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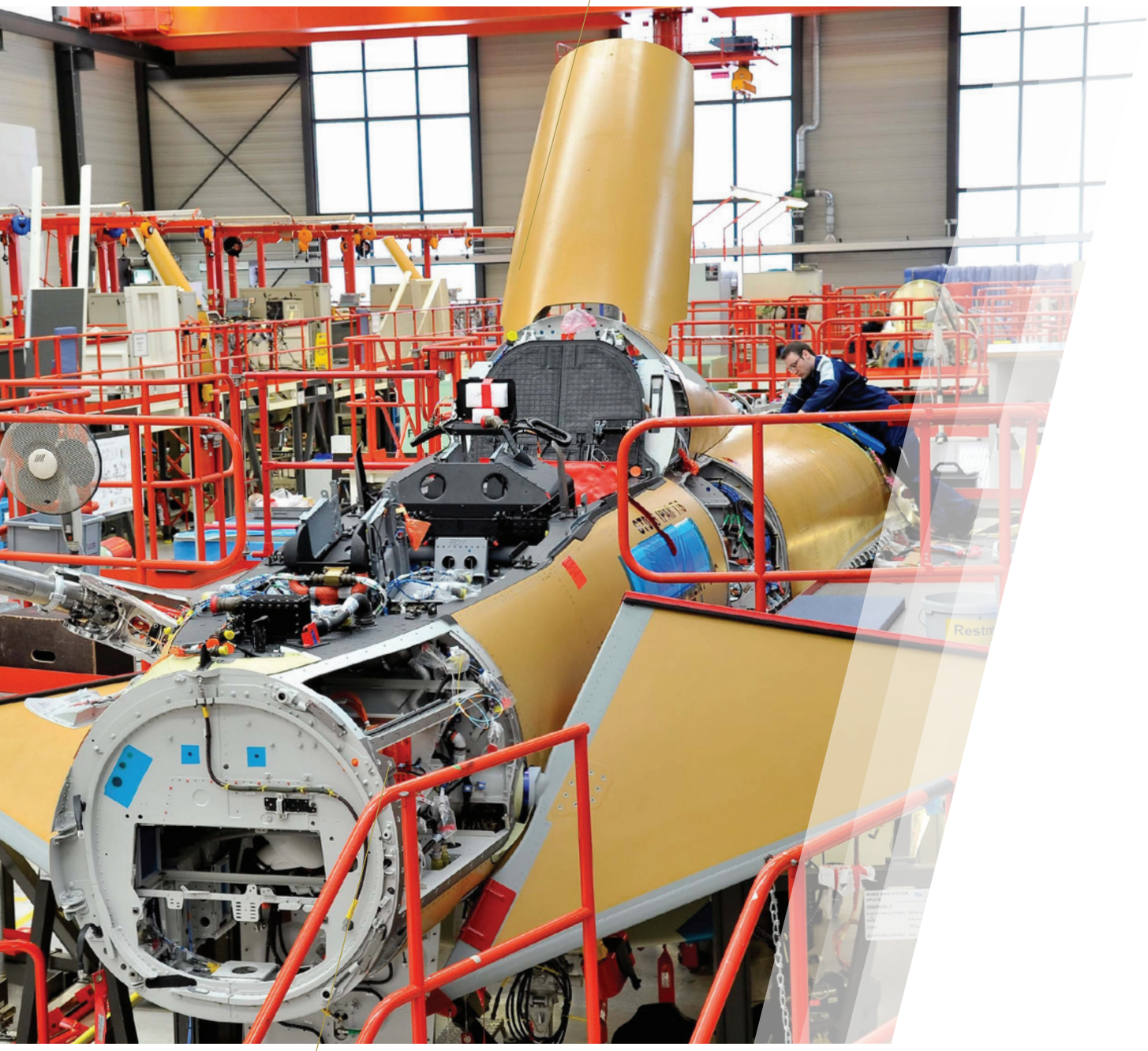

NOW OR NEVER

Prospects for the Development of the Polish Aviation Industry in Light of the State's Current Defense Expenditures

NOW OR NEVER

Col. Krystian Zięć (Ret.)
in collaboration with the Foundation team

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Cover photo, source: www.eurofighter.com

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INTRODUCTION

Poland is currently undertaking an ambitious programme to transform and modernize its Armed Forces. This initiative encompasses the acquisition of state-of-the-art weapon systems across all branches of the military, as well as the establishment of new units and tactical formations. In the coming years, the Republic of Poland will allocate hundreds of billions of zlotys to meet defence needs, a substantial portion of which to date has been directed primarily to foreign manufacturers.

Poland now ranks among the leading NATO member states in terms of nominal defence expenditure and is the undisputed leader relative to GDP. However, unlike other major Alliance members, Poland's domestic capacity for the development and production of advanced armaments remains very limited. Consequently, defence spending contributes only marginally to the strengthening of the national defense industry and broader economy.

Under the current technical modernization programs, particularly those concerning the Land Forces, plans call for the Polonizaton of foreign technologies and increased procurement from the domestic industry. Unfortunately, the aviation sector is often excluded from discussions on the need to reinforce national competencies and production capabilities, despite constituting one of the most innovative segments of the high-tech industry, with applications in both civil aviation and other advanced economic sectors The strategic importance of the aerospace industry is clearly acknowledged by the largest EU member states and other highly developed nations, whose economic growth is driven by innovation.

Both Poland and other EU Member States recognize the growing significance of U.S. policy in the context of security and international cooperation. The opening months of Donald Trump's presidency precipitated a cooling of transatlantic relations, and several of the President's pronouncements have called into question the very foundation of Europe's alliance with the United States. In response,

European nations are moving toward greater strategic autonomy in defense, accompanied by rising military expenditures, including within EU frameworks. Over the coming years, leading Member States will seek to further bolster their industrial and technological capabilities and Poland should play an active role in this process, for example by establishing a national capacity to manufacture combat aircraft.

This analysis prepared by the Alioth Foundation, seeks to assess the current capabilities of Poland's aerospace industry and to explore prospects for its continued development. We trust that the recommendations set forth herein will represent a meaningful contribution by the Alioth Foundation to the public discourse on the future of the national aviation sector, the innovation and competitiveness of Polish enterprises, and the broader economic development of the country.

Source: www.eurofighter.com

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TECHNICAL MODERNIZATION OF THE ARMED FORCES AND THE FUTURE OF THE POLISH AVIATION INDUSTRY

In recent years, a breakthrough has occured in the modernization of the Air Force and other aviation branches. This has been driven primarily by the accelerated acquisition of cutting-edge weapon systems that provide the Polish Air Force with previously unattainable operational capabilities. One of the most high-profile milestones was the assembly of the first F-35A fighter jet intended for the Polish Air Force. In late January 2025, for the first time, a Polish pilot—one

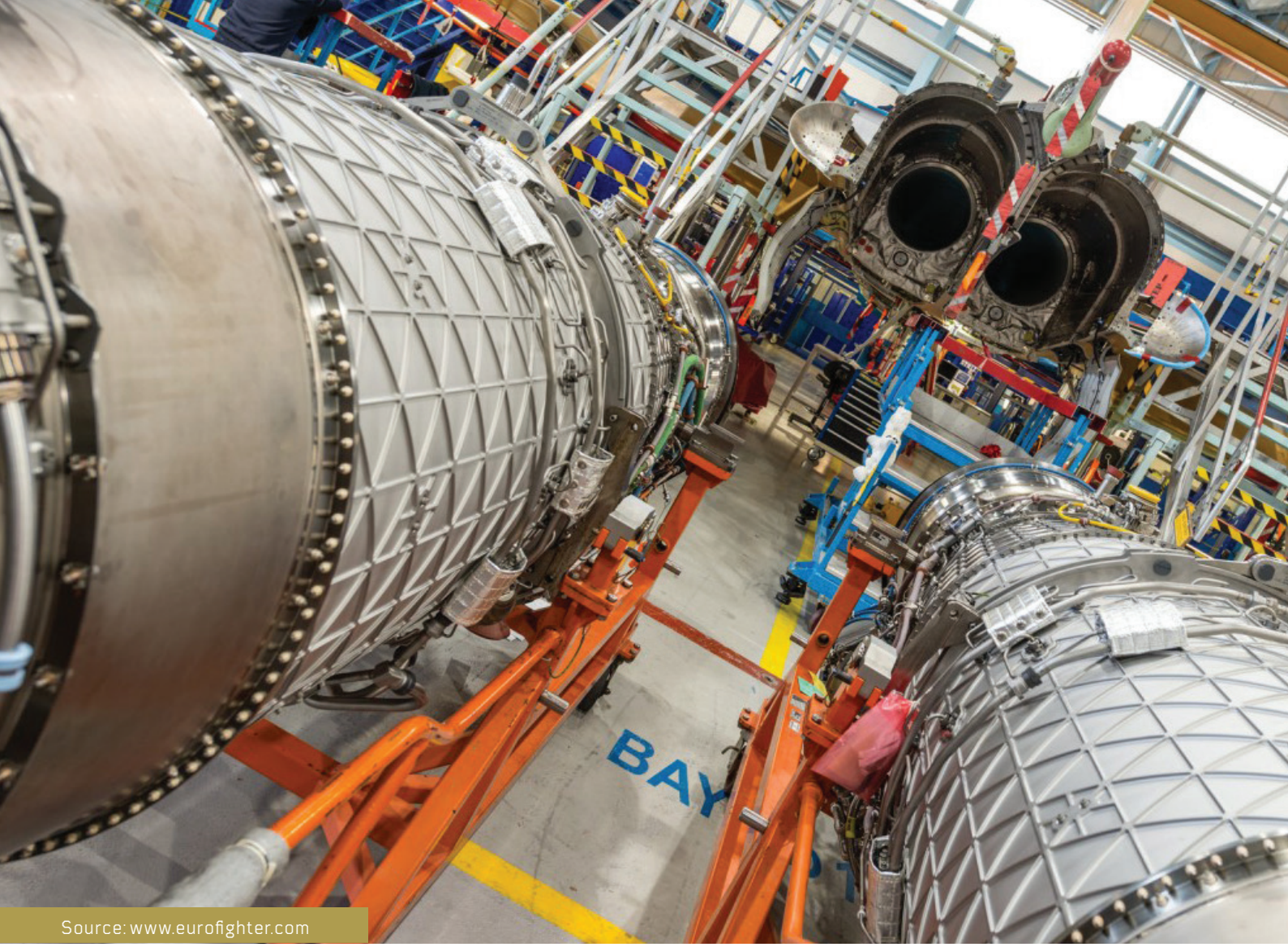
Source: Polish Armed Forces General Staff

of six currently training in the United States to become F-35A pilots for the Polish Air Force, took the controls of the American-built aircraft for the first time. According to the Ministry of National Defence, Poland is expected to field 32 multirole stealth fighter jets by the early 2030s, organized into two tactical squadrons. The initial deployment of F-35 aircrafts to Poland is scheduled for 2026.

Source: Polish Armed Forces General Staff | Staff Sergeant Rafał Samluk

In 2022, the Ministry of National Defense resolved to acquire twelve FA-50GF light combat trainers from South Korea, with an additional thirty-six more advanced FA-50PL variants set to be delivered starting this year. By the early 2030s, this will expand the Air Force's tactical aviation strength to eight squadrons. However, this force structure will still fall short of the Armed Forces' overall combat aircraft requirements especially given the FA-50's performance limitations relative to the far more advanced platforms fielded by American and European manufacturers.

Given Poland's geostrategic position, marked by the risk of a symmetric conflict in Central and Eastern Europe combined with the unpredictable stance of the United States regarding NATO's defence policy Poland cannot afford to rely solely on allied support, which may falter in times of crisis. The country needs to develop a military capability capable of delivering an effective defence during the initial phase of hostilities, prior to the arrival of substantialallied forces on its territory. Consequently, expenditure on the modernization of the Polish Armed Forces must be allocated judiciously. In this context, the capabilities of the Air Force are of paramount importance. They must secure all axes of approach within an integrated air-defence architecture and provid decisive support to Land Forces thereby determining the success of a broader defensive campaign.



Source: www.eurofighter.com

In a future armed conflict, Russia will apply the lessons learned from its invasion of Ukraine.

Assuming that, in a future conflict, Russia applies the lessons learned from its February 2022 invasion of Ukraine and fully commits its air-power potential, Polish tactical squadrons equipped with multirole F-16, F-35, and FA-50 aircraft would face hundreds of Russian air superiority fighters, including various Su-27, Su-30, Su-35, MiG-31, and Su-57 variants. Although the F-16 and F-35 are exceptionally capable platforms able to employ advanced air-to-air and air-to-ground munitions, they were not designed as dedicated air superiority fighters. Their tactical-technical specifications and combat effectiveness reflect a compromise designed to fulfil a broad spectrum of mission profiles This is especially apparent in the case of the F-35, which, was engineered with stealth technology to penetrate adversary air-defence networks.

It is important to note that pervious procurements of multirole aircraft were predicated on the assumption that, from day one of any hostilities, the Polish Air Force would operate as part of NATO's allied air-power contingents – forces possessing all the specialized platforms required to match Russian combat aircraft both in numbers and in tactical-technical performance.

Today, Polish policymakers face the imperative of taking decisive measures rearm the Air Force and to accelerate both the modernization and the indigenization of the domestic aerospace industry. In light of growing threats from the East, it is essential to devise a strategy that will ensure the state's effective defense for both the short and long term. Unfortunately, the facts on the ground demonstrate that immediate action is required; it is necessary to define precise defense priorities that will enable autonomous operations during the initial phase of any potential conflict, taking into account a range of scenarios, including uncertainty regarding the United States' stance within NATO's eastern flank operations.

The anticipated intensity of air operations within Poland's integrated air-defence system justifies the requirement to field a sufficient number of air-superiority fighters - at least four squadrons (64 aircrafts), whose tactical-technical performance and capacity to carry a substantial load of beyond-visual-range air-to-air missiles (BVRAAM), will ensure the requisite effectiveness without which all other defence measures would be rendered moot. A critical factor remains the operational availability of these assets, which necessitates robust logistical support, an ample supply of spare parts, and a cadre of qualified personnel capable of conducting routine maintenance and repairs.

To date, the procurement of multirole aircraft has been conducted under the assumption that the Polish Armed Forces would, from the first day of hostilities, operate as an integral part of NATO allied forces.

At the same time, significant deficiencies persist in the capability to conduct close air support operations for the Land Forces. In view of the need for cost-effective allocation of defence funds – and given the specific nature of such missions, which are typically flown at subsonic speeds a sensible alternative to multirole fighters would be the procurement of a large fleet of relatively inexpensive, low-maintenance aircraft. These platforms could sustain continuous support to ground forces through the employment of precision stand-off munitions.

Source: http://zoom.mon.gov.pl | Bartek BERA

Source: http://zoom.mon.gov.pl | Bartek BERA

A key factor remains the availability of combat assets for operational deployment — this necessitates proper logistical support, supply of spare parts, and qualified personnel.

We require platforms that precisely meet our needs. First, to ensure a comprehensive and airtight air-defense capability, and second to deliver intensive, effective close support to Land Forces operations. The judicious allocation of defense funding has also been the subject of extensive deliberation within the United States Air Force. In 2009, the U.S. launched the Light Attack/Armed Reconnaissance (LAAR) program, aimed at replacing the aging A-10 fleet and reducing costs by limiting the use of high-operational-cost platforms such as the B-1B, F-16, F-15E, and F-35 for these missions. The program is currently suspended, owing largely to debates over extending the A-10's longevity and a strategic pivot toward a potential conflict with China, which presents different geostrategic conditions and therefore demands distinct performance characteristics for combat aircraft and their weapon systems.

Poland is building capabilities to independently repel a Russian attack on the borders with Belarus and the Kaliningrad Oblast, as well as to conduct a long-term, intensive defensive operation.

Poland does not envisage participation in a Far East conflict, rather it is developing the capacity to independently repel a Russian attack along the Belarusian or Kaliningrad borders and conduct a sustained, high-intensity defensive operation. It should be noted that the United States Air Force recently conducted exercises on Polish soil, within the area of the potential conflict with Russia, employing A-10 aircraft, which are subsonic platforms powered by non-afterburning engines, a characteristic that also impacts maintenance and support costs. These exercises rehearsed the rapid restoration of combat readiness – rearming and refueling the aircraft without engine shutdown, from temporary landing sites on runways of otherwise inactive military airfields.

Bearing the foregoing in mind, it would be necessary to procure an optimal number of dedicated support CAS aircraft which in conjunction with modern ground-to-ground missile systems, would ensure effective support for Land Forces' defensive operations. Acquiring 8–10 squadrons (128–160 airframes) is justified not only by operational requirements and pilot training needs, but also by the potential economic benefits of large-scale production within Poland. Manufacturing this volume, encompassing a broad supply chain rather than solely final assembly, would further drive down unit costs and expand industrial capabilities.

Source: http://zoom.mon.gov.pl | Bartek BERA

Given the light combat aircraft currently available on the market, the selection of the M-346F Block 20 for the role described above isa clear choice. In addition to its low acquisition and operating costs and its dedicated CAS capabilities, it was designed from the outset to operate within NATO frameworks, and its entire supply chain is located within the European Union. Moreover, one should consider a factor that until recently may have seemed secondary but has gained significance in light of current U.S. administration policy: the cultural affinity between Poland and the country of manufacture. Poland and Italy share strong cultural ties, making any potential political coercion regarding the use of these weapon systems virtually inconceivable.

Source: http://zoom.mon.gov.pl | Corporal Sławomir Kozioł

The foregoing considerations demonstrate that the recently acquired FA-50 does not constitute a viable alternative for the operational requirements under discussion. As a supersonic platform, its acquisition and operating costs are substantially higher than those of the M-346F, rendering the procurement of the requisite number of aircraft for Land Forces support financially impracticable. Moreover, logistics and geographic distance from the manufacturer remain critical factors, given Poland's real threat from Russia, we cannot afford to rely on supply chains spanning such vast distances for combat aircraft and their spare parts. While this dependency poses challenges even in peacetime, in wartime it could lead to abrupt suspension of deliveries and the near-immediate grounding of aircraft whose replacement

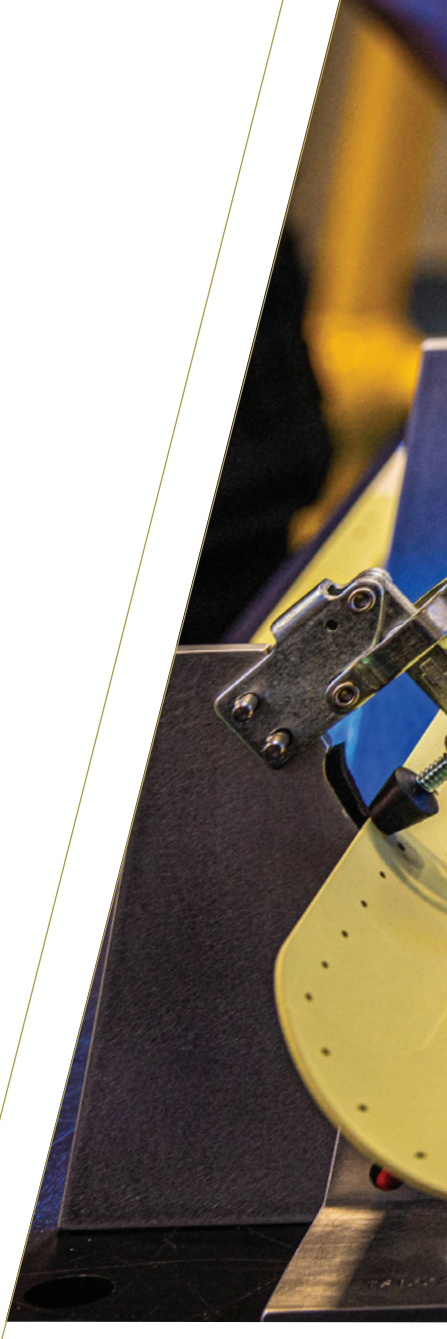
components become inaccessible. Furthermore, the FA-50 lacks a NATO provenance, complicating its integration with Alliance weapons systems. Although full integration may ultimately be achievable, the process demands time that Poland simply does not have under current circumstances.

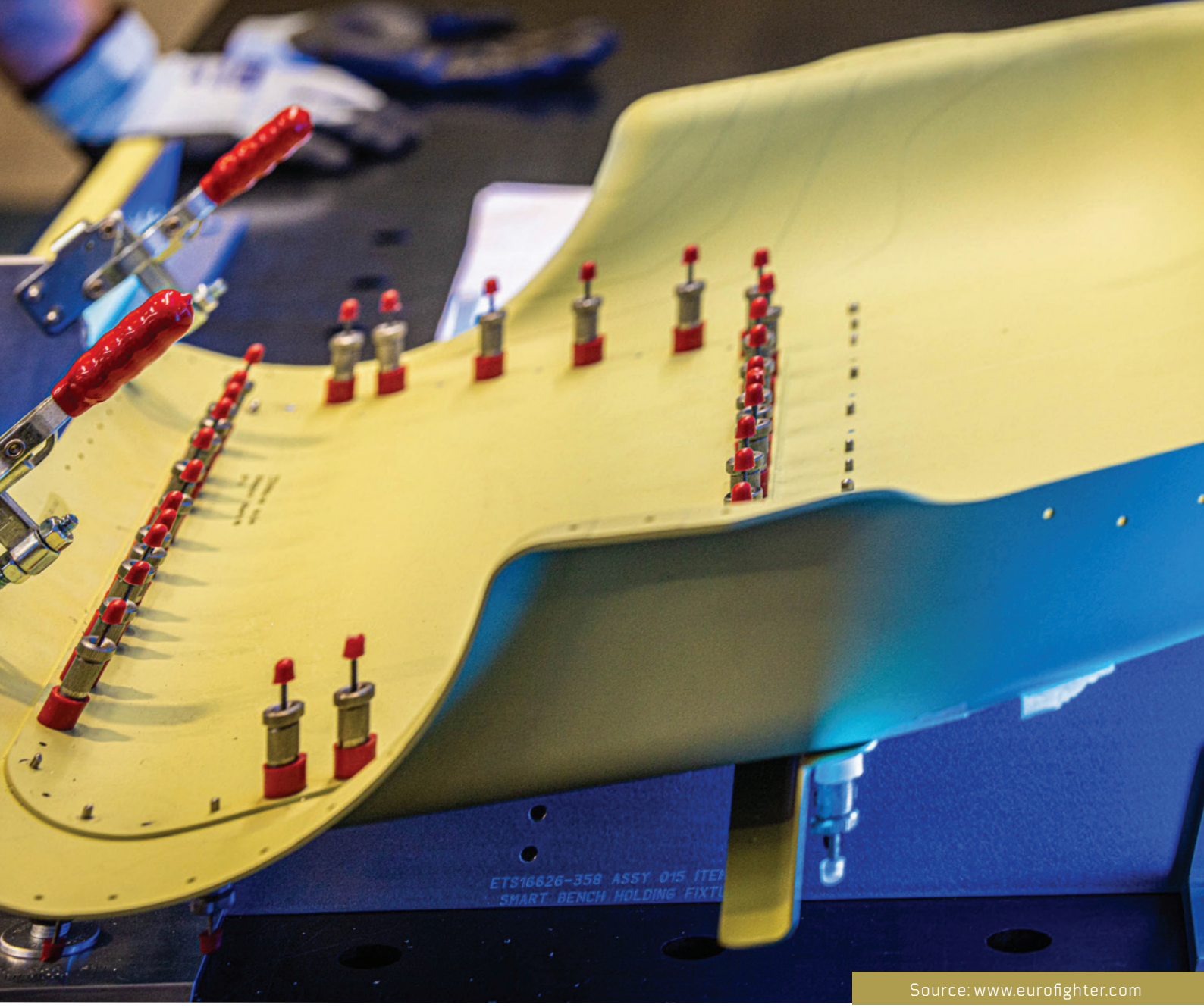
A re-examination of the FA-50 contract, scaling it back and reallocating the resources toward aircraft capable of countering our potential adversary would yield far greater benefits for the Polish Air Force over the long term.

The F-35 multirole fighters now being procured, an exemplary design in their class, will serve as the system's central integrating element, interoperating with air-superiority, strike, and support platforms. By exploiting all the hallmark features of a fifth-generation aircraft; stealth, the acquisition, processing, and distribution of vast data streams, and advanced intelligence, surveillance, reconnaissance, and electronic-warfare capabilities – the F-35 will significantly enhance the operational synergy and effectiveness of Poland's air-defense architecture.

Meanwhile, Poland is implementing a costly Mid-Life Upgrade (MLU) for its F-16 fleet—a program that provides limited new capabilities, particularly in the area of air defense. Redirecting some of these funds toward acquiring air superiority fighters and gradually replacing the F-16 fleet could be a more effective strategy.

The Polish Armed Forces are currently undertaking a Mid-Life Upgrade (MLU) programme for their F-16 fleet. Although this initiative entails substantial expenditure, it does not deliver any new capabilities—particularly in the area of air defense. Redirecting a portion of these funds to procure true air-superiority fighters, coupled with a gradual retirement and sale of the upgraded F-16s as new aircraft enter service, would constitute an optimal strategy for the long-term development of the Air Force.





Source: www.eurofighter.com

The F-16 platform is presently being phased out of the air forces of Western European states, both as part of the routine generational replacement of aviation assets and because it offers limited prospects for effective employment in any future symmetric conflict on the European theater of operations.

Given that the Polish Armed Forces' modernization programme, even at the conceptual level envisages a significant Polonization of procured weapon systems, a similar policy is equally warranted for the Air Force, which plays a pivotal role on the modern battlefield and determines the overall effectiveness of the Armed Forces. To date, all fighter-aircraft acquisition programmes have involved only marginal participation by the domestic aerospace industry,

owing both to limited scale of orders and to an inconsistent procurement policy. By 2030, this will result in the Air Force operating three small, disparate fleets of combat aircraft whose capabilities are inadequate to defend Polish airspace effectively. A substantial increase in resources devoted to the Armed Forces' modernization and transformation would not only present an opportunity for a quantum leap in the Air Force's combat potential, provided that acquisition are judiciously managed, but would, above all, foster the

Source: www.eurofighter.com

development of Poland's aerospace and defense industries, enhance the nation's technological base, and deliverbroader economic growth via the significant spill-over effects characteristic of the highly innovative nature of the aerospace sector.

The scale of current and imminently planned defense procurements fully justifies investment in the development of the aerospace industry, a sector classified as high-technology and among the most innovative branches of the economy. Its products find extensive applications in both military and civilian markets, enabling economies of scale even for highly specialized technological solutions These innovations

Multiplying the available resources for the modernization and transformation of the Polish Armed Forces presents an opportunity for a significant increase in the Air Force's capabilities.

often originate in defense-funded research and development programmes and later transition into civilian uses—for example, fly-by-wire control systems in commercial jetliners or advanced composite materials now widely employed in civil aviation.

The realization of synergies within the aerospace and space sectors is further enhanced by the proliferation of dual-use technologies, whereby capital-intensive military investments not only strengthen national defense capabilities but also generate substantial long-term economic benefits: the creation of high-skilled jobs in aerospace and related industries, and increased tax revenues for the state. Moreover, the aerospace industry drives scientific advancement, fosters technology transfer to other fields, and provides attractive career opportunities for top graduates of both technical and non-technical disciplines.

According to PwC estimates, aerospace firms serving civilian and military markets achieved global revenues of approximately USD 829 billion in 2023, an 11% increase over the previous year. It is now time for Poland to join the ranks of nations with advanced aerospace industries and to reap the tangible economic dividends of this dynamic sector.

Source: http://zoom.mon.gov.pl | Bartek BERA

THE IMPORTANCE OF THE AVIATION INDUSTRY FOR POLAND'S ECONOMY

Although the Polish aerospace industry remains notably less advanced compared to that of Western European countries, it already constitutes a significant component of the national economy. According to EY estimates, nearly 100 enterprises operating within Poland's aerospace sector — including a substantial number of small and medium-sized enterprises (SMEs) — currently employ over 32,000 individuals and generate annual output valued at approximately PLN 14.5 billion.

This sector is among the most dynamically developing branches of the Polish economy. Between 2018 and 2022, it recorded an average annual growth rate of approximately 10%, reflecting its robust expansion and increasing relevance. The aerospace industry also demonstrates a strong multiplier effect across the broader economy — both in terms of value added and employment. Available analyses indicate that in 2022, the sector supported over 90,000 jobs nationwide and contributed approximately PLN 4.5 billion to public sector revenues, underscoring its macroeconomic significance. In contrast toother branches of Poland's defense industry, which are predominantly composed of state-owned enterprises producing primarily for the Polish Armed Forces under the umbrella of the Polish Armaments Group (PGZ), the landscape of the Polish aerospace sector is significantly more diversified. This is evidenced by the dominant role of private sector entities, which account for more than 90% of total aerospace output. Moreover, the sector is highly export-orientated, with international sales representing as much as 87% of total industry turnover.

Available analyses indicate that in 2022, the aviation industry supported over 90,000 jobs across the entire economy and generated approximately PLN 4.5 billion in public finance revenues.

Source: www.eurofighter.com

The aerospace sector also provides attractive employment opportunities for engineers and technical professionals. Approximately 14% of the workforce consists of engineering personnel engaged in research and development (R&D) activities, and every second employee holds a university degree. Furthermore, the aerospace and space-related industries offer competitive compensation; in 2022, average wages in the sector exceeded the national average by 13%.

The legacy of the Polish aerospace industry dates back to the 1920s, as well as the influence of the establishment of the Central Industrial District Region (COP) in the 1930s, remains clearly visible today. A significant proportion of the country's largest aerospace manufacturing facilities are still concentrated in the Podkarpackie Voivodeship – the core area of the pre-war COP. Notable companies operating in this region include Pratt & Whitney Rzeszów, Goodrich Aerospace Poland, PZL Mielec, and MTU Aero Engines Polska.

The industry also encompasses a broad array of enterprises located in other parts of the country,such as PZL Świdnik (Lublin Voivodeship), UTC Aerospace Systems Wrocław (Lower Silesia), Airbus Poland (Łódzkie), Pratt & Whitney Kalisz (Wielkopolskie), Boeing Poland (Pomorskie), and GE Aerospace Poland (Warsaw).

The companies mentioned above by no means constitute an exhaustive list of key players operating within Poland's aerospace sector. In recent years, there has been a noticeable increase in the involvement of small and medium-sized enterprises (SMEs), some of which are developing as tiered suppliers to production facilities owned by international aerospace corporations. Another strategically important segment of the domestic aerospace industry is the development and manufacturing of unmanned aerial systems (UAS). The clear market leader in this domain is the WB Group, which supplies the Polish Armed Forces with a range of cutting-edge products, including FlyEye mini-class drones. Gladius reconnaissance-strike systems (designed to deploy both ISR platforms and loitering munitions), as well as other advanced solutions such as the integrated TOPAZ Combat Management System.

Particular attention should be paid to the space industry, which, although often treated separately in Polish policy documents, is inherently connected to the aerospace and defense sectors—both in terms of technology and market participants. In the context of developing Poland's industrial capabilities, the space industry warrants particular attention. While in Polish strategic and policy documents it is frequently classified as a separate branch of the economy, its synergies with both the aerospace and defence sectors are indisputable – as recognized by leading high-technology nations as well as by the companies operating across these interconnected domains. Regardless of the adopted definitional frameworks, the sector holds significant growth potential. This is evidenced, among other indicators, by the inclusion of space-related products developed by Polish enterprises in the Polish Defense and Security Equipment Catalogue 2024, published by the National Security Bureau (BBN), which is intended to promote domestic technological solutions on international markets.

A crucial branch of Poland's aviation sector is the production of unmanned systems, with the WB Group emerging as the clear leader in this field.

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IN SEARCH OF A DEVELOPMENT MODEL FOR THE AVIATION INDUSTRY

The situation of the Polish aerospace industry is rather specific, as Poland is currently emerging as one of NATO's leading defence spenders and allocates substantial resources to the procurement of various types of aircraft, while domestic entities remain only marginally involved in the technical modernization of the Armed Forces.

A prime example of this weakness is the acquisition of 32 F-35A fighter jets in 2020, paralleled by Germany's purchase of 35 in 2022. Although both countries purchased a comparable number of jets, only in the case of Germany was a significant level of industrial participation successfully negotiated as part of the F-35 programme.

Source: http://zoom.mon.gov.pl | Corporal Sławomir Kozioł

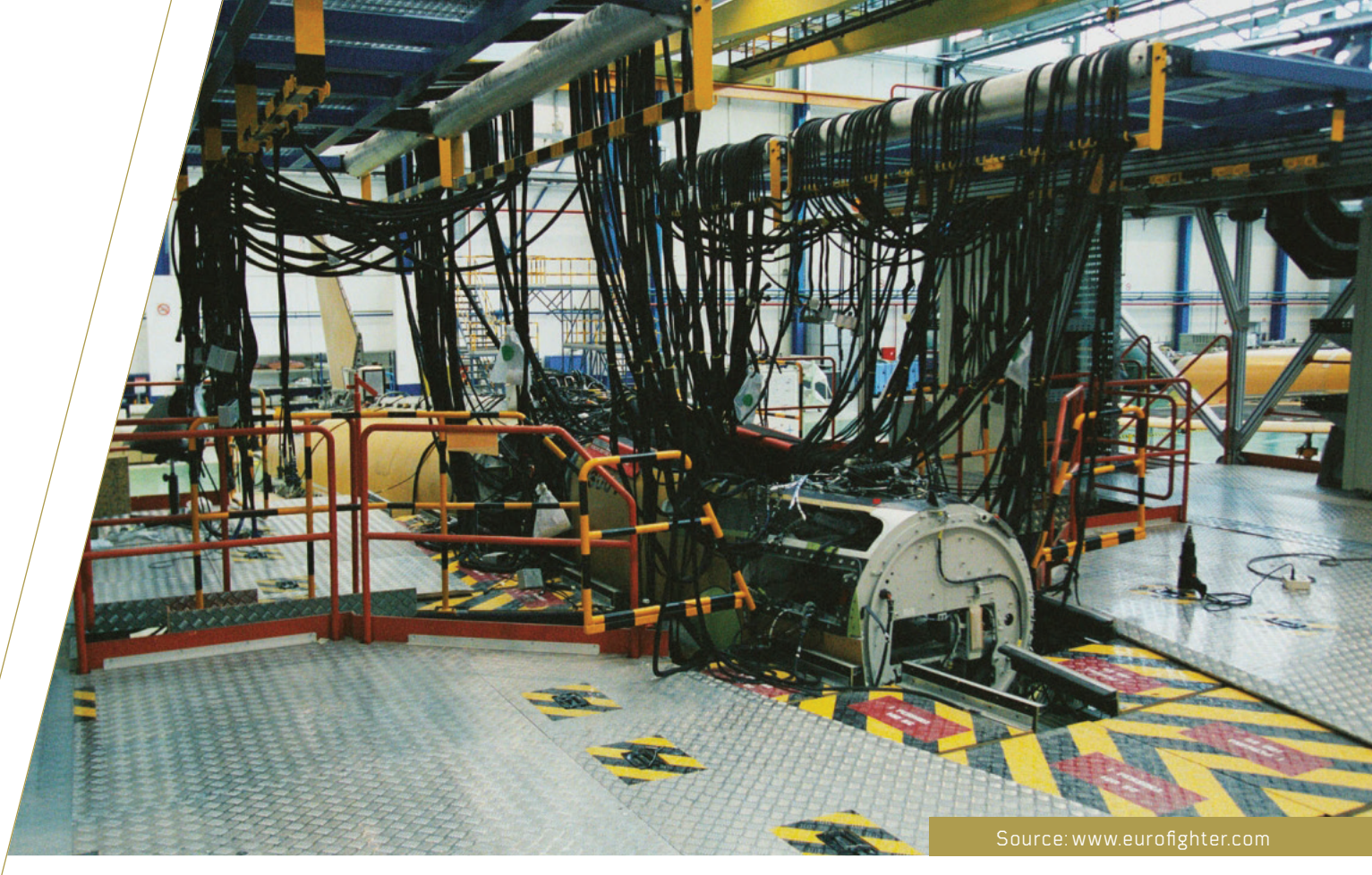
Poland is currently emerging as one of the leading defense spenders within NATO and allocates substantial resources to the procurement of various types of aircraft.

Investments by the Rheinmetall Group, cooperating with U.S. – based defence giants Lockheed Martin and Northrop Grumman, are expected to generate several hundred new jobs at newly established facilities in Weeze, North Rhine-Westphalia. Beginning in mid-2025, these facilities will be responsible for the production of at least 400 units of the centre fuselage section for the F-35A aircraft. This develop-ment marks Germany's industrial entry into the F-35 manufacturing ecosystem, despite the Federal Republic of Germany not having been a participant in the original Joint Strike Fighter programme. Simultaneously, the German aerospace sector continues to play an integral role in the manufacturing of new variants of the Eurofighter Typhoon, particularly for the German government with a new contract for the delivery of an additional 20 aircrafts expected to be signed in the coming months.

Source: http://zoom.mon.gov.pl | Corporal Sławomir Kozioł

The German aerospace industry is characterized by a high degree of specialization, enabling its active participation in the Airbus supply chain—Europe's leading manufacturer of commercial aircraft. For decades, the Federal Government of Germany has consistently implemented a comprehen-sive strategy for the development of the aviation sector, encompassing not only industrial production but also civil air tran-sport and passenger mobility.

The German approach, founded on international cooperation and joint ventures with other European states – mirrors the broader strategic orientation of the EU's leading aerospace nations. Multinational consortia such as Airbus engage industrial partners from France, Italy and Spain, where national aerospace ecosystems are among the most developed in Europe. In the long term, a similar path may constitute a viable model for the Polish aerospace sector, particularly in the light of the fact that corporations such as Airbus and the



Source: www.eurofighter.com

Italian group Leonardo maintain production facilities in Poland, while dozens of local suppliers are already integrated into their regional value chains.

A consistently implemented aerospace development strategy is also characteristic of emerging industrial powers such as Brazil, South Korea, and Turkey. In particular, the latter two have significantly intensified their efforts since the late 20th century, aiming to reduce dependency on foreign technologies and to establish autonomous aerospace capabilities. Today, both countries possess industrial bases capable of manufacturing components for international OEMs, as well as designing and producing complete air platforms indigenously. Flagship national entities—Korea Aerospace Industries (KAI) and Turkish Aerospace Industries (TAI)—have simultaneously expanded into the space sector, focusing notably on satellite systems.

The current maturity of the Korean and Turkish aerospace industries stems from a combination of sustained state investment in R&D and long-term strategic partnerships with international firms. Collaborations with American and European stakeholders have facilitated access to critical technologies and significantly enhanced domestic industrial competencies, ultimately enabling successful export of locally developed aerospace systems.

Investments by the Rheinmetall Group are expected to enable the creation of hundreds of new jobs at the facilities currently under construction in Weeze, which, starting from mid-2025, will be responsible for producing at least 400 central fuselage sections for F-35A aircraft.

The Turkish and South Korean aviation industries have reached their current level of development due to substantial government investment in research and development, as well as long-term collaboration with foreign companies.

Among the three previously mentioned countries, Brazil stands out as having achieved the most notable commercial success in the aerospace sector. In the late 1960s, Brazil aligned its economic policy with a strategic focus on export-orientated growth, in which the aerospace industry played a vital role. This transformation was supported through sustained government investment and international collaboration. A milestone in the development of Brazil's aerospace capabilities was the establishment of the state-owned company Empresa Brasileira de Aeronáutica (Embraer) in 1969. Initially reliant on foreign licenses. Embraer significantly enhanced its innovation capacity in the 1980s, particularly through its participation in the AMX attack aircraft program – a joint venture with Italian firms Aeritalia and Aermacchi under the AMX International consortium. This cooperation strengthened Embraer's competitiveness and facilitated its transition into the production of both military and civilian aircraft.

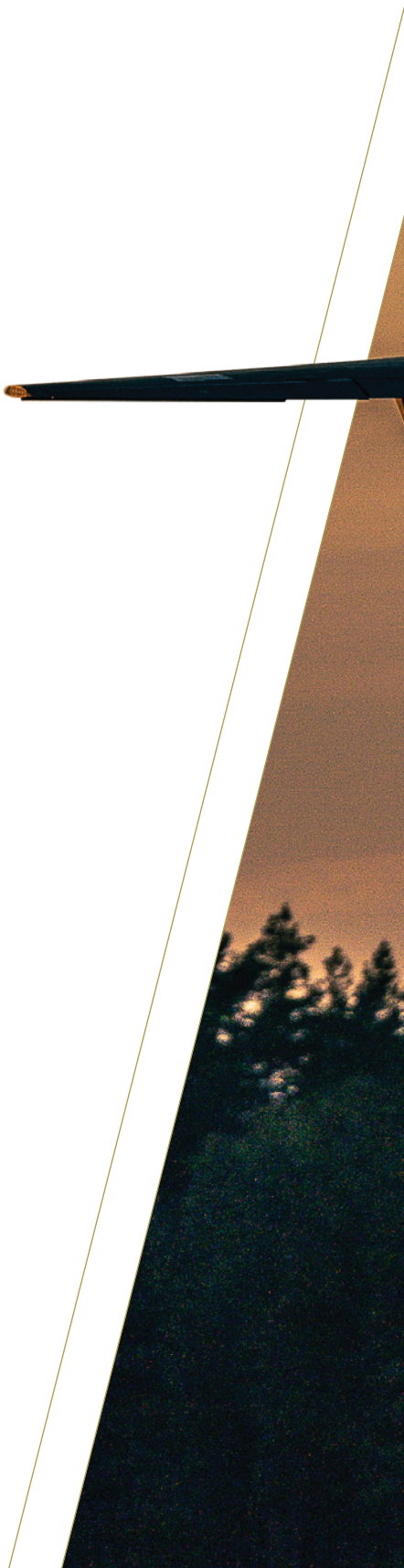
Today, Embraer is a global player in the aerospace industry. Its most recognizable civilian product line is the E-Jet passenger aircraft family of regional jets, widely used by carriers including LOT Polish Airlines. To date, more than 1,800 E-Jet aircraft have been manufactured. The company is currently producing the next- generation narrow body E-Jet E2 models, and according to industry reports, it is evaluating the development of a larger aircraft that could compete directly with the Boeing 737 MAX and Airbus A320 neo families. In the military aviation segment, Embraer has deepened its cooperation with the Swedish defense company Saab, leading to the establishment of a Gripen E/F fighter aircraft assembly line in Gavião Peixoto. The first Brazilian-assembled JAS 39 fighter (locally designated F-39E/F) is scheduled for delivery to the Brazilian Air Force in 2025.

In 2023, Embraer employed nearly 21,000 people, and further investments are planned that are expected to create several hundred additional jobs in the production of both military aircraft and commercial passenger jets. In 2024, the company delivered a total of 206 aircraft of various types - a 14% increase compared to 2023, when 181 units were delivered. Owing to its consistently implemented long-term development strategy, Embraer is currently the third-largest producer of jet-powered commercial aircraft in the world.

Embraer is a global player in the aviation industry. Its most recognizable product in the civil market is the family of E-Jet passenger aircraft.

PROSPECTS FOR THE DEVELOPMENT OF THE POLISH AVIATION INDUSTRY

The aforementioned cases illustrate that the establishment of a robust aerospace sectos is attainable even for economies that are relatively less technology advanced, provided that they pursue a coherent and long-term industrial development strategy centered on specialization in selected niche areas. An increasing number of countries are adopting this approach to strengthen their capabilities in high-technology industries. This trend is driven by both economic imperatives and strategic considerations, including geopolitical factors such as the pursuit of greater autonomy or even full self-sufficiency in critical technological domains.



Investments
in the aviation industry
directly translate
into enhanced capabilities
for developing domestic
solutions to meet
both military and civilian
market needs.

Source: http://zoom.mon.gov.pl | Corporal Sławomir Kozioł

Regardless of the underlying motivatons for investing in the aerospace sector a common feature among the countries examined in this study is the implementation of a long-term, industrial strategy. This approach is predicted on capacity-building through collaboration with foreign partners – either via jointly executed projects or through the acquisition of selected technologies and know-how, for instance, within the framework of licensed production.

Investments in the aerospace industry directly translate into enhanced capabilities for developing indigenous in the aerospace industry directly translate into enhanced capabilities for developing indigenous solutions to meet both military and civilian needs. In each case, the benefits to the national economy are multidimensional:

1

Lifecycle Economics

The lifecycle of defense platforms typically spans approximately 30–40 years, with production costs accounting for only a portion of the total lifecycle expenditure. It is estimated that maintenance, repair, operations (MRO), along with subsequent upgrades and modernization, comprise on average 60–70% of total lifecycle costs. Therefore, the ability to sustain and modernize such systems over the long term represents an additional ability to sustain and modernize such systems over the long term represents an additional opportunity to strengthen the national economy. Funds allocated for these purposes continue to support the domestic aerospace industry while also generating indirect benefits for other sectors through secondary economic effects.

2

Workforce and Innovation

Research and development, manufacturing and subsequently maintenance and modernization efforts may involve both industrial enterprises and research institutions. This translates into the creation of employment opportunities across a wide spectrum of specializations – particularly for engineers, technical personal, and scientists – thereby fostering economic innovation and promoting synergies between academia and industry. From the perspective of the Polish economy, this represents a highly desirable development trajectory, as the world's most advanced economies are built upon innovation generation and the maximization of value-added output.

3

Fiscal and Economic Multipliers

A well-developed industrial base yields tangible benefits for the state budget and acts as a catalyst for the broader economy. The strong multiplier effects inherent to the aerospace sector positively impact numerous industries and service providers, thereby generating additional tax revenue for the national treasury.

4

Strategic Resilience

A robust domestic industry enables the sustained operation of multirole combat aircraft and other air platforms during crises or armed conflicts.

The economic benefits of a comprehensive industrial base serving the aerospace sector are self-evident to the European Union's leading economies– among them Germany, France, Italy, and Spain. The strategic and economic significance of this industry within Europe is poised to grow further in light of the controversial foreign-policy orientation of the Trump Administration, which compels EU Member States to bolster their defensive capabilities and reduce dependency on the United States. Consequently, defense expenditures across the Union are set to rise amid the uncertain future of Euro-Atlantic relations.

This imperative extends to Germany, a country that has traditionally exhibited reticence toward rapid increases in military spending. Central to the EU's response in the European Commission's „Re-Arm Europe" initiative, which envisages allocating up to EUR 800 billion for the development of collective defense capabilities. Leading European policymakers - including French President Emmanuel Macron have likewise underscored the critical need to prioritize procurement of European-built defense systems.

Source: http://zoom.mon.gov.pl | Corporal Sławomir Kozioł

Given the increasingly tense international environment and the potential weakening of the transatlantic alliance, Poland in particular must prioritize strengthening its domestic industrial capabilities to secure greater sovereignty over the production and sustainment of equipment employed by its Armed Forces. Under current conditions, a gradual decoupling from reliance on the United States appears both prudent and necessary, as the defense capacities of EU Member States—including Poland—do not correspond to their technological and economic potential. Procuring European-made armaments and military systems is essential to bolster the continent's defense industry and, in turn, to rebuild Europe's collective deterrent based on a local industrial foundation. Poland must not adopt a passive role in this process; on the contrary, it should leverage rising national and EU defense expenditures to restore and expand its indigenous aerospace manufacturing capability.

The requirements of the Air Force—and, by extension, Poland's national security—demand decisive action to acquire a sufficient number of combat aircraft with specified tactical-technical characteristics. The choice is effectively limited to U.S. and European designs.

In the current situation, a gradual move toward strategic autonomy from the United States appears to be a desirable direction, as the defense capabilities of European Union countries, including Poland, do not correspond to their technological and economic potential.

For air-superiority roles, the F-15EX and the Eurofighter Typhoon are particularly compelling candidates, as their performance would markedly strengthen Poland's air-defense architecture and fill the capability gaps left by multirole platforms.

Given the current international climate and the Trump Administration's defense-related policies, further procurements of U.S. systems carry significant risks—especially concerning long-term logistical support. Equally important is the planned activation of additional European defense-procurement funds, which are intended primarily to support the aerospace industries of EU Member States, including Poland. Leveraging these European resources while balancing strategic autonomy considerations will be critical to ensuring both capability enhancement and sovereign access to sustainment.

In addition to tactical-technical specifications and geopolitical considerations, any further acquisition of combat aircraft must account for Poland's economic interests by facilitating the reconstruction of the domestic aerospace industry through maximized participation of national firms in the production process. While the prospect of manufacturing more advanced platforms on Polish soil should not be discounted—particularly over the longer term—a more immediate opportunity exists for the Polish aviation sector to acquire critical know-how by producing a simpler, lower-cost aircraft dedicated to close air-support for the Land Forces.

Unlike the F-15EX and Eurofighter Typhoon—platforms not currently in Polish service—Poland already operates a European-designed aircraft ideally suited to this mission: the M-346. Today, the M-346 forms the cornerstone of Poland's advanced pilot-training system, preparing aviators for subsequent transition to multirole fighters such as the F-16 and F-35. The latest combat variant (M-346F Block 20), with its airframe and engines optimized for subsonic flight, offers operating costs up to 80 percent lower than those of complex multirole jets.

In the case of air superiority aircraft, the F-15EX and Eurofighter Typhoon are of particular interest, as their capabilities would significantly strengthen Poland's air defense system by addressing gaps in multirole aircraft capabilities.

Assuming an order of at least 128 M-346F aircraft—comparable in scale to the Su-22 acquisitions made by the former Polish People's Republic in the 1980s—a logical next step would be to negotiate full-scale production (rather than mere final-assembly lines) in Poland. Such an arrangement would enable a gradual expansion of domestic capabilities and lay the foundation for the long-term revitalization of Poland's aerospace industry.

A virtually identical collaborative framework has been employed historically by both the South Korean and Brazilian aerospace industries. In Brazil's instance, participation in the AMX program—undertaken in partnership with the Italian aerospace sector—facilitated a substantial expansion of domestic industrial competencies. Consequently, Brazil's aerospace industry has emerged as one of the world's leading manufacturers of commercial airliners and now possesses the capability to produce advanced multirole c ombat aircraft, exemplified by the F-39E/F.

Although it is unrealistic to expect that Poland will be capable of independently producing combat aircraft in the near future, it is imperative that domestic entities be engaged as extensively as possible in licensed production or alternative partnership arrangements with foreign technology providers. Considering both the operational needs of the Polish Air Force and the strategic development goals of the national aerospace sector, initiating local production of the M-346F aircraft emerges as a strategic necessity.

At this stage, it is not feasible to definitively identify the specific components that could or should be manufactured in Poland. Nevertheless, this does not negate the importance of ensuring that Polish stakeholders pursue the broadest possible industrial participation. This approach should aim to involve not only aerospace companies but also enterprises from other high-tech industries, such as electronics and chemical engineering. It must also be acknowledged that this endeavor would constitute a long-term, phased process,

In the case of procuring at least 128 aircraft in the M-346F variant, a logical step would be to negotiate the production of these aircraft within Poland.

Source: www.eurofighter.com

A good example of international cooperation in Europe is the Eurofighter Typhoon aircraft, which has facilitated the creation of several industrial clusters in Spain, Germany, the United Kingdom, and Italy.

requiring the establishment of adequate production infrastructure within Poland, as well as comprehensive workforce training and the acquisition of critical know-how necessary to manage such a complex program.

The technologies and competencies gained through the domestic manufacturing of combat aircraft for the Polish Air Force would serve as a catalyst for further industrial advancement. In the long run, they could enhance Poland's capacity to generate innovation and support production for other international partners, particularly within the civil aviation market.

For the above reasons, the production of relatively simple combat aircraft should be viewed as the culmination of the initial phase in the restoration of Poland's domestic industrial capabilities in the aerospace sector. This foundational step would allow Poland, in subsequent stages, to participate on equal footing in the design and production of more advanced aircraft in collaboration with other countries that currently have more mature aerospace industries.

The commencement of M-346F aircraft production appears to be an absolute necessity.

A notable example of such international cooperation in Europe is the previously mentioned Eurofighter Typhoon program. This initiative led to the creation of more than a dozen aerospace industry clusters across Spain, Germany, the United Kingdom, and Italy. These clusters include over 400 aerospace firms involved in the program, spanning from the research and development (R&D) phase through to manufacturing and maintenance, repair, and overhaul (MRO). Furthermore, Eurofighter production supports nearly 100,000 jobs, particularly for engineers and other highly skilled professionals. Between 2024 and 2033, the Eurofighter Typhoon program is projected to generate up to €90 billion in GDP and a total of €22 billion in tax revenues for the budgets of the four partner countries. These figures may yet increase, given the recent surge in demand for European defense products.

Approximately 50 percent of the funds allocated for the technical modernization of the Polish Armed Forces should be directed to Polish enterprises.

The aerospace industry offers considerable potential for synergy between military and civilian production. Funds allocated for research and development (R&D) - for example, those aimed at advancing a specific military system can, over the long term, be seen as strategic investments in production capabilities applicable to the civilian market, and vice versa.

As stated by Deputy Prime Minister Władysław Kosiniak-Kamysz, approximately 50 percent of the funds designated for the technical modernization of the Polish Armed Forces should ideally be directed toward domestic enterprises. Unfortunately, this target is currently difficult to achieve, as the Polish defense industry still possesses highly limited production capabilities, particularly in technologically advanced segments, which also tend to be the most capital-intensive to develop. This is especially evident in the domain of combat aircraft and their associated armaments, for which Poland has allocated billions of dollars in recent years. These funds have primarily supported foreign defense industries, rather than contributing to the development of domestic industrial and technological capacity.

The strategic solutions proposed in this report aim to reverse this trend by charting a new course for Poland's industrial development, one that will gradually increase national self-reliance, particularly in the area of defense production for the Polish Armed Forces.

Source: www.eurofighter.com

RECOMMENDATIONS:

1

Force Structure

To ensure effective national defense in the event of a full-scale war with the Russian Federation, Poland should aim to acquire no fewer than four air superiority squadrons (64 aircraft) specialized in achieving air superiority, alongside an additional 8–10 squadrons (128–160 aircraft) of light support aircraft. This approach would significantly strengthen the operational capacity of the Polish Air Force and facilitate the development of a more comprehensive and layered defense architecture. In the context of sound public spending, supply chain security, and full sovereignty over military assets, the selection of aircraft must take into account several critical factors. These include lifecycle operating costs, proximity and resilience of supply chains, interoperability with NATO systems, and cultural and strategic affinity between the supplier nation and Poland. Prioritizing these criteria will not only ensure long-term sustainability of operations but also enhance Poland's defense autonomy within the broader framework of the Alliance.

2

Close Air Support

The acquisition of a substantial number of light close air support aircraft capable of conducting sustained high-intensity combat operations across extended frontlines is essential for the effective support of Land Forces. At present, the only platform that meets the requirement for low-cost delivery of precision-guided munitions to the battlefield is the M-346F. It stands out as the sole aircraft that can be procured in sufficiently large numbers while also offering the possibility of domestic production in Poland.

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3

Economic Integration

Ongoing and planned procurements of armaments and military equipment - particularly the high-cost programs for combat aircraft acquisition - should bolster the Polish economy by ensuring the participation of domestic firms in both the production and the full lifecycle sustainment of these systems. In this context, collaboration with foreign partners capable fostering industrial and technological competences in Poland – especially for the most advanced weapons systems – is indispensable. International experience clearly demonstrates that the development of high-technology industries is a multi-decadal endeavor. The scale of Poland's defense expenditures and the scope of its current programs present a unique opportunity for the country to join the select group of nations capable of designing and manufacturing the most sophisticated aerospace solutions.

4

R&D Investment

A strategic delineation of the Polish aerospace sector's priority capability and competency requirements must be accompanied by a concerted increase in public R&D investment. Poland's current R&D expenditure, just 1.56 percent of GDP in 2023 lags behind the EU average of 2.22 percent and represents a significant constraint on industry growth and innovation. By contrast leading R&D investors such as Sweden, Belgium, Austria and Germany allocate between 3.1 and 3.6 percent of GDP to research and development. In the short term, any additional R&D funding should be directed first and foremost toward technologies integral to Poland's newly inducted defense systems. Given the capabilities of domestic

enterprises, these resources, could or instance support the development of tactical and operational level unmanned aerial systems – now essential for the expansion and technical modernization of missile and artillery formations. Equally critical investments in satellite reconnaissance platforms and in the establishment of robust MRO (Maintenance, Repair and Overhaul) capacities. Such targeted R&D initiatives will not only enhance Poland's immediate defense posture but also lay the groundwork for sustained technological autonomy and industrial competitiveness in the long term.

5

Industrial Orders

Orders places with the domestic aerospace and space industry should likewise serve to reinforce Poland's aviation sector by providing a clear business impulse for further expansion. Procuring proven solutions, whose utility for the Polish Armed Forces is beyond dispute, catalyzing the development of indigenous capabilities in the mass production of defense systems.

6

Strategic Partnerships

A rapid expansion of Poland's aerospace capabilities is currently achievable primarily through collaboration with a foreign partner in the production of relatively less advanced aircraft. The M-346 platform represents the optimal solution in this context, as it already constitutes the core of the advanced training system

within the Polish Air Force and could potentially serve as a cost-effective complement to multirole combat aircraft. Participation in the production of the M-346, particularly the M-346F variant not only would enable the Polish Air Force to field a sufficient number of platforms for close air support of Land Forces but could also form the basis for restoring the industrial potential of the domestic aviation sector, especially if selected M-346 components were manufactured in Poland.

7

Long-Term Strategy

The production of combat aircraft in Poland represents a strategic opportunity to modernize the national economy and increase the share of high-tech industries in both exports and GDP. Technology transfer and related know-how associated with combat aircraft programs should primarily aim to establish a robust domestic industrial base in the aerospace sector. This in turn, would strengthen the overall innovativeness of the Polish economy and enable domestic companies to participate in the manufacturing of high value-added products, particularly as part of the European aerospace supply chains.

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