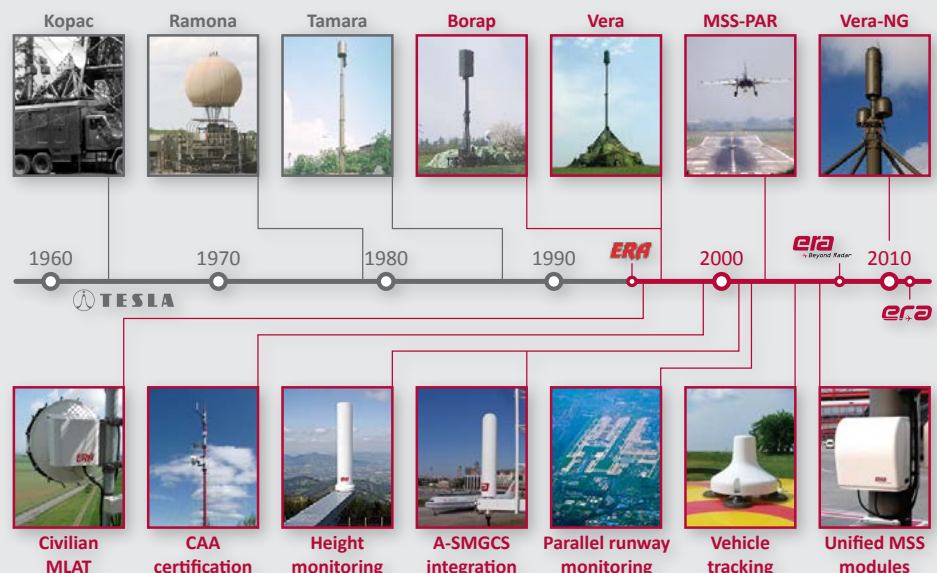
Pardubice, Czech Republic

#### Registration number:

60916427

#### Quality certification:

ISO 9001:2008, AQAP 2110



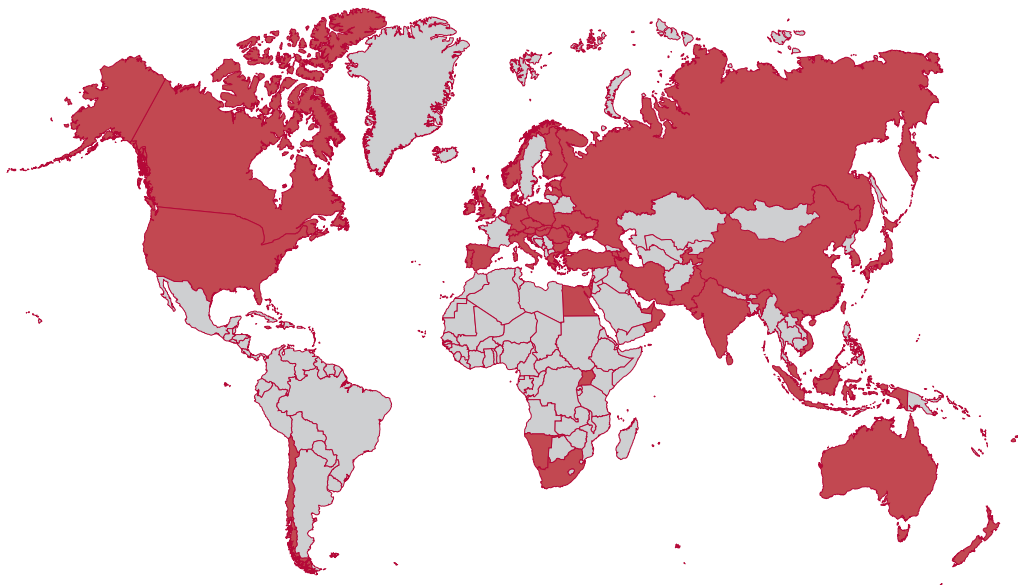


"Once again, ERA has delivered a reliable high-performance component of the Czech ATC infrastructure using its wide area multilateration technology. In this project, ERA's distributed timing features have allowed us to deploy receivers flexibly and discretely around the Prague terminal area to establish the coverage that we required. Also as usual, ERA's project and support people turned out to be just as reliable as their technology."

Ivan Uhlir, Surveillance Domain Expert, Czech Air Navigation Service (ANS)

"NAV Portugal believes that the choice of ERA for implementing the WAM system will contribute to ensure a robust solution for such a challenging project, considering the difficulties inherent to the location of the sites and the need of integrating this system with the one already installed on the Central Group of Azores, also implemented by ERA."

António Pinto Aires, the leader of WAM West Azores project.



## Selected References

Prague, Ostrava & Brno (Czech Republic)  
 Windhoek, Hosea Kutako (Namibia)  
 Cairo (Egypt)  
 Istanbul, Ankara & Antalya (Turkey)  
 Beijing (China)  
 Kolkata, Chennai & Mumbai (India)  
 Palma de Mallorca, Madrid, Santiago de Compostela & Asturias (Spain)  
 Copenhagen (Denmark)  
 Domodedovo, Sochi & Pulkovo (Russia)  
 Oslo (Norway)  
 Kuala Lumpur (Malaysia)  
 Munich, Hamburg & Braunschweig (Germany)  
 Budapest (Hungary)  
 Singapore (Republic of Singapore)  
 Johannesburg & Cape Town (South Africa)  
 Jakarta (Indonesia)  
 Yerevan & Gyumri (Armenia)  
 Khujand (Tajikistan)  
 Osaka, Okayama & Chubu (Japan)  
 Azores (Portugal)  
 Queenstown & Auckland (New Zealand)  
 Amsterdam (The Netherlands)  
 Thessaloniki (Greece)  
 Tallinn (Estonia)  
 Bucharest & Cluj Napoca (Romania)  
 Riga (Latvia)  
 Newcastle, East Midlands (United Kingdom)



**Customers:**  
 In 57 countries worldwide

**Employees:**  
 Approximately 300 people

**Awards:**  
 2007 Jane's ATC Industry Development Award  
 2007 Frost & Sullivan Award for ADS-B Technology Leadership  
 2009 Gold Medal IDET News for VERA-NG  
 2015 Silver DSEI in the nomenclature of Passive Surveillance System

## Ostrava Airport

### Challenges

- Inadequate radar coverage
- Mountainous terrain
- Unreliable radar coverage
- Prohibitive radar costs
- Growth of operations

### Solutions

- Wide area multilateration
- Complete area coverage
- Cost-effective
- Reduced separation
- Radar type certification

"ERA's multilateration systems have a long track record of performance and reliability in both surface and en-route applications. The bottom line is that they just work and they work better and more economically than SSR."

Ivan Uhlir, Czech ANS

## OUR SOLUTIONS



### Surface Multilateration

Multilateration (MLAT) is the process of locating aircraft based on the Time Difference of Arrival (TDOA) of its transponder signal to three or more strategically placed receiver stations. A proven technology developed decades ago for the military, MLAT uses small, unmanned ground stations placed strategically around an airport or terminal to provide constant and automatic air traffic surveillance.

As airports become busier and more complex, Advanced Surface Movement Guidance and Control Systems (A-SMGCS) are being deployed to address the serious risk of runway incursions by aircraft and airport vehicles, especially in reduced visibility conditions. Cooperative surveillance, such as multilateration and ADS-B, provides better coverage, more accurate identification and improved resilience to inclement weather when compared to surface movement radar (SMR).

ERA's proven and widely installed multi-sensor surveillance system (since 2014 in its latest, newly-enhanced version NEO by ERA) delivers the critical surveillance required for today's A-SMGCS. NEO by ERA integrates multilateration and ADS-B position data, and as the successor of proven and certified MSS by ERA system is fully compatible with all relevant standards (such as EUROCAE ED-117) and interfaces with any A-SMGCS application. ERA's unique ability to combine distributed timing architecture based on GPS or on reference transponders with central timing architecture, ideally suited to complex airport layouts, ensures that each system can be optimized to the unique requirements and constraints of the airport.

In addition SQUID by ERA vehicle transponders, are easily deployed on tugs, fire appliances, cars and any other vehicles around the airport, allow each surface vehicle to be uniquely identified on tower displays and augmenting the A-SMGCS solution.

Wide Area Multilateration system in Namibia is the largest system of its kind in the world, both in terms of geographical area (a territory as large as Germany and France combined) and the number of ground stations deployed across the entire country.



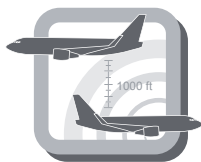




## Wide Area Multilateration

As the need for traffic surveillance expands over areas not presently covered by conventional secondary radar, many ANSPs are taking advantage of the cost benefits of multilateration versus new radar installations. In Wide Area Multilateration (WAM), the stations are spread much further apart, at distances of up to 100 km between each other.

Our installations in Namibia, the Czech Republic, New Zealand and the United Kingdom are typical. In such locations, multilateration provides superior range over secondary radar, more accurate tracking, significantly lower costs, and significantly earlier operational readiness following contract award. On the other hand, multilateration has also been chosen in situations where an existing "legacy" secondary radar has had to be replaced. In Armenia, for example, cost and performance analyses showed the clear advantages of multilateration over replacing the earlier secondary radar, and the wide area solution was chosen.



## Height Monitoring

To support increased traffic volumes on already congested air routes, reduced vertical separation minima (RVSM) are being introduced globally, increasing demands on the accuracy of aircraft avionics that report altitude.

RVSM is focused on reducing vertical separation minimums from 2000 ft to 1000 ft between FL 290 and FL 410. Height Monitoring Units (HMU), necessary to verify the Minimum Aircraft System Performance Specification (MASPS) of aircraft, are found beneath the Upper Air Route (UAR) to ensure that aircraft maintain requested flight levels. ERA's multilateration technologies have been proven to provide the measuring element of a height monitoring unit. Due to its extreme accuracy and reliability, NEO by ERA is able to precisely measure aircraft altitudes in a given UAR through its Height Data Processing System (HDPS). ERA was selected by

## Amsterdam Airport

### Challenges

- Surface management
- Incursion risk
- Growth of operations
- Safety enhancements
- Low-visibility locations

### Solutions

- Seamless integration with existing A-SMGCS
- Vehicle tracking
- Highly scalable
- Constant vehicle location and identification
- All-weather functionality

"SQUID by ERA units allow us to take full advantage of our A-SMGCS, providing air traffic controllers with a complete view of each vehicle's location, largely increasing safety levels at all areas on the airport's surface."

Ruud van Halm,  
Amsterdam Airport Schiphol



The surface multilateration at Cape Town Airport, South Africa (left)

The Height Monitoring solution used in Okayama, Japan

## Copenhagen Airport

### Challenges

- Growth of operations
- Increased incursion risk
- Surface movement capacity and safety
- Incomplete surface coverage

### Solutions

- A-SMGCS
- Multi-sensor data fusion
- Highly accurate multilateration & ADS-B positional data
- Complete surveillance coverage
- Airport vehicle tracking

EUROCONTROL, NATS and Okayama, JCAB to deliver Height Monitoring Unit within their RVSM program.



### Parallel Runway Monitoring

The pressure to increase airport capacity and throughput requires extreme accuracy and reliability of surveillance on approach to parallel runways to ensure that aircraft do not enter the high-risk zones between arrival and departure corridors. The high accuracy (compliant with standard 7.5 m requirements) and high update rates (1 second or less) delivered by ERA's surface multilateration solutions can be extended through the centrelines to provide the situational awareness and alerting capabilities required to guarantee safety in even the most complex and busy airports.

NEO by ERA as well as the previous multisensor system MSS by ERA provides improved reliability, higher accuracy, greater update rates and better coverage than specially designed, electronically scanned radar, and will do so at a much lower initial cost and with lower annual maintenance costs. For instance prior to the Olympic Games 2008 in China, Beijing Capital International Airport needed precision runway monitoring (PRM) system due to the use of three parallel runways. The ERA PMR solution was chosen because it was able to provide surface surveillance as well as parallel runway monitoring by utilizing the same network of sensors.



### ADS-B

Unlike current surveillance techniques, which use ground-based radar, Automatic Dependent Surveillance - Broadcast (ADS-B) equipped aircraft broadcast their positions once per second using GPS technology. Data is transmitted to dedicated ground receivers as well as other ADS-B equipped aircraft via dedicated radio data links. Air traffic controllers and aircraft immediately see the information on their screens, which

Due to the resistance to adverse weather conditions the sensors can be easily mounted in most locations. The ERA GPS antenna in deep freeze - WAM system at the Queenstown Airport in New Zealand





includes an aircraft's identification, altitude, velocity and heading. Controllers, in return, can uplink weather and other data to aircraft.

ADS-B will undoubtedly be a critical component of tomorrow's air traffic management infrastructure, but the full implementation of ADS-B will not be realized for many years. NEO by ERA decodes ADS-B signals according to all applicable standards (such as RTCA DO-260A and B) and can be configured as a standalone network of redundant ADS-B ground-stations capable of independent ASTERIX output. As an option, ERA can provide ADS-B receiver/decoders in portable configurations and equipped with data logging facilities so that data can be downloaded to PC applications for analysis. This is of particular value for organizations undertaking ADS-B trials or site location studies. With ERA's combination of ADS-B functionality and multilateration surveillance, next generation surveillance becomes deployable today.



## Military Systems

Air defence and passive surveillance are critical elements of today's military and security operations. Stealth technology has necessitated a new breed of surveillance technologies. Due to its active design, traditional radar is vulnerable to airborne defence operations and anti-radar systems. Moreover, traditional radar is unable to detect all targets, proven by its inability to track stealth fighters.

ERA has created the ultimate, world-leading and advanced passive ESM tracker (PET), VERA. VERA-NG by ERA utilizes multilateration techniques to locate and track targets by triangulating on various electronic emissions in a broadband range, including emissions from transponders, radar, jammers and TACAN/DME interrogators. Due to its construction, VERA-NG by ERA is both mechanically and technically covert. The passive technology utilized by ERA allows for a virtually undetectable operation, as no signals are sent from the system. Additionally, it is designed to be completely unobtrusive, allowing for camouflage in any surface environment.

## Beijing Airport

### Challenges

- Surface management
- Parallel Runway Monitoring (PRM)
- Growth of operations
- Airport infrastructure growth

### Solutions

- Wide area and surface multilateration
- A-SMGCS
- Cost-effective
- High accuracy and coverage
- Scalable



Precision runway management applications used at the Beijing Airport during the Summer Olympics in 2008 (left)

MSS ground station installation, Armenia

## OUR PRODUCTS

ERA equips military and civilian aviation industries with next-generation solutions that improve safety, enhance operations and increase tactical capabilities. ERA offers complete systems integration solutions for air traffic management and surveillance system redesigns and overhauls. ERA is able to seamlessly fuse our surveillance products with industry leading technologies to provide airports and ANSPs with state-of-the-art ATM solutions for both civil and military ATM applications.



### *VERA-NG* by era Passive ESM Tracking

VERA-NG by ERA offers the next generation in Passive ESM (Electronic Support Measures) Tracking (PET) technology. Its flexible network architecture delivers unparalleled performance, mobility and automation for high-precision defence surveillance missions. VERA-NG is also ideal for advanced border protection. It emits zero electromagnetic energy so it's invisible to anti-radar missile systems. Armed forces can conduct cross-border surveillance without alerting neighbouring states. VERA-NG also supports remote, unattended configuration and can be easily transported in general purpose vehicles. The VERA heritage extends over many decades and systems have been deployed in Europe, Asia and the Americas.



### *NEO* by era Multi-sensor surveillance system

As the world's airways and runways become more congested, the risk for error increases. NEO by ERA (enhanced version of certified MSS by ERA) uses proven multilateration (MLAT) and Automatic Dependent Surveillance - Broadcast (ADS-B) technologies to deliver high-performance surveillance solutions for surface movement; terminal area and wide area en route control applications. NEO provides a highly reliable, cost effective solution to any secondary surveillance requirement.

VERA-NG allows for "good neighbor" status while still being vigilant (left)

Multi-sensor surveillance system deployed in Fiji





## **SQUID** by era Vehicle Tracking

SQUID by ERA improves airport safety by broadcasting the exact position of ground vehicles using an ADS-B squitter beacon. At busy airports worldwide, ground vehicle incursion into critical safety areas is rising. SQUID by ERA minimizes the risk by using a fully standards compliant, vehicle-mounted transmitter that continually broadcasts a vehicle's location. The transmitter can be permanently or magnetically mounted to all airside vehicles, including tugs, fire, rescue vehicles and de-icing equipment. Each vehicle is clearly and uniquely identified.



## **MASTERCARE** by era Portfolio of services

ERA's industry-leading products are backed by the services and benefits of the MasterCare program. MasterCare is a complete portfolio of services and comprehensive range of assurance offerings that can be customized to the unique customer, deployment site and service level requirements.



# OUR QUALITY MANAGEMENT

ERA a.s. is committed to meeting customer requirements and expectations regarding the quality of all products and services it offers. ERA's management system is based on quality management standards and continuous process improvement to ensure the successful achievement of all specified needs and requirements for its customers. Quality assurance is one of the most important components of the company's management system.

ERA strives to exceed the needs and requirements of all its customers around the world. As such, ERA has created a unique quality manual that describes the activities of the individual elements involved in an ERA system, their mutual interconnections and the responsibilities associated with quality assurance.



SQUID beacon mounted on a vehicle, Copenhagen Airport, Denmark (left)

MasterCare is a complete portfolio of services that can be customized to the unique client



ERA received a prize for support of the school events: a plaque made by students in their art classes.



Last season Karolina has enjoyed immense success - she won two bronze medals in World Cup races.

## CORPORATE RESPONSIBILITY

In connection with the corporate responsibility programme, ERA's main partner has become Svítání a school for children with special needs. ERA sponsors several charity events and projects for children as part of this partnership.

ERA has repeatedly supported the charity event "Pardubice Racquet". The profit from the event is always donated to a non-profit organisation such as the shelter Klokánek for children with difficult life conditions, the paediatric rehabilitation centre LENTILKA for children with disorders or the Pardubice Children's home.

### Education, culture and sport

ERA, which is in constant search of young talented people, subsidized the Secondary School of Electrical Engineering based in ERA's hometown, the Faculty of Electrical Engineering and Informatics of University of Pardubice and the Faculty of Military Technology of the University of Defence in Brno. Support for activities such as school competitions and scientific conferences is part of ERA's official HR policy.

ERA has had a long-term relationship with East Bohemian Theatre, the Pardubice city theatre. ERA traditionally subsidizes regional culture and has been perceived as a respected partner for years.

ERA has signed a contract of partnership with the young speed skater Karolina Erbanova. Karolina used to be a member of the same team as the Olympic champion Martina Sablikova and has already achieved some remarkable results. She has been recently training with the Holland Continu speed skating team in Heerenveen, the Netherlands.

ERA has become the major partner of Golf Club Pardubice and its golf course in Bohdanec Spa carries the name ERA Golf Resort. Besides ERA sponsor a number of local sport events such as badminton, volleyball and futnet tournaments.

Twice a year ERA organizes tournaments for the company's long-term business partners of the golf community - representatives from distinguished companies and institutions.





# ERA'S CERTIFICATES

ERA's quality system has been certified to ISO 9001 standard since 1997 and is regularly audited and recertified by the Certification Authority TÜV SÜD Czech s.r.o. The system and certification applies not only to manufacturing, but to the whole system life-cycle, including product development, design, project delivery, installation and the maintenance of radio electronic systems and radars for ATC, navigation, military reconnaissance ELINT/ESM systems and related software.

The quality management system of ERA complies with NATO design, development and production requirements. The AQAP 2110 certificate is issued by the Defence Standardization, Codification and Government Quality Assurance Authority and is based on the ISO 9001:2008 standard, with a number of additions and specifications.

## International Type Certificates

A Type Certificate is a design approval issued by the Civil Aviation Authority (CAA) of a given country when the applicant demonstrates that a product complies with the applicable regulations. The Type Certificate normally includes the type design, the operating limitations, the Type Certificate Data Sheet, the applicable regulations, and other conditions or limitations prescribed by the CAA.

Civil Aviation Certification authorities in Russia, South Africa, Germany, Slovakia, Austria and Armenia, to name a few, have reviewed and tested MSS by ERA for both surface movement management and wide area surveillance as well as SQUID by ERA for vehicle tracking.

Review and testing by these authorities covers technical design, adherence to specifications and requirements as well as usability and documentation. End user experience and references are also taken up to verify vendor statements. In all cases authorities have found ERA's systems to meet all their technical requirements and stringent safety demands.



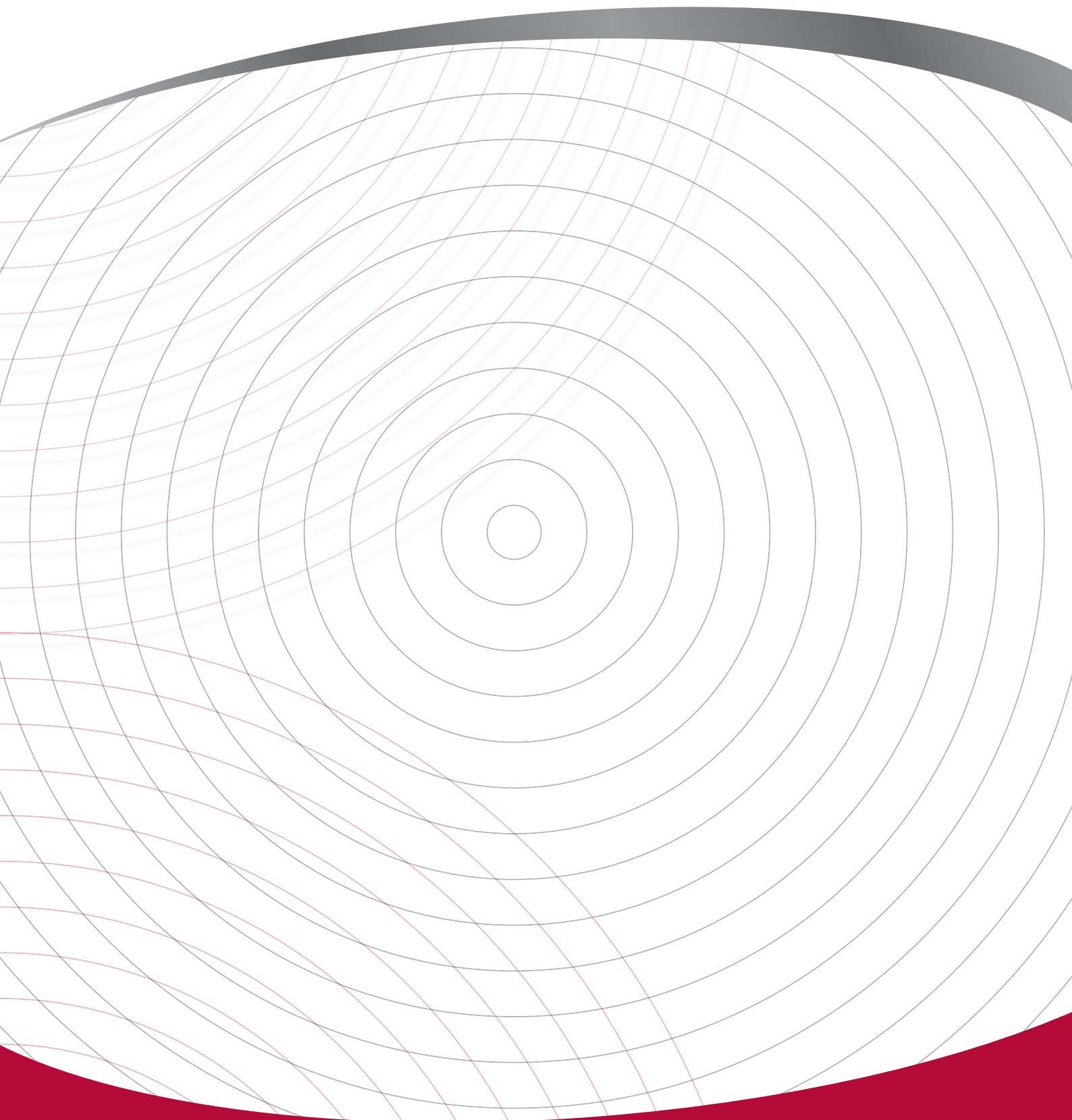
Certificate ISO



Certificate AQAP



ERA constructs a brand new headquarters building adjacent to its current factory location. The modern four story building will house as many as 190 people.



## THE OMNIPOL GROUP



### OMNIPOL

One of the Czech Republic's most important import/export companies with over 75 years of experience with defence, security and aerospace equipment.



### ERA

Research, development and manufacture of multi-sensor aircraft surveillance systems for air traffic control and air defence applications.



### CESKA LETECKA SERVISNI

Major provider of integration, installation, certification, sales, maintenance and repairs of commercial and military avionics.



### RAMET

Development and manufacture of primary and secondary ATC surveillance radar systems, meteorological radars and radar speed cameras.