



# WOJSKOWE ZAKŁADY LOTNICZE NO. 2 S.A.

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COMPANY CATALOG

# Bydgoszcz

Maintenance, repair, and overhaul of military aircraft:

F-16, C-130, MiG-29 and Su-22

Civil Aviation

Unmanned Aerial Vehicles Systems

Military and civil painting shops

Galvanizing shop

Mechanical services

Non-Destructive Testing

Metrology (Precise Instruments Measurement Equipment Laboratory)



# Warsaw

Maintenance, repair, and overhaul of jet,  
turbine, and starter engines

F100-PW-229 for F16C/D Block 52+

RD-33 do MiG-29

PW127G for CASA C295M

AL-21F3/F3A for Su-22M4/Su-24M

TW2-117A/AG for Mi-8

TS-21 for Su-22M4/Su-24M

AI-9W for Mi-14, Mi-17, Mi-24

Wojskowe Zakłady Lotnicze No. 2 S.A. is one of the largest aviation companies in Poland, one of the elite group of companies of strategic importance for the economy and defense of Poland. The company belongs to the concern of Polska Grupa Zbrojeniowa PGZ S. A. (Polish Armament Group), the leader of the Polish arms industry and the largest arms company in Europe, which brings together more than 30 companies.



For more than 78 years, the plant has been offering comprehensive services in the maintenance, servicing and upgrade of military aircraft, including fighter and transport aircraft of significant technological advancement. The Warsaw part of the plant specializes in maintenance of jet engines, turbine and starter engines, as well as low-power propulsion turbines.

The plant provides technical support, overhauls, repairs and modernization of Polish Air Force aircraft such as F-16, C-130, MiG-29 and Su-22. The company is also a Manufacturer of Unmanned Aircraft Systems including UAVS of categories Short Range Tactical System and DragonFly Loitering Ammunition System.



# ABOUT THE COMPANY

Apart from the military aviation, General Aviation activity is being constantly developed in the Company. The plant is an Authorized Service Centre for Cirrus and Diamond aircraft within the approved comprehensive airworthiness organization PART CAO and the maintenance organization for EMBRAER ERJ 170/190 aircraft approved according to EASA PART 145.



The plant owns a very modern machine park, including machining equipment (CNC and measurement equipment), modern lines for applying galvanic coatings, a chemical laboratory and stations for defect testing. Most components are manufactured on the basis of fully automated, precise and efficient technological lines.

The company has also the most modern aircraft painting plant in Europe. Painting takes place in a modern hangar, which is designed for aircraft of code C according to ICAO (e. g. A320 or B737), or smaller. The hangar is equipped with modern heating, humidification, ventilation and lighting systems.





# MILITARY AVIATION

# MAINTENANCE OF F-16

WZL No. 2 S. A. has the necessary personnel, equipment and infrastructure to perform component repairs and periodic maintenance of F-16 aircraft.

## The plant conducts the following:

- > Landing gear LRU overhauls (landing gear components, shock absorbers, wheel axles);
- > Overhauls of hydraulic systems (tanks, actuators, valves);



- > Repairs of electrical equipment (transducers, control units, voltage regulators);
- > Repairs of avionics (displays, weapon control units, radio stations);
- > Plastic Media Blasting (PMB) paint coating removal;
- > Design and manufacture of ground support equipment (GSE);

- > Painting the airframe;
- > Painting of alternate mission equipment (AME);
- > Applying a painting coating to the airframe in Have Glass II system;
- > Carrying out NDI tests on the structure and components of the airframe (non-destructive).







# MAINTENANCE OF C-130

The plant has the necessary personnel, equipment and infrastructure to perform repairs and periodic maintenance of Hercules C-130E and C-130H transport aircraft. Service contracts and PDM (Programmed Depot Maintenance) contracts are implemented as ongoing support for aircraft operation through repairs, improvements, delivery of technical materials, and development and implementation of technical bulletins.



## The plant conducts the following::

- > PDM support;
  - > HSC and ISO periodic maintenance;
  - > Landing gear LRU overhauls (landing gear components, shock absorbers, wheel axles);
  - > Overhauls of hydraulics (tanks, actuators, valves);
  - > Overhauls of electrical equipment (transducers, control units, voltage regulators);
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- > Overhauls of avionics (displays, weapon control units, radio stations);
  - > Development of technical bulletins and execution of commissioned bulletins;
  - > Painting the airframe;
  - > Design and manufacture of ground support equipment (GSE);
  - > Carrying out NDI tests on the airframe structure and components (non-destructive).





# MAINTENANCE OF MiG-29

The company conducts maintenance of MiG-29 aircraft in the scope of control and regeneration work, periodic maintenance after every 150 and 300 flight hours and maintenance of aircraft components, units, LRUs, and airframe.



- > Deep modernization of navigation systems avionics (EGI SAASM laser platform, mission computer, MILBUS rail);
- > Video recorder and audio DVR (Digital Video Recorder).

## The plant carries out upgrade works:

- > Tactical Air Navigation System (TACAN);
- > VOR 9VHF Omnidirectional Range / ILS (Instrument Landing System) navigation system;
- > GPS (Global Positioning System) receiver;
- > IFF Mod. 5 Receiver;





# MAINTENANCE OF Su-22

The plant supports the operation of Su-22 aircraft in the scope of control and regeneration works, periodic maintenance after every 240 airframe flight hours and maintenance of aircraft components, units, LRUs.



The navigation instruments located in the cockpit of the aircraft have been modified, currently indicating flight parameters in the Anglo-Saxon units, and an additional radio station was installed.

The training-and-combat aircraft were equipped with the SMO load monitoring system, and a digital video and audio recorder (DVR system) and the flight parameters recorder system S2-3a were installed.





# ENGINE MAINTENANCE

The company provides overhaul and repair services (MRO): turbine engines for military aircraft:

- > F100-PW-229 (F-16);
- > RD-33 (MiG-29);
- > AŁ-21F3 (Su-22);
- > TW2-117A/AG (Mi-8),
- > PW127G (CAS C296M)

their components, generators and LRUs. These engines provide propulsion for military aircraft.



The company also provides maintenance, repair and overhaul services for TS-21 and AI-9W starter engines. WZL No. 2 S.A. improves and repairs low-power turbine engines (GTD-5, 9156-3, 2PW8-1) and their units and components. These engines power land combat vehicles.

Within the scope of aircraft engines overhauls and repairs carried out, services such as: endoscopic control, dynamic balancing, non-destructive testing (NDT), metrological services, automatic dimensioning, mechanical, chemical and thermal processing, welding, chemical and special coatings are performed.







# JET ENGINE TESTING CENTER

The plant has two engine test stations, thanks to which it is possible to conduct manufacturing, operational and regulating tests of aircraft after repairs and overhauls, both of military and civil aircraft.



## Test station for testing propulsion systems of military and civil aircraft:

- > F100-PW-229 (F-16);
- > CFM56-3 (Boeing 737).

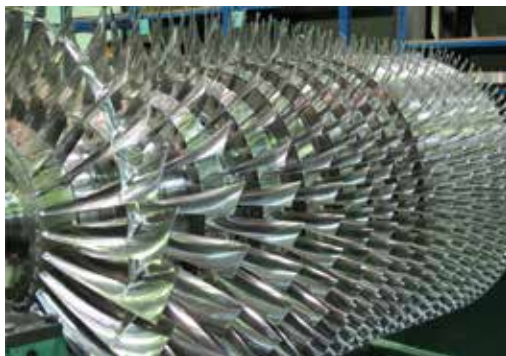
## Test station for Russian-made aircraft engines:

- > AŁ-21 F3 (Su-22);
- > RD-33 (MiG-29).



## The jet engine testing station enables the following:

- > Testing of new generation jet engines with a mass flow rate of up to 650 kg/s (1,433 LB/s) and a maximum flow rate of up to 330 kN (75,000 LBF);
- > Independent operation of four engines at the same time, thanks to a dedicated preparation hall;
- > Controlling the engine during the test and monitoring its parameters.





# PAINT SHOP

# MILITARY PAINT SHOP

The Paint Shop Department of Wojskowe Zakłady Lotnicze nr 2 S.A. consists of four hangars dedicated for surface painting and preparation, having the following dimensions:

- > Width: 21 m;
- > Length: 23/30 m;
- > Height: 8 m (depending upon additional equipment).



Two of the hangars are dedicated for painting details in open paint booths and a closed dust-free cabin dryer, where the drying process is carried out using endothermic heating and an IR oven to dry the details, while the reimaging two hangars are dedicated for painting aircraft.

## The plant conducts the following:

- > Removal of old paint coatings;
- > Selective removal of paint coatings using the PMB (Plastic Media Blasting) system in the hangar;
- > Removal of old paint coatings;
- > Application of primer to cleaned surfaces;
- > Application of intermediate substrates;
- > Application of surface enamel.





# CIVIL PAINT SHOP

The paint shop is used to paint entire aircraft or their parts, e.g. fuselage, wings, tail, and aircraft components. The process begins with an incoming inspection. The paint shop uses the latest technology for repainting, e.g. primer/coating and non-chromatic materials that comply with the requirements of the European Parliament's REACH regulation.



## The plant conducts the following:

- > Removal of paint coatings by mechanical or chemical method;
- > Surface preparation, application of anti-corrosion coatings;
- > Removal and replenishment of aerodynamic sealants;
- > Application of special coatings according to technical documentation;
- > Application of technical descriptions and decorative foil.

## Modern painting shop in Central Europe:

- > Performs all kinds of applications of painting system (High Solid, Base Coat Clear Coat, VIP Finishes);
- > Electrostatic painting system (paint consumption);
- > LED lighting system ensuring neutral light temperature (daylight);
- > Environmentally friendly (waste treatment, air filters).





CIVIL AVIATION

# MRO

As part of the PART-145 certificate, WZL2 offers line, base and workshop aircraft maintenance. Aircraft service is carried out in two hangars. The first of these is a facility, which consists of a hall dedicated to passenger and transport aircraft service, as well as a modern painting shop. The second hangar is a surface that allows simultaneous service of two EMBRAER ERJ 170/190 aircraft.



The plant helps in preparing documentation, analyzes faults, and solves technical problems. As an approved EASA Part-145 service organization, continues expanding the range and types of aircraft serviced by carrying out overhauls and upgrade/modernization services for the civil sector.

## Workshop maintenance:

- > Overhauls and repair of components (wheels, brake assemblies, batteries);
- > Structural and sheet metal repairs;
- > Overhauls of interior equipment, such as passenger seats.







Within the framework of the approved certificate No. PL.CAO.0016 of the Comprehensive Airworthiness Organization, WZL-2 carries out the following:

- > Aircraft maintenance;
- > Continuous airworthiness management;
- > Airworthiness reviews (issuing and extending the validity of the ARC);
- > Issuing flight permits.



WZL-2 is an Authorized Service Center for Cirrus and Diamond aircraft. The plant provides service for the following aircraft:

- > Cirrus (SR20, SR22, SR22T);
- > Diamond (DA20, DA40, DA42, DA62, DV20);



The company also holds the approval of the National Organization of NCAO, certificate No. PL.NCAO.0003, in the area of operation and management of continuous airworthiness for the following aircraft:

- > Van's RV-8;
- > Van's RV-10;
- > SONEX.





# UNMANNED AERIAL VEHICLES SYSTEMS

# UAVS COMPETENCE CENTER

The Competence Center for Unmanned Aerial Vehicles was established in 2016 by the Management Board of the Polish Armament Group S.A. (PGZ) in order to establish a technical leader and coordinator in all projects related to UAV systems conducted within the GK PGZ S.A.



## The main tasks of the SBSP CK include:

- > Designing UAVS;
- > Conducting research and development work in this field;
- > Manufacturing and servicing;
- > Integration of systems and their upgrades and modifications.

## Key product groups:

- > Unmanned Aerial Vehicle systems for military purposes;
- > Unmanned Aerial Vehicle systems for non-military use;
- > Loitering Ammunition Systems;
- > Other research and development projects.





# UAVS DRAGONFLY

The DragonFly Loitering Ammunition System is a project implemented from the own resources of the Wojskowe Zakłady Lotnicze nr 2 S.A. on the basis of a license obtained in 2017 from the Military Technical Institute of Armament. The heart of this system is the carrier of warheads i.e. Unmanned Aerial Vehicle platform in vertical take-off multi-rotor system weighing 5 kg.



Depending on the type of warhead used, DragonFly can be directed to precisely hit lightly armored objects and live-force groups within a radius of 10 km. The warheads can be equipped with a daylight or thermal imaging camera, which allows to conduct combat operations both at day and night.

## Types of warheads:

- > **GK-1 HEAT** cumulative and shrapnel warhead (damages tanks and armored combat vehicles);
- > **GTB-1 FAE** thermobaric warhead (destroys bunkers and shelters, as well as equipment such as radar stations and rocket launchers);
- > **GO-1 HE** shrapnel warhead (effectively raids light armored vehicles and live force groups);
- > **GO-1 HE-TP/ GO-1 HE-TR** training heads (used for training system operators in the field observation, guidance and execution of fire).





# UAVS ORLIK

The program implemented for the Polish Armed Forces on the basis of an agreement concluded between the Treasury, represented by the Armament Inspectorate of the Ministry of National Defense and a consortium consisting of the Polish Armament Group S.A. as the leader, Wojskowe Zakłady Lotnicze No. 2 S.A., and PIT-RADWAR S.A. ORLIK is a system of short-range tactical-class unmanned aerial vehicles.



The system as a whole was designed by the members of the Consortium, thanks to which the companies, including WZL No. 2 S.A., have full intellectual property rights to the system, together with the competence to manufacture, upgrade and service it.

The system is intended for conducting reconnaissance missions within a range of 100 km using a four-sensor optoelectronic warhead and SAR radar. Reconnaissance operations can be carried out for up to 6 hours both during the day and at night. The take-off weight of the aerial platform is 150 kg. The platform takes off from a special launcher included in the kit, while the landing does not require airport infrastructure. The take-off, mission and landing of the platform can be carried out in a fully automatic mode.







# UAVS WIZJER

Implementation of the Agreement concluded between the Consortium consisting of: Polish Armament Group S. A. (Leader), Wojskowe Zakłady Lotnicze nr 1 S.A Military Aircraft No. 1 S.A. Branch in Dublin and Wojskowe Zakłady Lotnicze nr 2 S.A acting in the role of technical leader.



The mini surveillance aircraft, intended for both civilian and military purposes, is foreseen to conduct reconnaissance missions within a radius of 30 km using a two-sensor optoelectronic warhead operating in day and night conditions. It has a low noise emission factor with a ready-to-fly airframe weight of 13 kg and provides for 3 hours of observation.

The automation of the mission and the possibility of landing with the use of parachute and airbag ensure complete safety of use.



As part of the license acquired by WZL-2 from the Technical Institute of the Air Forces, the Center, in addition to production capabilities, will also acquire competencies related to system integration, maintenance, upgrade and modification.

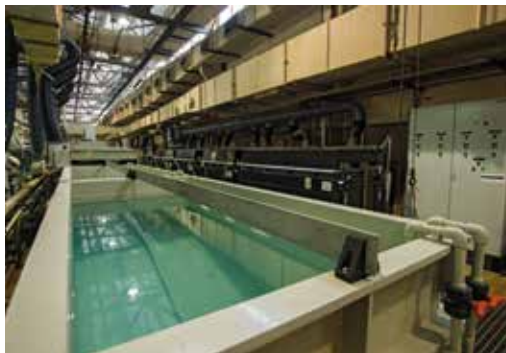




SERVICES

# GALVANIC PROCESSING

Wojskowe Zakłady Lotnicze No. 2 S.A. is equipped with one of the most modern galvanic shops in the region, having capability to apply standard and unique electroplating coatings. The quality of the electroplating processes carried out is confirmed by external audits which confer the authority to issue certificates in the field of national, European, civil and military standards.



## Scope of services:

- > Conventional anodizing with coloring;
- > Hard anodizing;
- > Aluminum chromium plating;
- > Zinc coating with passivation;
- > Zinc phosphating;
- > High phosphorous and electrochemical chemical nickel plating;
- > Zinc-barium oxide phosphating;
- > Steel oxidation;
- > Steel passivation;
- > Selective placement of galvanic coatings.

The quality of the galvanic coatings is ensured by application of the following standards:

- > MIL-PRF-8625;
- > MIL-C-26074;
- > PN-EN 2536;
- > PN-EN 2284;
- > PN-EN ISO 7599;
- > PN-EN ISO 4527;
- > AMS 2469.





# MECHANICAL SERVICES

The company is the most experienced manufacturer of spare parts for aircraft used in the Polish Air Force. The construction of aircraft components requires great commitment and great precision. The set requirements gave effect in the form of a modern and highly specialized mechanical department, formed by a team of people with the highest qualifications in the region.



- > Plasma spraying;
- > Waterjet cutting;
- > Vulcanization of rubber products;
- > Laser marking;
- > Details 3d printing;
- > Metal and sheet metal works;
- > Engraving and infusing the engraving with paint.

## Scope of services:

- > Strengthening details with the shot peening method;
- > Heat treatment and heat-chemical treatment;
- > Machining: turning, milling, grinding, welding, bronze soldering;
- > Machining on 5-axis machining centers, CNC lathes and large-format CNC plotters;
- > Abrasive and vibratory machining;



TESTER T-576 29



# DESIGN AND MANUFACTURING OF AEROSPACE PRODUCTS

Wojskowe Zakłady Lotnicze nr 2 S.A in its core business uses many unique and specific technological processes and provides complementary services for customers.

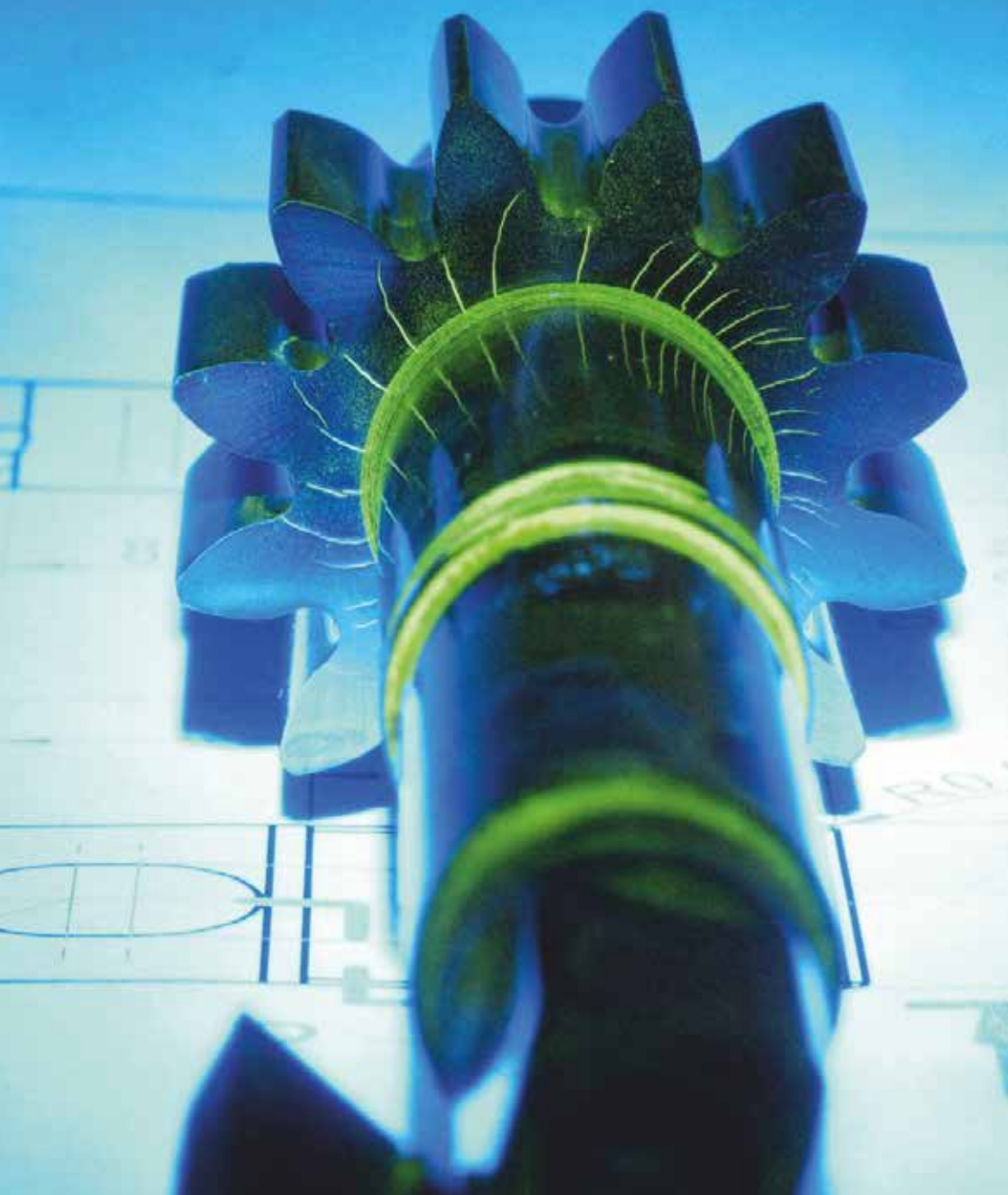


- > Manufacture of low-pressure rubber pipes;
- > Maintenance of pressure tanks;
- > Design and manufacture of containers for storage and transport of aircraft engines;
- > Grinding of organic glass.

## Scope of services:

- > Manufacture of electrical cable harnesses;
- > Manufacture of rubber products;
- > Manufacture and repair of composite elements;
- > Manufacture of units and electronic devices;
- > Design and manufacture of avionics systems testers;
- > Overhaul of aircraft units and equipment;

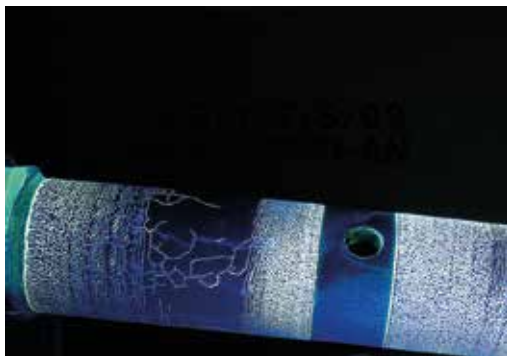






# NON-DESTRUCTIVE TESTING NDT

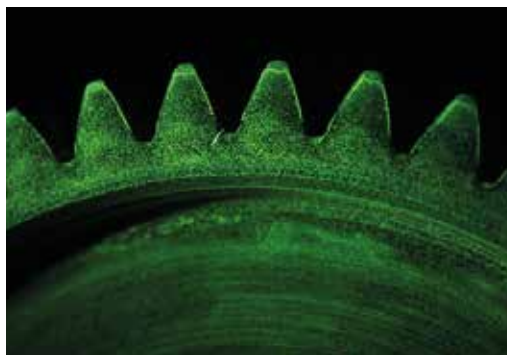
During engine overhauls and repairs, individual parts and assemblies are subjected to non-destructive testing. Test methods and techniques shall be used in accordance with the relevant instructions describing in detail the control process. The plant is certified PART-145 in the field of non-destructive testing of civil aircraft. The tests are carried out by a staff trained in accordance with EN 4179/ NAS410, having level II and III qualifications in PT, MT, ET, UT and RT methods.



In particular, the following are subject to radiographic examination:

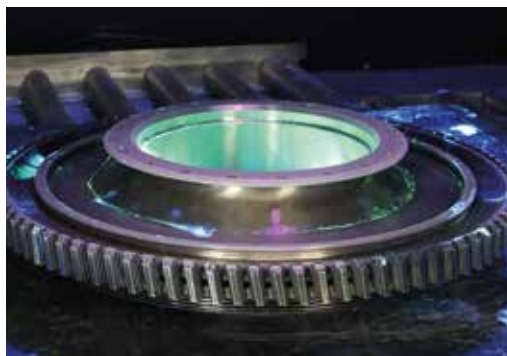
- > aviation parts and engine turbine components after their overhaul;
- > welded and brazed connections;
- > parts after mechanical processing operations such as electro-drilling, grinding or drilling;
- > castings, composites.

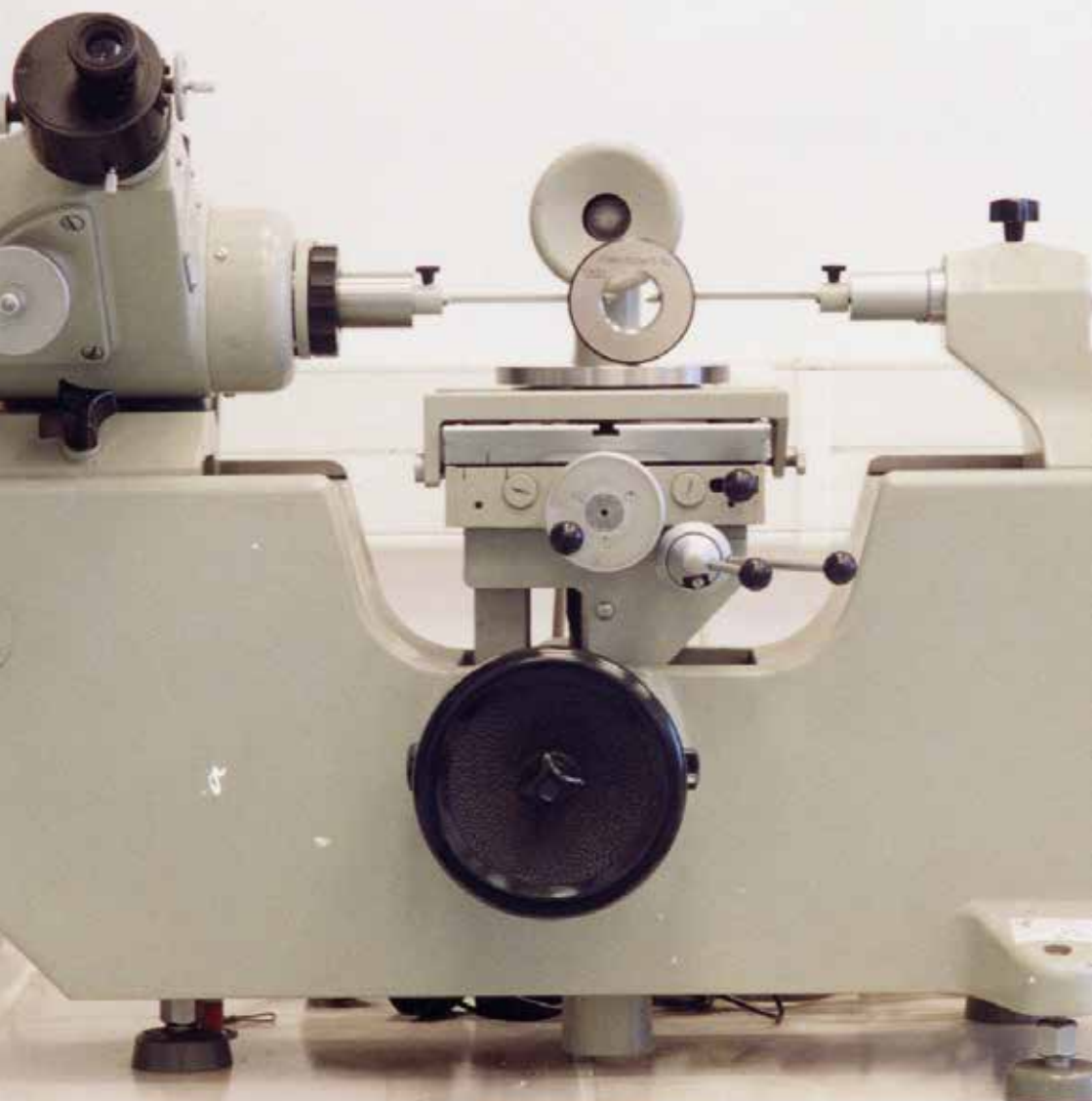
Tests are performed in accordance with the ASTM-E 1742 standard.



## Scope of services:

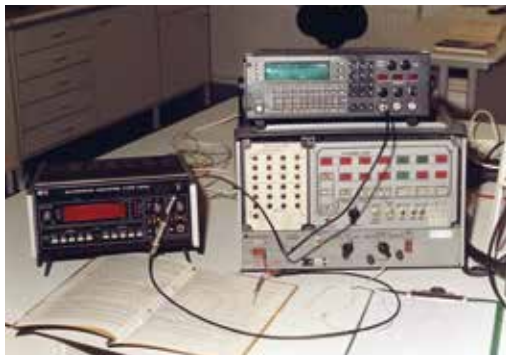
- > **PT** (Penetration Testing) testing using a liquid penetrant;
- > **MT** (Magnetic Testing) used for manufactured structures and components from ferromagnetic materials: ferritic steels, cast iron and cast steel;
- > **UT** (Ultrasonic Testing) ultrasonic testing;
- > **ET** (Eddy Current Testing) testing using the eddy current method;
- > **RT** (Radiology Testing) is an X-ray examination performed using the film method.





# METROLOGY

Metrology Department of WZL NR 2 S.A. operates in accordance with the requirements of the PN-EN ISO/IEC 17025:2018-02 standard. In order to ensure the highest quality of calibrations, a Management Book and System Procedures describing the Management System in the Metrology Department were developed. Calibration of measuring equipment is performed by experienced staff based on approved Measurement Procedures.



The laboratories of the Metrology Department meet local and environmental requirements according to the requirements of the PN-EN ISO/IEC 17025 standard. In addition, the laboratory meets the requirements of all other quality systems owned by WZL-2 regarding the supervision of test equipment.

## Scope of services:

- > Calibration of measuring instruments;
- > Calibration of measuring instruments for external recipients;
- > Measurements of parts and production products within the scope of the measuring equipment;
- > Testing of materials and product characteristics exclusively for the production needs of WZL-2.



**Wojskowe Zakłady Lotnicze No. 2 S.A.**

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