SAHA EXPO
25-28 OCTOBER 2022
ISTANBUL TÜRKİYE

A Message from Prof. İsmail DEMİR
President of Defence Industrry Agency

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TUESDAY
25 October 2022

SAHA EXPO 2022

Prepping to Prove Itself as a Global Brand

All planning and preparation for the exhibition have already been made in line with this objective. The exhibition will host world-renowned companies such as ASELSAN, BAYKAR, BMC, FNSS, HAVELSAN, OTOKAR, ROKETSAN, STM, TAIS, TUSAŞ (TAI & TEI), Airbus, BAE Systems, Barzan Holdings, Dassault Systemes, FED JSC, Ivchenko-Progress, Leonardo UK, Motor Sich, Rolls-Royce, and THALES. SAHA EXPO 2022 will bring together the latest projects and products of domestic companies, which are the pioneers and cornerstones of the aerospace industry, with the professionals of the sector for the first time. This will be an exhibition where SAHA EXPO will prove its competence.

SAHA EXPO 2022 International Defense and Aerospace Exhibition to be held on October 25-28, 2022, by SAHA Istanbul, the largest Defense, Aerospace, and Space Cluster in Türkiye and Europe with 816 member companies and 23 universities, with the participation and support of the Ministry of Foreign Affairs, the Ministry of Interior, the Ministry of National Defense, the Ministry of Industry and Technology, the Ministry of Trade and the Defense Industry Agency, under the auspices of the Presidency of the Republic of Türkiye, will host industry professionals from different countries around the world. The event will be a platform where leading platform manufacturers, suppliers, as well as companies that want to take part as suppliers in the defense, aviation, maritime and space industries will come together. Page: 5-11

A Message from Hulusi AKAR Minister of National Defense

Hulusi AKAR: "I would like to congratulate and thank everyone who helped make the SAHA EXPO 2022 event, which I am happy to see has grown into one of the development indicators of the domestic and national defense industry." Page: 6


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Due to several social, economic, political, military, technological, and environmental factors, the world and our region are going through a critical period, and the balance of power, players and roles are constantly changing.

From securing borders to safeguarding cyberspace, countries are increasing their defense investments and establishing multi-faceted relations in the international arena.

With the advances it has made in defense and security as well as the multifaceted relationships it has built with other countries, Türkiye has emerged as a focal point in the international arena under the leadership of our President. Our sphere of influence now spans three continents, and our area of interest now encompasses the entire world. Accordingly, the risks and threats against our country have also increased.

In such an environment, Türkiye has become a stabilizing and reassuring country in its region and across various geographies, by closely monitoring developments and responding proactively in the face of these developments by acting with real-political data.

One of the most critical requirements for our country to maintain this strong position is to have a domestic and national defense industry.

This is crucial not only for us but also for the security of our brothers and allies.

Therefore, we are working hard to expand our domestic and national defense industry, and we are getting tangible results of our initiatives. We have demonstrated to the entire world that we can accomplish our goals and be successful with only our own resources.

While in the past, we used to supply even our infantry rifles from abroad, we have now reached the level of designing, building, manufacturing, and exporting our National Infantry Rifles, Smart Precision Munitions, Multi-Barrel Rocket Launchers, Fırtına Howitzers, UAV/UCAVs, ATAK Helicopters, Frigates and Warships.

The world's attention is drawn to the operational accomplishments of our weapon systems, which are produced in accordance with NATO standards, and the demand for our domestic and national defense industry products is increasing day by day.

We are continuing our efforts also to improve our capabilities and the capacity of trained personnel by using domestic and national technologies in "cyber security, internet of things, digital transformation, big data analysis, and artificial intelligence" domains, which are the defense technologies of the future.

Our goal is to raise the local content rate, which has already reached 80% thanks to the leadership, encouragement, and backing of our President, to higher levels.

I sincerely believe that we will achieve these goals in a much shorter time by working collectively with public institutions and organizations, foundation companies, the private sector, academies, and exporters, with determination, sincerity, dialogue, coordination, and with high motivation.

SAHA EXPO and similar organizations significantly contributes to achieving these objectives.

I would like to congratulate and thank everyone who helped make the SAHA EXPO 2022 event, which I am happy to see has grown into one of the development indicators of the domestic and national defense industry.

Hulusi AKAR

Minister of National Defense

PRESIDENCY OF
THE REPUBLIC OF TÜRKİYE
DEFENCE INDUSTRY AGENCY

In line with our domestic and national defense industry targets, we all keep on working in collaboration with all ecosystem players under the coordination of the Presidency of Defense Industry Agency.

We are aware that working together is necessary to achieve a fully independent defense industry. From design to production, we must collaborate as stakeholders who compensate for each other's deficiencies in the interests of our country, which is our common objective.

Clusters play an important role in these efforts. They are the organizations created to meet the design, production and engineering needs of procurement authorities and main contractors domestically. Clusters serve as the point of contact between the procurement authorities and main contractors, and significantly contribute to national and domestic production by enhancing communication and collaboration amongst all stakeholders.

SAHA Istanbul Defense, Aerospace and Space Cluster, the largest industrial cluster in Europe, which was founded with the goals of bringing the production capabilities that are not available in our country, ensuring that our universities and industry work in tandem, and providing collective support to the search for foreign markets, provides great added value to our defense industry.

We consider the SAHA EXPO, which will be organized by SAHA Istanbul, as an important event for the gathering of suppliers, major platform manufacturers producing for defense, maritime, aviation and space industries, as well as businesses looking to take part in these industries as suppliers.

I believe SAHA EXPO succeeded in becoming an international platform showcasing the expansion in Türkiye's domestic manufacturing competence and independent production power and will lay the groundwork for significant national and international collaborations.

I hope that SAHA EXPO will be beneficial to our industry and our country.

Prof. İsmail DEMİR
President of Defense Industry Agency

“WE ARE STRONGER TOGETHER”

Established 7 years ago to ensure the involvement and integration of private sector dynamism in the defense industry in Türkiye, SAHA Istanbul has progressively expanded to become the largest industrial cluster in both Türkiye and Europe. Our cluster, which aims to spark collaboration between the public and private sectors, as well as academia, continues to strive towards its goals of fostering cooperation in the defense industry, financial efficiency, sustainability, synergy, export, and training. This year, we will organize our SAHA EXPO exhibition, which is the most significant added value in supporting exports and domestic production, both physically and in the metaverse as a first in the world.

As you know, we held our first exhibition in 2018, bringing together main contractors and subcontractors in the defense sector. SAHA EXPO has evolved into a mutual platform, especially for our industry, hosting procurement delegations from Türkiye and abroad, representatives of main contractor companies, official visits, and panels.

We held our exhibition, which was scheduled to take place in 2020 and could not be held physically due to the COVID-19 outbreak, as the world's first 3D virtual fair in the same year. More than 115 thousand people visited our virtual exhibition, which attracted great interest from all over the world, and more than 32 thousand B2B meetings took place. Following SAHA EXPO 2021, which we held with the participation of 481 companies and 597 delegations from 36 countries in 4 halls on November 10-13, our exhibition continued virtually from November 15, 2021, to February 15, 2022. As a result, the world's first 3D hybrid exhibition in the defense and aerospace industry was held.

SAHA EXPO 2022 is being conducted as a state program under the auspices of the Presidency of the Republic of Türkiye, with the support of the Ministry of Foreign Affairs, Ministry of Interior, Ministry of National Defense, Ministry of Industry and Technology, Ministry of Trade, and Presidency of Defense Industries. This year, SAHA EXPO Fuarcılık Hizmetleri A.Ş. will organize our exhibition on October 25-28, 2022, at the Istanbul Expo Center in Yeşilköy, Istanbul. With the participation of nearly 1,000 domestic and foreign companies in a total of 6 halls, 143 official delegations, including 1 prime minister, 9 ministers, chiefs of staff and force commanders from 70 countries, and 119 trade delegations, we expect SAHA EXPO to garner considerable international attention. SAHA EXPO will enable exhibitors to connect with existing and potential business partners, key domestic and foreign industry professionals and suppliers. Following the end of the physical exhibition, the world's first Metaverse Defense Industry Exhibition SAHA EXPO will launch online on November 1, 2022 and will be open to exhibitors and visitors until February 1, 2023.

You will witness fruitful cooperation at SAHA EXPO, where you can also discover how our country's defense industry's capabilities have grown over the past 15 years thanks to the involvement of our private sector industrialists. Numerous systems and subsystems will be showcased for the first time at our exhibition. SAHA EXPO 2022, where participants meet with national and international main contractor companies, will be a fair where significant partnerships will begin, connections will be established, and a genuinely profound and comprehensive move in defense will be made.

At SAHA EXPO 2022, Türkiye will demonstrate its domestic production power, and new national products, systems, and technologies will be unveiled. Companies performing activities in the field of designing, developing, and manufacturing subsystems and components of the most modern platforms to be used in the operations across defense, maritime, aviation and aerospace industries will exhibit their products.

With the will embodied in the National Technology Move, our country is minimizing its foreign dependency and becoming a country that establishes norms with the technologies it develops in the world history of warfare. In the first nine months of this year, Türkiye's exports in the defense and aerospace Industry totaled 2 billion 636 million dollars with an increase of 42.2 percent compared

to the same period of the previous year. The local content rate in the Turkish defense industry was between 15 and 20 percent 15 years ago, while today it has reached 80 percent. In the last decade, exports have grown by 10 percent each year in US dollar terms. This export trend will continue to gain momentum in the upcoming period.

Our country has become a game changer in the operations area with the cutting-edge technologies it has developed. In Northern Iraq and Syria, where we are fighting against threats to our borders, as well as in regions such as Azerbaijan, Libya, and Ukraine, we are achieving outstanding success with the contribution of our technology. Just as our security forces who are on duty day and night in the field, we strive to support them by working hard at our factories, R&D centers, and universities.

We believe that it is very important to carry on the indigenization movement as a mobilization, particularly in the fields of defense and aerospace, which are crucial to homeland security. Numerous initiatives that will support Türkiye's National Technology Move continue to be developed. As our local content rate reaches 80%, we are working hand in hand by expanding this throughout our industrial base.

While the number of countries we export to in the defense and aerospace industry is increasing, the number of Turkish-made products with high added value in the market continues to grow steadily. The resolute steps we take, the investments we make in advanced technologies and defense industry, and the efforts we exert to train and develop the workforce we require are the guarantee of our future. We are all aware that when we are united, our strength will be greater than that of those who stand in our way. Türkiye now has the capacity to develop and produce advanced technologies, is independent in the defense industry, and has a stronger voice in the world.

SAHA EXPO 2022 will be the strongest platform where we will successfully implement SAHA Istanbul's motto "We are stronger together" with our industrialists. We will keep adding new chapters to the success stories in aviation, defense, and space technologies. As SAHA Istanbul, we will continue our efforts for Türkiye both domestically and internationally with our new projects and solid collaborations at full steam also during SAHA EXPO 2022.

Haluk BAYRAKTAR

The Chairman of the Board at SAHA İstanbul

Indigenization in Full Steam Ahead

With the largest booth space and the broadest selection of products, ASELSAN is taking part in SAHA EXPO 2022, which is organized by SAHA Istanbul under the auspices of the Presidency of the Republic of Türkiye.

In addition to specific events for its strategic partners, ASELSAN conducts indigenization activities during the expo to encourage the growth of domestic production potential and independent production power. ASELSAN, the largest defense technology business in Turkey, hosts guests on more than an acre of space, including the showground at SAHA EXPO

ASELSAN Chairman and CEO Prof. Haluk GÖRGÜN stated that they are delighted to have been one of the major sponsors of SAHA EXPO since the first day, and said:

"Our company has been operating on the premise that indigenization is not a choice but rather a requirement in the geopolitical climate we are in as a country, in keeping with the vision of the Indigenization Move in the Defense Industry put forward by our President in 2004. Since ASELSAN's founding, we have expedited indigenization activities inside its own ecosystem and elevated them to the level of a mobilization.

One of the most significant platforms for these efforts is the SAHA EXPO Defense and Aerospace Exhibition, which is hosted by SAHA Istanbul, the largest industrial cluster in Turkey and Europe with 816 businesses and 22 academies. The expo, which has worldwide participation, features numerous products that have been introduced to our country as part of indigenization, in addition to our high-tech systems. Products that have recently completed the process of indigenization take place among these products.

Indigenized Products Strengthens the Industry

We display a wide variety of products, including power amplifier modules -the first of their kind in the world- anti-jamming GNSS receivers, high-frequency (RF) circuit components, gyroscopes containing important technologies, inertial measurement units, sensors, fiber optic products that have been successfully produced domestically, and sonar system components. These products have started to be employed in many systems exhibited by ASELSAN and other defense industry companies, giving great strength to the industry at the national level.

SAHA EXPO reveals the growth in domestic production potential as well as its independent production capacity. We are delighted to take part in this event, which is on its way to becoming a global brand, with the innovative approaches it brings to exhibitions and fairs."

The Biggest of SAHA EXPO

ASELSAN displays a broad spectrum of products from unmanned systems to satellite systems, from naval systems to electro-optical systems, as well as products indigenized with its domestic strategic partners. ASELSAN, which exports its products to 80 countries, including Azerbaijan, Kazakhstan, Pakistan, and Jordan, through a mix of technology transfer and co-production activities in addition to direct sales, introduces its products and systems as well as its activities on supply chain management to visitors.

Prof. Haluk GÖRGÜN - ASELSAN Chairman & CEO

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TURKISH AEROSPACE

Polish MoD Following Work Strands to **Fully Introduce the TB2 into Service**

SAHA EXPO Daily caught up with Sławomir CICHOCKI, Director of Armament Policy Department at the Ministry of National Defense of Poland during SAHA EXPO 2022 to discuss the impact of the Russia-Ukraine War on Polish armament efforts, and the areas that are defined for the further cooperation between Poland and Türkiye. We also took the opportunity to ask him about the delivery schedule and technical features/payloads of Polish BAYRAKTAR TB2 UCAVs.

SAHA EXPO Daily: Can you elaborate on how the Russia-Ukraine War has impacted Polish armament efforts, what kind of policies and efforts have been realized to back the local defense industry and could you talk about the share of the local defense industry now in the ongoing armament/modernization programs?

Sławomir CICHOCKI: Russia's brutal and unprovoked invasion of Ukraine has irreversibly changed the security environment of Europe, and more precisely the eastern flank of NATO, triggering long-lasting military and economic repercussions especially in the defense industry.

Poland has been supporting Ukraine in all activities aimed at defending its independence and territorial integrity, particularly in the military domain, providing large amounts of military equipment, ammunition, spare parts and necessary training. The transfer of all these items, both from military units and ongoing/planned production for the Polish Armed Forces, causes significant shortages in the current stocks, and consequently capability gaps in the Army.

In this context, enhancement of industrial capacities to increase production output seems to be of key importance. We have implemented a number of solutions that will hopefully bring concrete results relatively soon. We plan to significantly boost our industrial production capacities owing to investments and international cooperation.

The most effective way to strengthen the industrial base is by common procurement among allies, multi-year agreements and international industrial cooperation, which impose long term effects on both quality and quantity in terms of production capacity and output.

SAHA EXPO Daily: Poland has a plan to allocate a sum of around 520 billion Zloty, which equates to approx. US$140 billion, for the procurement of new armament and equipment. Can you elaborate on the projects that Poland has recently launched, especially after Russia's attack on Ukraine, for the modernization of military equipment? Can you list Poland's most important procurement programs and the envisaged time frame of realization?

Sławomir CICHOCKI: In Poland, for the last few years the Armed Forces have been undergoing a comprehensive technical modernization, which – in light of the dramatic deterioration of the security situation in our region – is being significantly intensified and accelerated.

The new Homeland Defense Act, aside from increasing national defense spending from the current 2.3% GDP to at least 3% from 2023 and doubling the size of the Polish Army over the next decade, obligated the Government to establish the Armed Forces Enhancement Package for the years 2023-2025, which we have already started to implement. According to this document, as well as previously signed agreements, we would like to acquire new military capabilities such as: combat aircraft, armored and mechanized systems, air defense, artillery and rockets systems, frigates and many others.

SAHA EXPO Daily: Can you elaborate on any areas that have been defined for further cooperation between Poland and Türkiye? What can you tell us about Poland's approach to Türkiye in terms of defense industrial cooperation?

Sławomir CICHOCKI: We are open to all types of collaboration, should it accelerate the replenishment process, lower the costs and be beneficial for the defense industries of our countries.

Last year, the agreement between the Government of the Republic of Poland and the Government of the Republic of Türkiye on Mutual Protection of Classified Information in the Defense Industry was signed on 24th May 2021 and it has been an important step forward to smooth our cooperation. As potential fields of armaments cooperation we can indicate UAVs systems, artillery and rockets systems, electronic warfare systems and procurement of different caliber ammunition.

SAHA EXPO Daily: Poland purchased 4 BAYRAKTAR TB2 Armed Unmanned Combat Air Vehicle (UCAV) Systems (each contains 6 air vehicles and Ground Control Station as well as other related ground segment equipment) from BAYKAR Defense of Türkiye under a contract inked on May 24, 2021, in Ankara, Türkiye. Can you elaborate on the delivery schedule and technical features/payloads of Polish BAYRAKTAR TB2 UCAVs?

Sławomir CICHOCKI: Our approach to the TB2 is very similar to any other procurement for the Polish Armed Forces. As you know, in addition to the air platforms and land-based parts of the system, the contract signed last year covers logistics and training packages as well. To fully introduce the TB2 in service there are a few work strands that we are following right now, ranging from infrastructure preparation to house the new equipment system in our units, through operator training up/process to establishing the capacity for service and repair parts of the system. Obviously, each aspect has a different pace.

What we see as crucial is comprehensive support from BAYKAR Defense. Our expectation is to have the BAYRAKTARs deeply integrated into our sensor/effector network, which calls for adjustments of necessary Command and Control, Navigation and Identification subsystems. In this scope our Turkish friends from Istanbul provided us with full sustenance and excellent responsiveness.

As far as deliveries are concerned, I have been informed that preparations of the first batch for shipment by the manufacturer are on schedule and we will be able to receive it in Poland very soon. The last delivery is to be concluded in 2024.

SAHA EXPO Daily: Can you tell us about Poland's participation at SAHA EXPO 2022, and what would be your message to the visitors/participants? What is your opinion of the SAHA EXPO 2022 Exhibition?

Sławomir CICHOCKI: Türkiye is not only a strong NATO member but also a country with a well-developed and modern defense industry. Participation in SAHA EXPO enables dialogue with representatives of the Turkish Government in the field of military as well as the industrial and technical domain. Equally important is the opportunity to get acquainted with the offer of various enterprises of the Turkish Defense Industry, offering modern, technologically advanced and combat proven equipment and systems. The solutions presented here are widely used not only in the Turkish Army but also implemented by other countries. I am very pleased to have the opportunity to participate in this wonderful exhibition and I find SAHA to be a perfect platform to exchange views and experiences, as well as to deepen our relations in the military-technical domain and future potential projects.

SAHA EXPO Daily: Thank you for sharing your time with our readers.

Focusing on SMEs, SAHA EXPO is Prepping to **Prove Itself as a Global Brand**

The Defense, Aerospace, and Space Cluster Association (SAHA Istanbul), with 90% of its members being SMEs, organized the SAHA EXPO Exhibition for the first time in 2018 with the goal of bringing together businesses that contribute to or want to contribute to the defense industry as manufacturers or suppliers. As of 2022, the SAHA EXPO Exhibition aims to establish itself as a global brand.

All planning and preparation for the exhibition have already been made in line with this objective. The exhibition will host world-renowned companies such as ASELSAN, BAYKAR, BMC, FNSS, HAVELSAN, OTOKAR, ROKETSAN, STM, TAIS, TUSAŞ (TAI & TEI), Airbus, BAE Systems, Barzan Holdings, Dassault Systemes, FED JSC, Ivchenko-Progress, Leonardo UK, Motor Sich, Rolls-Royce, and THALES. SAHA EXPO 2022 will bring together the latest projects and products of domestic companies, which are the pioneers and cornerstones of the aerospace industry, with the professionals of the sector for the first time. This will be an exhibition where SAHA EXPO will prove its competence.

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30,000 PROFESSIONALS ARE EXPECTED TO BE ATTENDED THE SHOW

SAHA EXPO 2022 will demonstrate the increased domestic production potential and the strength of independent production by bringing together approximately 1,000 businesses from more than 50 countries. Around 10,000 B2B, B2G, and G2G meetings are anticipated to take place during the exhibition, which will be organized by SAHA EXPO Fuarcılık Hizmetleri A.Ş. on October 25–28, 2022, in 6 halls and an area spanning 60,000 square meters at the Istanbul Expo Center in Yeşilköy, Istanbul. 30,000 professional visitors are anticipated to attend the exhibition. People above the age of 18 will be eligible to visit SAHA EXPO 2022, but only on the last day of the show.

SAHA EXPO 2022, which is to be held under the auspices of the Turkish Presidency this year, is supported by 5 Ministries (Ministry of Foreign Affairs, Ministry of Interior, Ministry of National Defense, Ministry of Industry and Technology, and Ministry of Trade) and the Defense Industry Agency. With their own wet signatures, these 5 ministers issued invitation letters to 104 countries. In addition, the Chief of General Staff, Force Commanders, Deputy Ministers, the President of the Defense Industries, and the Chairman

of the Board of SAHA Istanbul also invited their counterparts with wet-signed invitation letters. A total of 227 official delegation invitation letters were sent by 17 civilian and military authorities, while wet-signed invitation letters were sent to 496 authorities from 104 countries. As of October 5, 2022, 57 of these 104 countries have confirmed their intention to attend, and the participation of 1 prime minister, 9 ministers, 143 official delegations, 119 commercial delegations, 350 foreign companies from 57 different countries, 45 domestic and foreign press partners, and 1,000 domestic and foreign companies are expected.

1 PRIME MINISTER, 9 MINISTERS, 143 OFFICIAL DELEGATIONS, 110 COMMERCIAL DELEGATION WILL BE ATTEND SAHA EXPO

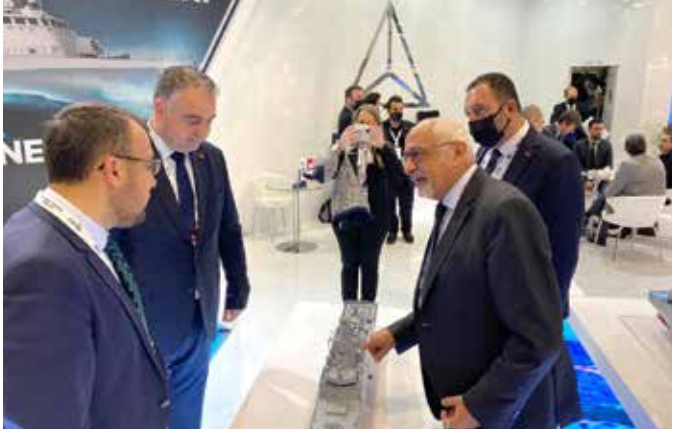
This year's SAHA EXPO 2022, which will be held for the third time, is truly a very young fair. It is as if it is debuting this year.

SAHA Istanbul, the Defense, Aerospace and Space Cluster Association, organized the inaugural SAHA EXPO, a supply chain fair where industrialists networked with one another, on September 13-15, 2018, at Istanbul Expo Center Hall 11 with the participation of 135 companies, including 24 foreign companies from 12 countries. A total of 644 B2B meetings were held during SAHA EXPO 2018, which hosted 13,327 visitors.

SAHA EXPO, which is designed as an international defense industry specialized fair to be organized every two years, was planned to be held in even years, while IDEF, a platform-oriented fair, was planned to be held in odd years. However, SAHA EXPO 2020, which was scheduled to be physically conducted, was postponed to November 10–13, 2021, due to the COVID-19 outbreak. Taking proactive action in a period when business relations shifted to the virtual environment, SAHA Istanbul succeeded in organizing the world's first 3D Defense Industry Exhibition between November 9, 2020, and April 6, 2021.

Unlike platform-oriented (tank, aircraft, ship, missile, etc.) defense industry exhibitions such as IDEF, Paris Air Show, and Eurosatory, where mostly platform sales are realized, companies set up large booths to exhibit large platforms, and where the focus is more on the show part, SAHA EXPO exhibitions are designed as a specialized fair for the industrialists who produce those platforms. Companies do not need to exhibit such large platforms and various products, so they can open smaller booths. It was determined during research for SAHA Istanbul that there is no other defense industry fair on such a large scale in the world focusing on the specialized areas of the industry, and its subject is SMEs. It was decided that a world brand fair could be held in this concept, and accordingly the related work was initiated for SAHA EXPO 2021 in line with this objective.

Organized as the world's first hybrid defense industry exhibition with the participation and support of the Defense Industry Agency (SSB), the Ministry of National Defense (MoND), and the Ministry of Interior, SAHA EXPO 2021 Defense, Aerospace and Space Industry Exhibition was held physically in four separate halls (Halls 2, 5, 6 and 7) spread over a total area of 40,000 sqm at the Istanbul Expo Center on November 10-13, 2021. SAHA EXPO 2021, which was held as a hybrid event until November 13, turned into a



virtual fair (online) on November 15 and continued until February 15, 2022. A total of 608 companies, including 203 foreign companies from 36 countries, participated in the SAHA EXPO 2021 physical exhibition, which was visited by a total of 25,000 people, including 18,000 professional visitors. 481 of such companies opened booths, and 127 of them attended through their representative offices. The SAHA EXPO 2021 physical exhibition hosted a total of 597 military and civilian delegations from 36 countries (308 Turkish delegations, including 38 MoND, 220 Ministry of Interior, and 50 SSB) and a total of 8,483 planned and unplanned B2B meetings, 8 sectoral panels, 31 signing ceremonies, and 74 company products, and project presentations were held. For only four of the 31 contracts signed during the exhibition, the relevant companies disclosed the financial details, and the total worth of these four contracts was announced as 123.5 million USD. The SAHA EXPO 2021 3D Virtual Defense Industry Fair was attended by 456 companies and had more than 16,000 visitors, with more than 750 B2B and B2G meetings held during the fair, and featured a total of 409 products, 185 of which were 3D and 224 2D.

SAHA EXPO 2021 was designed as a defense industry specialized fair where SMEs operating in the defense industry and participating companies with SME status could discuss business development processes with each other and where trade was at the forefront. The event was held with this new concept and was also appreciated by the companies participating in the fair. 86% of the participating companies were fully satisfied with the fair, scoring 5 out of 5 on the satisfaction survey conducted. As a result, SAHA EXPO Fuarcılık A.Ş., the organizer company established within SAHA Istanbul to carry out exhibition activities, decided to continue with the same concept for SAHA EXPO 2022, exerting efforts to create a global brand.

Türkiye was only a market previously. Foreign companies used to attend the defense industry fairs in Türkiye to promote their products. In recent years, Türkiye has become a country that can develop and produce technology quickly and effectively and sell it cost-effectively. Thanks to the advancements in the defense industry with the contribution of the companies in the sector within SAHA Istanbul, Türkiye has transformed from a market where products are sold to a partner with whom collaboration is made. As a result, SAHA Istanbul wants SAHA EXPO to be a fair where visitors from abroad can interact with a variety of countries and delegations rather than a fair where they can market their products. Given that Türkiye has a very high potential for collaboration, foreign businesses who are taking part in SAHA EXPO will not be coming to Türkiye to promote products but rather to find out what type of cooperation can be developed with Türkiye as part of the international competition. Developing countries particularly value Türkiye's rapid and results-driven state policy for exports in recent years, which includes co-production, technology transfer, manufacturing in neighboring countries, the establishment of production facilities in the client country, etc. As a result, participation from these countries at SAHA EXPO, which was held for the third time this year, has steadily increased.

STM Demonstrates Innovative & National Solutions at SAHA EXPO

We present an exclusive interview with Özgür GÜLERYÜZ, General Manager of STM about their participation in the SAHA EXPO International Defense and Aerospace Exhibition with a sizeable booth, their expectations from the exhibition, and the most recent developments in ongoing projects in the fields of military naval platforms and tactical mini-UAV systems.

SAHA EXPO DAILY: What can you say about STM's performance in the first 10 months of 2022 and the expectations and targets for 2023?

Özgür GÜLERYÜZ: STM is a company dedicated to homeland defense. For more than 30 years, we have been strengthening the Turkish Defense Industry. As STM, we have been more concentrated in the field of military maritime since we started to take part in MILGEM, our national corvettes, the pride project of our country. It has become one of STM's most fundamental behaviors, to take steps especially in areas for our army requirements and those that involve sophisticated engineering. With the tasks given, this strategy not only helped STM become an agile engineering company, but also opened the door for the diversification of its area of expertise. With our current capabilities, STM primarily operates in the fields of military surface and underwater platforms, tactical mini-UAV systems, cyber security and information systems, we also produce solutions in many areas such as satellite technologies, command and control, RF-simulation technologies and consultancy.

We made great progress in the first 10 months of 2022 in every aspect of engineering area. We signed several contracts for military naval platforms, particularly in Türkiye, and we also used our innovative technology to produce tactical small UAVs, which we pioneered, to serve our army.

We will keep working on our domestic and international projects till 2023, when we will commemorate the 100th anniversary of our Republic. We will continue our efforts in accordance with our country's export targets for 2023, and we believe it is our responsibility to provide our security forces with cutting-edge domestic technology. We intend to generate 50% of our revenue from exports in 2023.

SAHA EXPO DAILY: What can you tell us about the most recent developments and deliveries in STM's activities for Fixed and Rotary Wing, Loitering Munitions and Unmanned Systems for Reconnaissance and Surveillance?

Özgür GÜLERYÜZ: We are one of Türkiye's leading companies in the production of tactical mini-UAVs. KARGU, Türkiye's first attack mini-UAV developed in this field, has been used effectively by our security forces for nearly five years. We have exported KARGU, which has proven itself successfully in different geographical conditions, on two different continents so far.

I can confirm that several countries are quite interested in KARGU, and our negotiations are still underway.

In the first 10 months of this year, we completed new deliveries of KARGU to our security forces. We also made the first deliveries of TOGAN, our rotary-wing national spotter UAV, and BOYGA, our ammunition-dropping UAV, this year.

Designed for use in tactical level reconnaissance, surveillance, and intelligence missions, TOGAN will detect the invisible and track the untraceable with its features. TOGAN, which has effective day and nighttime operation and physical target tracking capabilities, can also conduct joint operations with STM's other UAVs. TOGAN has an indigenous flight control system and mission planning software and can autonomously switch missions in-flight. TOGAN offers operators uninterrupted and long-term surveillance capability. A single TOGAN platform can operate for 45 minutes at a range of 10 kilometers.

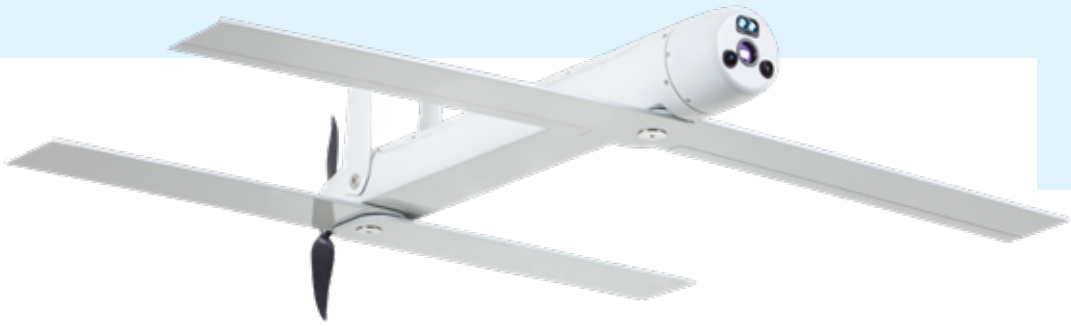
TOGAN Multi-Rotor UAS

BOYGA, the latest member of STM's Tactical Mini UAV product family, drops its customized 81mm mortar ammunition on the target with pinpoint accuracy thanks to its improved ballistic trajectory prediction algorithm. BOYGA, which can be used effectively in counterterrorism and asymmetric warfare environments, has an endurance of 30 minutes with mortar ammunition. A single soldier can carry the 15-kilogram BOYGA platform, which has a range of 5 kilometers and an altitude of 1,500 meters.

Another member of our Tactical Mini UAV family, the fixed-wing loitering munition system ALPAGU, will be available to our security forces before the end of 2022. With its lightness and efficiency, ALPAGU, Türkiye's first fixed wing loitering munition system, will support our troops in theater. We are exerting utmost efforts to launch and integrate ALPAGU from land, naval, and air vehicles. Thanks to the experience and knowhow we have gained from the development of ALPAGU, we also have plans for an ALPAGU version with a longer range and the ability to carry more explosives.

In addition, we are continuing our activities for different payload versions of KARGU. KARGU was initially developed with an anti-personnel warhead, but it will also be quite effective when utilized as a drone, especially against light armored vehicles. The work pertaining to ammunition has been finalized and related tests are currently being conducted on the final ammunition. We will soon be able to use armored ammunition in KARGU. In this regard, our work on the integration of an RF Seeker and armor-piercing ammunition into the platform continues.

KARGU- Rotary Wing Loitering Munition System



ALPAGU Loitering Munition

SAHA EXPO DAILY: Can you enlighten our readers about the latest status of the naval projects currently being carried out by STM, which made a significant expansion into the maritime sector with the MİLGEM Project in 2006? In this context, what is the latest status of the Type 214TN REİS Class Submarine, "PREVEZE" Class Submarine Mid-Life Upgrade (MLU), TCG İstanbul (MİLGEM-5), Turkish Type Fast Patrol Boat, Logistic Support Ship, Ukrainian Navy's MİLGEM Corvette Project, and Khalid Class Agosta 90B Submarine Mid-Life Modernization Projects?

Özgür GÜLERYÜZ: We are a well-known business in our industry, especially in the design, modernization, and construction of military naval vehicles. As STM, we produce tailor-made, indigenous, and adaptive engineering solutions within the scope of design, construction, and modernization activities for more successful missions of the surface and submarine platforms of our country, which is a NATO member and one of the most effective navies in the world, as well as for navies of friendly and allied countries. On the path we set out on for the protection of our homeland, we are now transferring our NATO-standard engineering expertise and technologies to friendly and brotherly countries.

In the field of military naval platforms, we delivered the TCG GÜNGÖR DURMUŞ (A-574), the first ship of the Logistics Support Ship Project, to the Turkish Naval Forces in December 2021. We delivered the TCG UFUK, the Test and Training Corvette, another important project of which we are the main contractor, on January 14, 2022, with a ceremony attended by the President of the Republic of Türkiye. With its features, the TCG UFUK will be a crucial deterrent force in our country's struggle in the Blue Homeland. The four PREVEZE Class Submarines in our Navy's arsenal, which are part of the modernization project, are used for crucial operations. We successfully completed the PREVEZE Class Submarine's essential design phase and early delivery activities this year. The modernization process is proceeding according to plan.

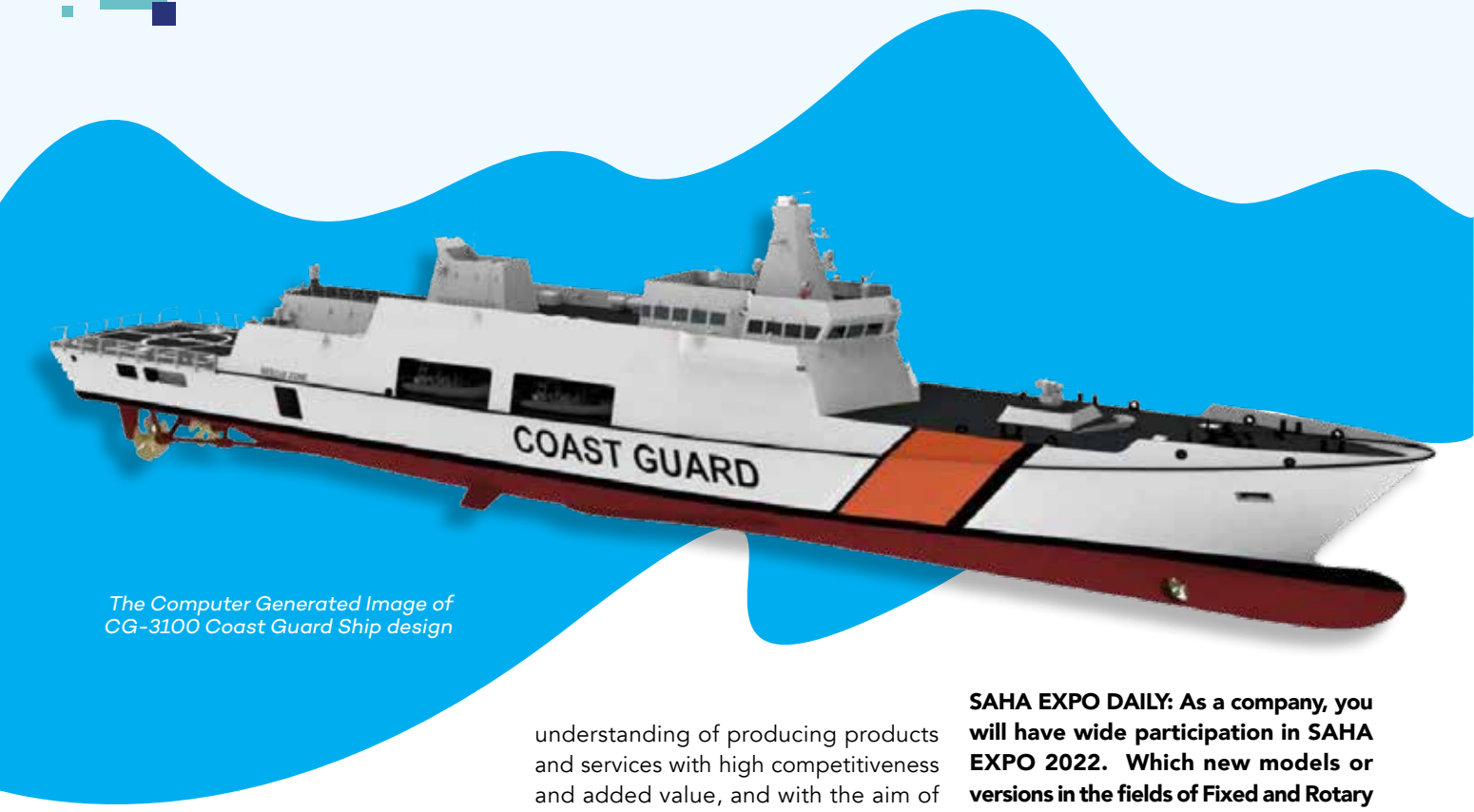
The most significant development this year for us was undoubtedly the start of the construction of our STM500 Mini- Submarine. The STM500 was designed by local resources and engineers with completely national capabilities. We started the production activities of our small-sized STM500 Submarine this year with the production of the durable test hull.

In addition, for the first time in Türkiye, we produced the bow section "Section 50," housing the torpedo tubes, which only a few countries in the world can produce, with indigenous capabilities, under the engineering and coordination of STM. We accomplished new deliveries to Gölcük Shipyard Command in 2022. We have produced not only military naval platforms, but also some sub-systems for the successful operation of these platforms with our innovative and indigenous approach and have put them into the use of our navy.

As the designer and main contractor of Türkiye's first national frigate, the TCG Istanbul (F-515), we will deliver the ship to our navy in 2023 with a local content rate of at least 75%. We will keep working to deliver the Üsteğmen Arif Emekçi, the second ship of the Logistics Support Ship Project, in 2024.

During these developments at home, we also received good news from Pakistan in March 2022. The Agosta 90B Class Submarine PNS/M Hamza, which was modernized by STM for the Pakistan Navy, managed to sink a decommissioned frigate through a torpedo shot with pinpoint accuracy. The effective completion of the submarine's operation in this project—where all systems were completely modernized—demonstrated STM's proficiency in national and international submarine construction and modernization. We are planning to deliver the second and third submarines as part of the modernization of the Agosta 90B submarines in Pakistan in the coming period.

STM 500 Mini Submarine will be displayed first time at SAHA EXPO 2022



The Computer Generated Image of CG-3100 Coast Guard Ship design

We initiated the construction of corvettes for the Ukrainian Navy in 2021, which entails technology transfer within the scope of the cooperation. We launched the first corvette we built on October 2, 2022, with a ceremony held in Istanbul. Following the first steel cutting, the first corvette of the project was launched in 17 months in accordance with the schedule with maximum equipment. In the coming period, we will complete the outfitting activities of the ship in the fastest way possible and deliver it to the Ukrainian Navy.

SAHA EXPO DAILY: How does STM plan to position itself in the Fixed and Rotary Wing, Mini Attack UAV Systems market as well as in the maritime industry in the future?

Özgür GÜLERYÜZ: We will keep providing competitive, reliable, innovative, and sustainable technological solutions in the naval, tactical mini-UAV systems, and cyber security-informatics to meet the needs of our domestic and international customers. One of our main objectives is to achieve export-oriented sustainable growth. Our long-term objective is to rank among the world's top 50 defense industry companies. To realize and sustain these goals is achieved through R&D. We will continue to conduct result-oriented R&D activities with the understanding of producing products and services with high competitiveness and added value, and with the aim of offering technology-intensive indigenous solutions to support the national goals of our country and the business strategies of our company.

SAHA EXPO DAILY: Can you tell us about STM's space-related objectives and the most recent developments in micro and nano-satellite activities such as the LAGARI New Generation Micro Earth Observation Satellite and PIRISAT?

Özgür GÜLERYÜZ: The LAGARI Satellite is the first satellite of a constellation to provide imagery to be used for general mapping, forestry, agricultural, disaster monitoring, near real-time tactical field applications. Satellite production and testing activities are carried out in Germany. The production and launch of the prototype satellite are scheduled for the project's initial stage. At the current stage of the project, testing activities of the camera subsystem, which is the payload of the satellite, are ongoing. Satellite level integration and test activities will be carried out following the test activities.

The PIRISAT satellite is being developed as a satellite that will work in Low Earth Orbit to show that multiple satellite missions can be performed with a nano-satellite platform in 6U cube satellite standards.

SAHA EXPO DAILY: As a company, you will have wide participation in SAHA EXPO 2022. Which new models or versions in the fields of Fixed and Rotary Wing, Mini Attack UAV Systems, and Unmanned Systems for Reconnaissance and Surveillance will be on display at the STM booth? Will you be unveiling any products or capabilities during the exhibition?

Özgür GÜLERYÜZ: At SAHA EXPO, we will showcase models of Türkiye's first national frigate the TCG Istanbul, the Pakistan Navy Fleet Tanker (PNFT), the STM500, our indigenously designed small-sized submarine, and the CG-3100, our Coast Guard Ship design. The STM500 will be exhibited for the first time at a domestic event at SAHA EXPO. Additionally, we will show guests the Tactical Mini UAV product family's KARGU, TOGAN, and ALPAGU models.

SAHA EXPO DAILY: What else would you like to share with us regarding your expectations for SAHA EXPO?

Özgür GÜLERYÜZ: SAHA EXPO, hosted by SAHA Istanbul, Türkiye's and Europe's biggest industrial cluster, is a significant gathering of domestic suppliers and procurement authorities as well as numerous international military delegations. We are excited to exhibit our innovative and national solutions at SAHA EXPO, where cutting-edge technology solutions will be on display. We would also like to generate new collaborations with our suppliers and delegations at the same time.

Leonardo has been a pillar of the Turkish defence industry for more than 30 years; Contributing to Turkey's prosperity, domestic intellectual property and the national defence. Leonardo Turkey offers domestic and export customers a broad range of leading-edge equipment, systems and logistic support services for civil, parapublic and military mission success.

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ACCELERATING TECHNOLOGY EVOLUTION

Airbus is Committed to Further Supporting Opportunities for Turkish Industries Including SMEs

Mr. Simon WARD – Head of Airbus Türkiye evaluated their operations that were carried out by Airbus & local sub-contractors over the years in Türkiye as well as future expectations in this market

Simon WARD underlined the fact that Airbus and Türkiye have a 40-year history of cooperation in civil and military aviation, supporting Türkiye's sustainable growth and contributing to its innovative and competitive aerospace ecosystem. WARD continued: "Türkiye is an integral part of the Airbus supply chain. Today every Airbus commercial aircraft flying have Turkish parts on them. Especially the A220. Türkiye designs and manufactures components such as fixed trailing edges, canopies or harnesses representing 5 percent of an A220 by value. Every A220 order adds to the growth and supports the Turkish aerospace industry and the Turkish economy. Türkiye has also been a partner in the A400M program since day one as one of the partner countries and this has further developed the Aircraft design competencies in Türkiye. Airbus continues to invest in Turkish companies and people and is proud of the success of its partnerships with the Turkish industry, government, and communities. Airbus is the only OEM (Original Equipment Manufacturer) to offer design and build packages which is important to support the development of young engineering talent in Türkiye. Airbus with its partner EFW (Elbe Flugzeugwerke GmbH) is currently looking to further develop its partnership with Türkiye with an A330

P2F passenger to freighter conversion line for around 12 aircraft per year. Türkiye has been an integral part of the Airbus supply chain for more than 20 years, being a partner in main Airbus aircraft programs, from the small single aisle A220 to the latest generation widebody A350. Airbus is committed to long-term mutually beneficial industrial cooperation, through the placement of work packages that are developing the indigenous aviation sector."

"Airbus and its Tier1s also contribute to the growth of several SAHA companies' members"

WARD also touch upon the significance of supply chain operations that were carried out in Türkiye with local partners and shared updated information about these operations. WARD said: "Since 2014, Airbus has been partnering with Turkish Aerospace (TUSAŞ) to develop the capabilities of the Tier 2 supply chain by contributing to audits, supplier development and qualification of suppliers and special processes used for Airbus products. This has been beneficial to SMEs (Small and medium-sized enterprises) working for TUSAŞ and now being also suppliers of other Airbus major Tier 1 partners (HMS for PFW, GKN and FACC, KPA for Daher, Kale Aero for PFW, Uygur for Safran, Diehl and Patria, Epsilon for Patria, Alp Aviation for Honeywell). The Turkish industry is also a key player in engine parts manufacturing. These engines are used on the Airbus A320neo and A220 through P&W and CFM through Kale P&W, Alp Aviation and TEI. Airbus and its Tier1s also contribute to the growth of several SAHA member companies in being a part of the end-to-end supply of Airbus work-packages as highlighted above. Airbus is committed to further support opportunities for the Turkish industries including the SMEs."

Simon WARD also provided brief information about two satellites that were delivered in a single year (from 2021 to 2022) ~TURKSAT 5A and TURKSAT 5B. WARD: "Both satellites are now operational and performing well. Airbus has a very constructive relationship with TURKSAT and is supporting them to maximize the utilization of the two satellites."

"Airbus is proudly supporting Türkiye 's commitment to zero-emission goals"

WARD wrapped up his assessment touching on the zero-emission commitment of Airbus on global scale. "Airbus is fully committed to developing a sustainable aviation industry, across the value chain, that will reduce the environmental impact of flying. This is why Airbus is focused on reducing the CO2 emissions of its aircraft but also actively working on a large portfolio of projects focused on increasing the understanding of non-CO2 emissions generation and effects and on evaluating solutions covering all mitigation options: fuel, engine technology and flight operations. Signing the Global SAF Declaration during the Istanbul Airshow 2022 alongside Turkish Airlines, Airbus is proudly supporting Türkiye 's commitment to zero-emission goals."

Prototype Manufacturing has Started on of Türkiye's Most Powerful Engine TEI-TF6000

We present the special interview with General Manager & CEO of TEI, we held on October 7 during the İstanbul Air Show 2022 where he talked about the TEI-TF6000 Engine, the most powerful turbofan developed in our country to date, with a dry thrust of 6,000 lbf, and TEI's participation in the SAHA EXPO 2022.

SAHA EXPO DAILY: First of all, could you briefly introduce the TEI-TF6000 Turbofan Engine, which was designed in less than two years and exhibited for the first time at TEKNOFEST Black Sea? What can you say about the compressor and fan design and the number of turbine stages?

Prof. Dr. Mahmut F. AKŞİT: Our TEI-TF6000 engine is actually an engine that we, as the TEI engineering team, built to train our team and develop them as a talent on our way to the National Combat Aircraft (MMU/TF-X). We have brought it up to this point with our own means. It is actually the most powerful engine ever designed and developed in Türkiye. It produces 6,000 lbf of thrust. The engine's thrust capacity can be increased to 10,000 lbf if an afterburner is added to the exhaust section. So it's a pretty powerful engine. We have built our engine as a technology development project to study the technologies to be used in the National Combat Aircraft's engine. We will also use it to validate and calibrate the design analysis software developed by our engineering team and the hypothesis' used in the design.

SAHA EXPO DAILY: It's kind of like a steppingstone for the MMU/TF-X engine...

Prof. Dr. Mahmut F. AKŞİT: Yes, we aim to validate the technologies to be used in the larger engine via the TF6000 and then apply them to the larger engine...

SAHA EXPO DAILY: Isn't TEI one of the three companies already bidding for the MMU/TF-X Engine?

Prof. Dr. Mahmut F. AKŞİT: As we mentioned before, TEI is involved in the national development of the MMU/TF-X engine. It is essentially a military turbofan engine configuration. There are two fan stages in the front and compressor stages behind it...

SAHA EXPO DAILY: Do commercial engines have a different fan placement?

Prof. Dr. Mahmut F. AKŞİT: Commercial engines have a large single-stage fan at the front. A massive fan, you can even see the light behind it. In commercial turbofans, the actual corer engine is located in the middle. Because the fan is so large, most of the airflow bypasses the engine directly to the rear. In military turbofans, a small part of the air still bypasses the engine, while a significant amount flows through the core to produce the actual thrust. The air is sucked by the compressor and fed into the combustion chamber where it is, compressed, mixed with fuel, ignited, and ejected from the nozzle at the back. Some of this power is used to spin the fan. Military turbofan engines have a smaller fan diameter. There are different reasons for this. First, if you want to reach high speeds, it is not possible to go higher than the speed of sound with such a big fan. As the speed increases, the large cross-section creates greater drag resistance. It is more convenient to use small size fans in military turbofans. In fact, this is what military turbofans are made for. One advantage is, of course, the afterburner configuration. The bypassing stream of air around the engine core reduces fuel consumption and increases range. In this way, you can fly more economically in military aircraft, except for emergencies. A typical jet engine uses only about half the oxygen it ingests. In emergency and high-thrust situations, the afterburner combines much of the remaining oxygen with jet fuel, injected into the high-speed exhaust stream from the engine's turbine, and ignites the mixture. That's how you get to 10,000 lbf. This is an indispensable need for military engines.

Türkiye's First Turbofan Engine TEI- TF-6000

SAHA EXPO DAILY: You said there are compressor stages behind the fans...

Prof. Dr. Mahmut F. AKŞİT: Yes, there is a compressor, but the compressor does not ingest all the air provided by the fan. In this configuration, it uses about half of it.

SAHA EXPO DAILY: Does the TEI-TF6000 have single crystal turbine blades?

Prof. Dr. Mahmut F. AKŞİT: Yes, after the air from the compressor burns in the combustion chamber, the hot exhaust gas hits the turbine blades. And since turbine blades are in direct contact with the flame and the hot exhaust gas, they must be made of heat-resistant single crystals to operate at higher temperatures.

SAHA EXPO DAILY: So are the single crystal turbine blades and the IBR used in the F135 TF Engine the same thing?

Prof. Dr. Mahmut F. AKŞİT: No, IBR is used on the compressor. We call these new generation blades blisk (compressor disc and blades produced as a single piece), which means "bladed disc." Some other engine manufacturers call it IBR (Integrally Bladed Rotors). They are essentially the same thing. In other words, the blades are not manufactured separately and stacked on a disc. Discs and blades are integrated; they are designed and manufactured together.

SAHA EXPO DAILY: Does the TEI-TF6000 Engine also have blisk technology?

Prof. Dr. Mahmut F. AKŞİT: Yes, our engine has that new generation blisk or IBR technology. This directly affects the efficiency of the engine.

SAHA EXPO DAILY: Mr. Akşit, you mentioned that the temperatures in the combustion chamber reach very high degrees. High temperatures require cooling and special materials. Are these materials (such as titanium, nickel, steel, aluminum, and composite), especially needed for the hot section in the TEI-TF6000 Engine Project, produced domestically or outsourced? Did the Aviation Engine Materials Development Projects previously initiated by the SSB and TEI, such as CEVHER and KÜLÇE, provide the desired solutions?

Prof. Dr. Mahmut F. AKŞİT: At TEI, we saw this need even before our first helicopter engine project started, so we began working with our own means, just like the TEI-TF6000 engine. As you already know, the number of projects supported by the SSB has increased significantly. Their resources are also limited; the SSB cannot support every project at all times. So, what are we doing? We start to work on the technologies that are necessary, beforehand. When they reach a certain point, we ask for additional support from the SSB and continue our studies. For example, we started the Single Crystal Turbine Blade Casting Process Techniques studies before the TEI-TS1400 Turboshaft Engine Development Project. Afterward, we turned it into an SSB R&D Project, and thanks to their support, we successfully cast single crystal

blades for the first time in Türkiye. Likewise, we started the CEVHER-1 and CEVHER-2 projects, which focus on material technologies. Now we are beginning the second phase of CEVHER-2. We carry out R&D projects to produce the strategic materials that we are dependent on abroad, step by step, in Türkiye.

SAHA EXPO DAILY: In which parts of the engine are Titanium, Aluminum, Steel, and Composite materials used in the engine?

Prof. Dr. Mahmut F. AKŞİT: Generally, the compressor side on the main flow path at the front is made of titanium. It is relatively cold. The turbine stages behind the combustion chamber are made of nickel superalloys and are directly exposed to the flame. Unfortunately, titanium cannot work at those high temperatures. In other words, the front of the engine is usually titanium, and the rear side is usually nickel superalloy.

SAHA EXPO DAILY: Both materials are used heavily in aviation (including the engine). So, is TEI working on producing these materials locally under the CEVHER-1 and CEVHER-2 Projects, which aim to develop materials and manufacturing processes used in aviation?

Prof. Dr. Mahmut F. AKŞİT: Yes. Of course, they have different grades. The material developed for blade casting is a nickel superalloy, but it can be used in the single-crystal form. There are also other materials we use for stator nozzles and vanes. They are fixed parts and do not spin. They are also nickel superalloy, but they can be made of other materials as well. As I said, they have different grades. Under the CEVHER-1 and CEVHER-2, we developed the most urgent and indispensable ones in the first stage. Now we have moved to the second stage with CEVHER-2. In the long term, we are following a strategy that will hopefully produce all the critical materials that our engine needs in our country. Let me give you the good news about alloys. As of today, we have developed the single crystal blade material in Türkiye.

SAHA EXPO DAILY: Do you work with TÜBİTAK MAM Materials Institute?

Prof. Dr. Mahmut F. AKŞİT: Yes, TÜBİTAK is also involved as well as our subsidiary companies (GÜR METAL and Varzene). We have a large material engineering team in our R&D Department. We have a Material Process Department of its own. Under their coordination, we developed both single crystal blade material and alloys, such as the n superalloy "Inconel 718, 718 Plus, 738" in Türkiye, together with the TÜBİTAK MAM Materials Institute team and our subsidiaries. But there are more special materials with higher quality and higher resilience, such as those used in discs, and we are currently working on them.

SAHA EXPO DAILY: What is the current situation in the TEI-TF6000 Turbofan Engine Project? Has prototype production started?

Prof. Dr. Mahmut F. AKŞİT: Engine design is a cyclical, iterative process. For example, we fired the core of our helicopter engine,the TEI-TS1400, the first helicopter engine manufactured in Türkiye, in November 2017. You can find its videos online. That engine, for example, was in the second design cycle. In other words, the engine was designed from the ground up once, then optimized and designed once again. We manufactured and ran that second design. That version was tested for hundreds of hours while design iterations continued. For better, results and continuous improvements.. At the moment, we will produce and deliver our first two engines, which we will hopefully approve for manned flight, before the end of this year. Actually, TUSAŞ asked us to do some of the tests at TEI before delivering the engines. Therefore, we will carry out those tests and send the engines after that. So maybe it will be delayed until mid or end of February 2023, but it doesn't matter.

The TEI-TS1400 engines, which we will deliver ready for the first manned flight, are in the 8th design cycle. Now coming to the TEI-TF6000 engine, this engine is still in its early design cycles. During the TEI-TS1400 helicopter engine process, we decided that it could be fired in the


ENGINEERING THE NEXT
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second design cycle. Of course, with the experience from the helicopter engine, we progressed faster in the design cycles of the TEI-TF6000 and started the prototype manufacturing process within 2.5 years. So the first TF6000 prototype is currently in production.

SAHA EXPO DAILY: Can you give us a date for the first test run?

Prof. Dr. Mahmut F. AKŞİT: With such large engines, manufacturing the first prototype especially takes a significant amount of time because you need to write CNC codes for individual models of all parts and test sample pieces. You also prepare molds when necessary. You can proceed to manufacture actual materials after validating that the software processes everything at the desired size. It takes quite a while to do this for hundreds of parts. Manufacturing engineering is also very important here. It normally takes at least two or three years. We are currently trying to fit the whole process into one year.

SAHA EXPO DAILY: Will you show the prototype of the TEI-TF6000 at the IDEF '23 Fair?

Prof. Dr. Mahmut F. AKŞİT: We are pushing the team right now, but there are also problems with the supply of materials. Supply chains are broken all over the world, especially due to COVID. So think of an engine; it has hundreds and thousands of parts and components.

SAHA EXPO DAILY: Can you share the number of parts in the TEI-TF6000 engine?

Prof. Dr. Mahmut F. AKŞİT: The number of main parts that make up the actual engine is between 200-300. However, there are many additional things on it, such as more than 1,500 screws, bolts, cables, and clips, large and small.

SAHA EXPO DAILY: Mr. Akşit, at the beginning of our conversation, you pointed out that TEI designs the TEI-TF6000 as a capability to train the team on the way to the MMU/TF-X. But ultimately, you will deliver a TF engine, which will incur a development cost. On which platforms do you intend to use the TEI-TF 6000? For example, KIZILELMA MIUS?

Prof. Dr. Mahmut F. AKŞİT: Let's put it this way, as we have said for our the TEI-TJ300 Turbojet Engine before, the TEI-TF6000 is also a technology acquisition and know-how build-up project. Think about it; we made the TEI-TJ300 after the TEI-TJ90 Engine. We made it to gain experience. We can say that the TEI-TJ90 was our first jet engine. A small engine that powers the ŞİMŞEK High-Speed Target Drone. The TEI-TJ300 is specially designed with an axial compressor. The reason is that all these military turbofan engines have axial compressors. The TEI-TF6000 also has an axial compressor. We are adopting the know-how from the TEI-TJ300 to a slightly larger scale to use as a steppingstone. But we pay special attention when choosing the sizes of these intermediate products to use in possible projects. Our country has to someway benefit from these efforts, right? For example, the TEI-TJ300 has been utilized an anti-ship missile engine. MIUS can use the the TEI-TF6000 engine; it is already suitable for its power class. We specifically chose that. Also, four of these engines can power an assault boat. It can also be used as a gas turbine to generate electricity... It produces enough power to supply the electricity of approximately 3,000-4,000 homes on its own.

SAHA EXPO DAILY: Could you give us some information about the latest situation in the TEI-TS1400 Turboshaft Engine Program? Finally, with the use of Alp Aviation's gearbox, we believe the engine has become 100% indigenously produced. When do you plan to begin on-platform flight tests?

Prof. Dr. Mahmut F. AKŞİT: As I already mentioned, the latest versions of our TEI-TS1400 engines are currently in the assembly phase. We will finish their assembly before the end of the year. That was our goal. We will conduct some required tests per our discussions with TUSAŞ before delivering them. If nothing goes wrong, we will provide the engines to them at the end of February next year, with all the mandatory tests completed. If they can speed up the integration process into the helicopter, we hope that we can take off with our national engine in the first half of next year.

SAHA EXPO DAILY: Are the 8th design cycle engines you will deliver compatible with the T625's engine bay? Will you work on adapting the engine mounts on the T625 GÖKBEY Helicopter after the delivery?

Prof. Dr. Mahmut F. AKŞİT: Of course. The first prototype we delivered at the ceremony attended by our President is 'form fit.' It has the exact dimensions of the latest mature version of the engine. It fits in the same place, the connections are the same, and everything is the same. That's why we delivered it as soon as possible so they can start the formality and integration work early. So, when we provide the final design engines, TUSAŞ can plug them in quickly and fly. Otherwise, the integration process of an engine into an aircraft takes several years.

SAHA EXPO DAILY: After all, it is a brand-new engine that has never flown. Will it be airworthy immediately upon delivery, or will the TEI-TS1400 be used together with a foreign engine on the helicopter?

Prof. Dr. Mahmut F. AKŞİT: As far as I know, both engines on the helicopter will be the TEI-TS1400 on the first flight. Of course, TUSAŞ will decide this. First, they secure the helicopter to the ground and run up the main rotor to full power. If there is no problem, they untie the chains and then perform the tests 10-15 meters above the ground. Therefore, they do not immediately take off with the helicopter.

SAHA EXPO DAILY: A similar procedure was followed in the maiden flight of the T625 GÖKBEY helicopter.

Prof. Dr. Mahmut F. AKŞİT: Yes, we call it "hovering." We expect the same here. In other words, if we pass the maximum performance tests on the ground without any problems towards the middle of next year, I hope we will see the helicopter take off from the ground.

SAHA EXPO DAILY: What can you tell us about TEI's participation and agenda in SAHA EXPO 2022? How many products will you exhibit at SAHA EXPO, will there be the engines you will showcase for the first time?

Prof. Dr. Mahmut F. AKŞİT: We have a larger booth for SAHA EXPO than our place here (İstanbul Air Show 2022). Delivering a new product every two months is rather challenging, and we have produced 11 national engines in the last eight years. We will be at SAHA EXPO again with our national products.

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Kale Arge Exhibits Real KTJ-3200 and KTJ-1750 Engines for the First Time at SAHA EXPO 2022

Kale Arge, a Kale Group company, is exhibiting the real models of the KTJ-3200, Türkiye's first national turbojet engine optimized for unmanned aerial platforms such as cruise missiles and target drones, and the KTJ-1750 Turbojet Engine that will power the ÇAKIR Cruise Missile developed by ROKETSAN, for the first time at the SAHA EXPO 2022 Fair.

by İbrahim SÜNNETÇİ

The real KTJ-3200 TJ Engine, which has several differences from the mock-up previously exhibited at the IDEF '21 Exhibition, is still in the Serial Production and Delivery phase for SOM (SAGE) and ATMACA (ROKETSAN) Missiles. The first batch of KTJ-3200 Engines, the serial production of which started at Kale Aero facilities in the first half of 2022, was delivered to ROKETSAN in August 2022 for integration into the missiles/platforms to be used in the firing tests planned to be held in the fall of 2022, following the completion of the Factory Acceptance Tests (FATs, each new production engine undergoes FAT on a Test Rig).

Although the KTJ-3200 was initially integrated into the SOM ALCM, the engine has also been modified for the ATMACA Anti-Ship Cruise Missile through modifications (changes to the interface and software, adjustments to the control/accessories, etc.). Thus, deliveries are currently being made for both SOM and ATMACA. The Serial Production Project also includes the phase of fire tests with the SOM and ATMACA. These tests, which are expected to be conducted in the coming period, will mark a significant accomplishment for the integration work that has already been largely completed.

The KTJ-3200 Turbojet Engine, which was indigenously developed by Kale Arge, including all engine controls and accessories, was subjected to comprehensive tests in the Altitude Test System at Kale Arge Tuzla Development & Test Center and was made ready for acceptance tests in mid-2021. The engines were successfully delivered under the Development Contract following the completion of their acceptance process, and the Turbojet Engines Procurement and Integration Project Protocol was signed on August 18, 2021.

Within the scope of the 'Turbojet Engine Development Project Contract' signed with the Defense Industry Agency on February 22, 2012, Kale Arge had to develop all necessary technology and critical subsystems on its own since there was a severe lack of skilled human resources in Türkiye (both in terms of academic staff and workforce), technological infrastructure, and the ecosystem in the field of gas turbine engines at that time and started to work on three different turbojet engine development projects (KTJ-1750, KTJ-3700, and ARAT Engine) with varying thrust levels for both domestic and international customers in 2021, with its own resources using the know-how from the KTJ-3200.

Thanks to the expertise and high Technology Readiness Level it has acquired throughout the Turbojet Engines Development Project over 9 years, the company is now able to commission and complete new engine projects in a shorter timeframe and very quickly. For example, the KTJ-1750 Turbojet Engine Project, which started development with the company's own resources in March 2021, went from the design phase to the captive test phase in just 15 months. During the unveiling ceremony of the ÇAKIR Cruise Missile Family held on March 31, 2022, it was shared with the public that the KTJ-1750

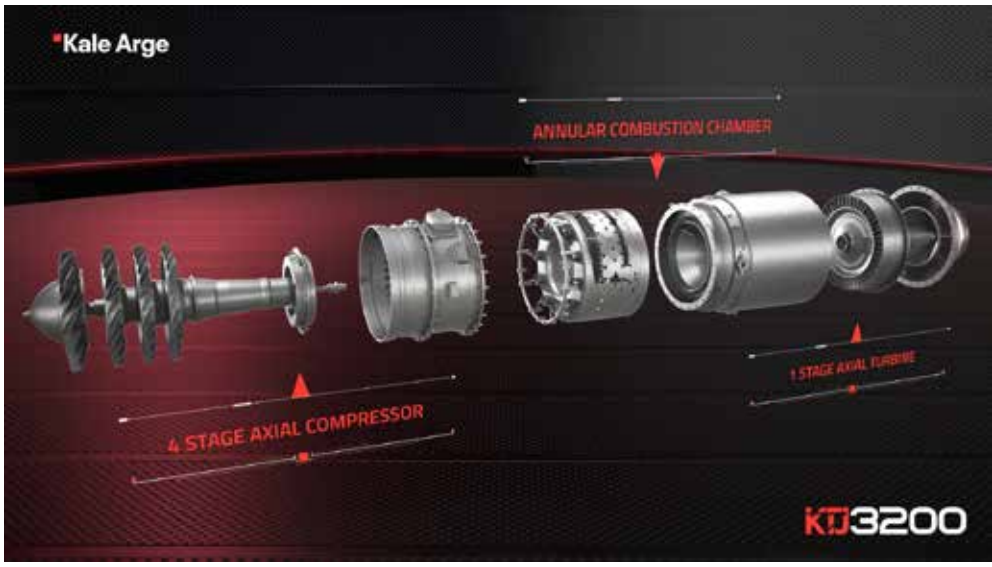
TJ Engine was chosen to power the ÇAKIR Missiles, and a contract was signed between ROKETSAN and Kale Arge on the National Turbojet Engine Development.

Prototype production of the KTJ-1750 TJ Engine, which was developed by utilizing KTJ-3200 experience, was completed in the first half of 2022, and ground tests started at the Altitude Test System at Kale Arge Tuzla Development and Test Center in June 2022. The KTJ-1750 TJ Engine reached 50,000rpm during the tests in September. The ongoing qualification tests of the engine are expected to be completed in the last quarter of 2022. The KTJ-1750 is expected to be ready for use on the ÇAKIR Cruise Missile by the end of 2022, thanks to the joint development and integration studies. During the unveiling ceremony, it was announced that the first firing test from the AKINCI UCAV with the ÇAKIR Missile, which will be powered by the KTJ-1750 TJ Engine, will be carried out at the end of 2022.

The KTJ-1750, a product of domestic and national engineering, draws attention with its compact design, lightweight, and low fuel consumption thanks to its very high compression ratio and thermodynamic efficiency provided by the axial compressor design. Designed for the ÇAKIR Cruise Missile Family, the KTJ-1750, which can offer superior performance at high altitudes, can produce 1,750N thrust at sea level.

KTJ Series Turbojet Engine Family and Technical Features

KTJ-3200: Kale Arge's first engine, the KTJ-3200, was developed for SOM (SAGE) and ATMACA (ROKETSAN) Cruise Missiles. The KTJ-3200 Turbojet Engine, consisting of a 4-stage axial compressor, annular combustion chamber, and a single-stage turbine, with a thrust power of 3,200N (Newton), is 63cm in length, approximately 30cm in diameter, and weighs 50kg. The Compressor stages of the ITAR-Free engine are made of Aluminum, and the Combustion Chamber and Turbine are made of special alloys and Nickel Superalloys. Since the compressor uses monolithic (one-piece) rotors, the engine has low fuel consumption and high thermal efficiency.



The KTJ-3200 has been developed and optimized over many years and has similar capabilities to its competitors in terms of performance and thrust capacity though it has a longer service life (both in terms of aerodynamic components, for example, a far more advanced turbine material is used in the engine, so the turbine service life is significantly prolonged, and the indigenously designed and produced bearings have a longer service life than their counterparts) and substantially lower fuel consumption values.

The KTJ-3200, which stands out with its low fuel consumption and ability to be launched at different altitude/speed conditions, has been designed to operate at an altitude of 5,000m and Mach 0.95 in accordance with the operational flight envelope of SOM ALCM and ATMACA Anti-Ship Cruise Missiles. However, the KTJ-3200 has a much wider starting envelope than equivalent engines. This makes it possible to run the engine even at extremely low speeds. The Altitude Test System at the Kale Arge Tuzla Development and Test Center has played a key role in the development and testing process of the KTJ-3200 engine, which features a pyrotechnic igniter and a windmilling capability. The KTJ-3200 Turbojet Engine was developed by Kale Arge with only domestic resources and no reliance on foreign sources since all components are designed and manufactured in Türkiye, making them not subject to export restrictions. The qualification process of hundreds of ordered KTJ-3200 Engines has been successfully completed, and serial production has begun.

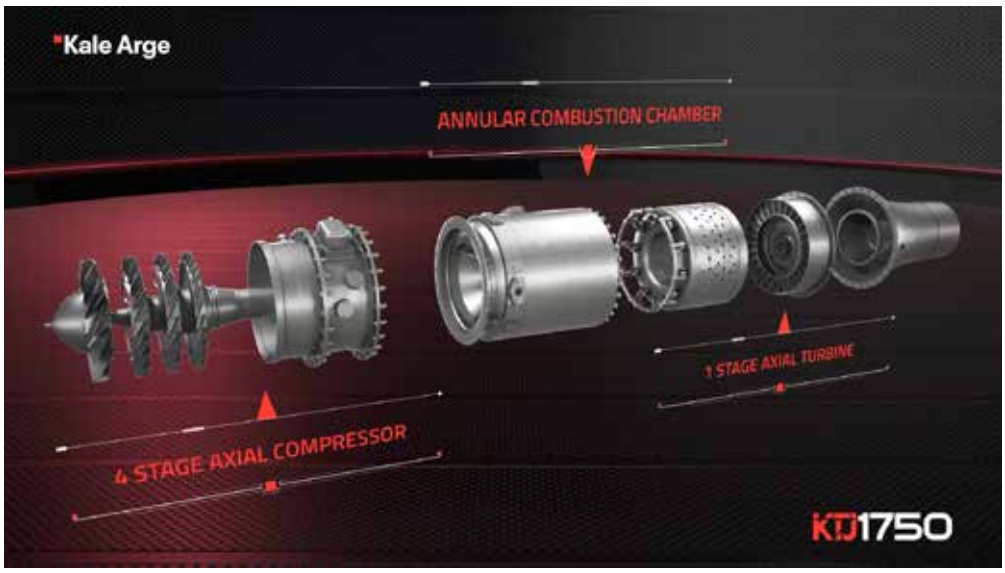
KTJ-3200 has been a great opportunity for the Kale Arge engineering team to gain experience in managing a holistic engine development project from start to finish, including design, testing, production, and assembly activities. The capabilities acquired during the KTJ-3200 Project have provided Kale Arge with sufficient flexibility to carry out cruise missile programs of different thrusts and ranges.

KTJ-1750: The KTJ-1750 TJ Engine, designed and developed based on the KTJ-3200 technology, has a 4-stage Axial Compressor design like the KTJ-3200. Capable of producing 1,750N of thrust at sea level and operating at speeds up to Mach 0.95, the KTJ-1750 has a diameter of 202mm and a weight of 25kg. With a Specific Fuel Consumption Value of <1,1 kg/(daN*s) and a thrust/weight ratio of >11, the total length of the KTJ-1750 is 464mm.

In general, single-stage centrifugal compressors are used in this type of small turbojet engine. However, since the compression ratio is low due to the single-stage configuration, these engines have higher fuel consumption because of low thermal efficiency. It is stated that there is no other engine of this size and class in the world with a 4-stage Axial Compressor design. The KTJ-1750 is unique in this sense in the world.

KTJ-3700: The KTJ-3700, which will power the KARA ATMACA Surface-To-

Surface Cruise Missile being developed by ROKETSAN, is another turbojet engine project initiated by Kale Arge with its own resources. The KTJ-3700, which weighs 50kg, is aimed to have an operating altitude of 10,000 meters and a flight speed of Mach 0.95.



Although it has similar weight and dimensions, the KTJ-3700 produces 500N more thrust than the KTJ-3200 and offers better Specific Fuel Consumption, thanks to its improved aerodynamic design. Thanks to its lower fuel consumption, it provides a longer range to the missiles/platforms. As with the other two engines, the closed-circuit fuel lubrication technique is used in the KTJ-3700. However, Kale Arge also worked on closed-loop oil-lubricated versions of the engines.

Ground tests of the prototype KTJ-3700 Engine will be carried out at the Altitude Test System located at the Kale Arge Tuzla Development and Test Center campus. For this purpose, the running/test altitude conditions of the Altitude Test System, designed to simulate flights at 0-5km and speeds up to 0.95M, will be increased to 10,000 meters for the testing of both KTJ-3700 and ARAT Turbojet Engines. In this way, the weather conditions 10,000 meters above the ground will be simulated, and testing will be performed to see how the engine responds to those circumstances. It is aimed to start ground tests with the KTJ-3700 before the end of 2022 and use the KTJ-3700 in the first firing test of the KARA ATMACA Surface-to-Surface Cruise Missile in 2023.

ARAT Engine: Developed locally and nationally by Kale Arge under the Improved Turbojet Engine Project, the ARAT TJ Engine will have very low fuel consumption and high thrust capacity. A Contract was signed between Kale Arge and the Defense Industry Agency (SSB) on 5 November 2021 within the scope of the ARAT Project, which was initiated to develop and deliver indigenous turbojet engines for the Serial Production Phase of the new cruise missile with superior features and longer range. The ARAT TJ is expected to have similar characteristics and thrust power to the foreign-origin turbojet engine procured from abroad for the aforementioned new cruise missile. The ARAT TJ Engine, which will be designed and qualified for operation at high altitudes and in harsh environmental conditions, will meet a critical need for cruise missiles. With the ARAT TJ Engine, the number of KTJ Series Turbojet (TJ) engines has reached 4. Aimed to be an advanced turbojet engine, ARAT, like the other three members of the KTJ Series TJ Engine Family, will feature a closed-loop fuel lubrication technique and will be exempt from any export restrictions. Conceptual Design Review (CDR) was completed in the project, and a Conceptual Design Review Meeting was held with the SSB in the second half of 2022. Although the development process was announced as 40 months, Kale Arge aims to complete the project as soon as possible.

25 October 2022 - Tuesday

10:00	**Doors Open**
10:30-12:10	**Exhibitor Product and Start-Up Project Presentations** *Hall 8 Presentation Area*
10:30-18:00	**B2B Meetings** *Exhibitor Stands and B2B Area – Foyer*
14:00-15:15	**Opening Ceremony** *Hall 5 Main Stage*
15:15-16:30	**Protocol Stand Visits**
16:30-17:15	**SAHA MBA Diploma Ceremony** *Hall 5 Main Stage*
16:30-18:00	**Signing Ceremonies** *Hall 6 and Hall 8 Signing Ceremony Areas*
16:30-18:00	**Exhibitor Product and Start-Up Project Presentations** *Hall 8 Presentation Area*
18:00	**End of Day 1**

ROKETSAN is at SAHA EXPO with its Wide Range of Product and Technology Family

ROKETSAN General Manager Murat İKİNCİ: "At SAHA EXPO, which hosts hundreds of professionals from Türkiye and abroad, we will have the chance to evaluate what we can do with SAHA's vast ecosystem while opening a door to new contracts and collaborations."

SAHA EXPO DAILY: Can you inform us about ROKETSAN's performance in the first 9 months of 2022 and its expectations for 2023?

Murat İKİNCİ: As Roketsan, Türkiye's national rocket, missile, and munition development and production center, we continue to make a name with our success. In addition to meeting the needs of our Turkish Armed Forces in the fastest and most reliable way, we also increase our exports to friendly and allied countries. With our 34-year history, our goal is to minimize Türkiye's dependence on abroad by producing domestic and national solutions while ensuring that our country stands firm against embargoes. We are also happy to contribute to the economy with our export activities.

Another indication of our success is that we were in the Defence News Top 100 list this year as well, which ranks the world's top 100 defence industry companies. Entered for the first time in 2017, we were ranked 86th in 2019 and 91st in 2020. Despite various negative factors that hindered the global supply chain, such as the COVID-19 pandemic, our company continued its R&D studies, production, and exports with a successful strategy and succeeded in re-entering the 2022 ranking from 86th place.

We welcome 2023, the 100th anniversary of our Republic, with much bigger goals. 2023 will be a year when we will exceed our production capacity, sign new export contracts, and promote our name to the whole world with the products we have developed. In this context, we have already started our intensive work, and I have no doubt that we will achieve our goals with such a team.

SAHA EXPO DAILY: What are ROKETSAN's goals and expectations in space programs? What can you tell us about the current situation of the Micro Satellite Launch System (MUFS) Development Project?

Murat İKİNCİ: With the decision of the Defence Industry Executive Committee (SSİK) in 2012 regarding our country's independent access to space, we, as ROKETSAN, were tasked with carrying Türkiye to the space league.

As part of these studies, which we carried out under the leadership of our Defence Industry Agency, we achieved the goal of reaching space within four years in 2017, a

year earlier, and reached an altitude of 126 kilometers with the first domestic sounding rocket launched with national technologies. Thus, we have crossed the 100-kilometer line, which is considered the limit of space. This is how we took our first step into space with the technologies we developed as a country. In this process, we developed 24 different technologies with our own engineering capabilities and domestic partners. I would especially like to point out that behind this first step we have taken into space, there are more than one million hours of hard work of our nearly a thousand experts and technicians. Again, as a company, we have welcomed dozens of subcontractors and universities in our country into the space technologies ecosystem, and we still continue to do so. In the next stage, we focused on collecting data from space, and as our President announced at the end of 2020, we successfully completed the launch tests with our new sounding rockets. In these tests, our sounding rocket successfully reached an altitude of 136 kilometers. This was a significant turning point for us because we took an important step toward developing liquid-fuel rocket engines, and our country started scientific studies in space thanks to the payloads we carry with our sounding rockets.

Let me briefly talk about what we aim for in the following stages. Our first goal is to perform a sub-orbital flight at an altitude of 300 kilometers in 2023 with our new sounding rocket with a payload capacity of 100 kilograms. With this step, we will validate the technologies that will reach the altitudes where the International Space Station (ISS) is still operating. After that, we aim to successfully launch a Space Launch System that can place a 400kg satellite at an altitude of 550 kilometers – where Starlink satellites also orbit – by bringing the technologies we have developed to larger scales. When we accomplish this goal, Türkiye will become a country that can send its own satellite into space. Then, with the deep space and space exploration phase, we will take important steps in many developing areas, such as access to extraterrestrial planets and space mining.

For your other question, at our Space Systems & Advanced Technologies Research Center, which was inaugurated with the participation of our President on August 30, 2020, we carry out several new and high-tech system and subsystem development, including the Micro Satellite Launching System (MUFS) Development Project initiated by the Defence Industry Agency. The size of the projects carried out here exceeds one billion euros. A significant part of this budget consists of investments made in qualified human resources and technologies that compete with the world. When the Micro Satellite Launch System project, which we call Şimşek, is completed, we will be able to place microsatellites of 400 kilograms in Low Earth Orbit at an altitude of at least 550 kilometers. Türkiye will be capable of launching, testing satellites, and establishing a space station, which only a few countries in the world have. When

Micro Satellite Launch System

Space Systems & Advanced Technologies Research Center, which wasinaugurated with the participation of Mr. Recep Tayyip ERDOĞAN - The President of the republic of Türkiye on August 30, 2020

our domestic satellite is launched into space, a secure flow of information will be provided to our country in both war and peacetime. Our satellite will contribute to the future of our country in every field, from agriculture to battlefield intelligence, and will facilitate the work of our soldiers by providing instant information and coordinates.

SAHA EXPO DAILY: What can you tell us about ROKETSAN's participation in SAHA EXPO 2022 and its expectations from the Fair? Will you share or exhibit any information or product with your visitors for the first time during the fair?

Murat İKİNCİ: Türkiye has become one of the world's leading countries in the defence and aerospace industry. While our country used to import foreign products in the defence industry, we now export our products to the world beyond meeting our own needs.

SAHA EXPO Defence & Aerospace Exhibition also plays a vital role in the development of the Turkish defence industry. At SAHA EXPO, which hosts hundreds of professionals from Türkiye and abroad, we will have the chance to evaluate what we can do with SAHA's vast ecosystem while opening the door to new contracts and collaborations.

ROKETSAN participates in SAHA EXPO with its experienced personnel and many products, as it does every year. I would like to talk briefly about these products.

Murat İKİNCİ - General Manager of ROKETSAN

TRLG-122 and TRLG-230 missiles, which can destroy their target with pinpoint accuracy with laser guidance, CİRİT Laser Guided Missile, designed to fill the tactical gap between unguided 2.75" rockets and guided anti-tank missiles, tank destroyers Medium Range Anti-Tank Weapon System (OMTAS) and Laser Guided Long-Range Anti-Tank Missile System (L-UMTAS), and our ATMACA Anti-Ship Missile, which will provide the Turkish Naval Forces with long-range precision strike capability will be exhibited at our booth.

In addition to these, our world-renowned Micro Smart Munitions MAM-L, MAM-C, and MAM-T, HİSAR-O Air Defence Missile, which will provide medium altitude air defence, SUNGUR Air Defence Missile System to be used in the short-range air defence of mobile/stationary units and facilities on the battlefield, Our Short Range Anti-Tank Missile KARAOK, Stand-Off Missile (SOM), Navigation Systems and our TEBER-82 Guidance Kit, which turns the MK-82 series into smart bombs, will also be on display.

As in previous years, we believe that delegations and professionals from Türkiye and abroad will show great interest in our booth this year as well. My team and I will be present at our booth to answer their questions and talk about our activities.

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HAVELSAN Focuses on New Cooperation & Business Development with High-Tech Solutions

HAVELSAN was established in 1982 as a corporation affiliated with the Turkish Armed Forces Foundation and today is one of Türkiye's leading technology companies. Thanks to its decades-long experience and highly qualified human resources, HAVELSAN provides high technology-based software-intensive solutions and products for armed forces, public and private sectors.

HAVELSAN established itself as a reliable, sustainable and strategic solution partner to meet the security and safety needs of friendly and allied countries with scientific, unique, innovative, and high-technology products, solutions, and services. HAVELSAN has undersigned many reference projects at home and abroad in the fields of Command Control and Defense Technologies; Simulation, Autonomous and Platform Management Technologies; Information and Communication Technologies; Homeland Security and Cyber Security.

HAVELSAN, not only designs innovative technologies but also develops holistic defense systems for a trusted future. HAVELSAN also leads the way for digital transformation both at home and abroad.

As a company which has adopted the principle of "Quality in Management" HAVELSAN currently maintains internationally accepted management system standards/certificates such as CMMI Level-3, ISO 9001, ISO 27001, ISO 45001, ISO 14001, AQAP-2110, AQAP 160, EFQM and many others.

HAVELSAN has been one of the most important solution providers in Surface/Underwater Command, Control, Communication, and Computer Systems, Air Command Control and Information Systems and Land/Joint Command Control Systems. As Türkiye's one and only sole source proven combat management system provider, HAVELSAN has not only contributed to the Turkish navy in improving its deterrence power but also strengthened its competitiveness in global markets.

As one of the world's leading simulator companies in the defense and aerospace industry, HAVELSAN has delivered critical technologies and turnkey solutions to the Turkish Armed Forces for years. With the strength of its capabilities based on world-class, industry-leading simulation technology, HAVELSAN is dedicated to providing the very best of simulation and training products,

solutions and services to satisfy the evolving demands of its customers worldwide.

Moreover, thanks to its Autonomous and Platform Technologies, HAVELSAN has combined its Hybrid Swarm intelligence capabilities with its years long experience in Joint Robotics and Autonomous Systems. The prominent autonomous unmanned aerial, land and naval vehicles HAVELSAN has developed within this concept of Digital Troops are BARKAN (Autonomous Medium-Class Unmanned Ground Vehicle), BAHA (Sub-Cloud Autonomous UAV) and SANCAR SİDA (Armed Unmanned Autonomous Naval Vehicle).

HAVELSAN can compete in a wide array as it is a software company that offers products and solutions in ICT apart from the defense industry. This is another big competitive edge for HAVELSAN in its rivalry on a global scale. Moreover, HAVELSAN also develops systems and products to meet cyber security needs that are increasing at an unprecedented pace, while meeting the cyber security-related needs of various institutions.

In parallel with the developments in the world defense industry in the last decade, HAVELSAN has also displayed a successful and steady growth in its export performance and delivered scores of successful projects especially in the defense industry abroad. To highlight a few of them: HAVELSAN has been the market and export leader of Türkiye in command control technologies for the last 15 years, Türkiye's first command control system export to the Asia Pacific region was realized by HAVELSAN. HAVELSAN has been the export leader of Türkiye in simulators in the last 10 years. Numbers of pilots from various countries completed hundreds of hours of flight training on HAVELSAN simulation systems. HAVELSAN has also signed very critical contracts with several countries that will turn into export records in the coming years. Combat Management

System/Ship Data Distribution System/ Air Command Control System software contracts with friendly and allied countries are just a few examples illustrating HAVELSAN's export dynamism.

In this context, HAVELSAN expands and diversifies its presence in the markets where it is already operational and penetrates into new markets. The Asia-Pacific region, the Middle East, and the Gulf region are the regions where HAVELSAN has been running operations for a long time now, carried out projects, and have ongoing contracts. Apart from this, North African countries and Sub-Saharan Africa are the new geographies in which HAVELSAN seeks several opportunities today to realize cooperation in the coming period. HAVELSAN also monitors the market developments and trends in Eastern Europe and some of the countries identified within the CIS region closely.

Today, HAVELSAN has access to the markets of more than 20 countries, ranging from Pakistan to Qatar, from Malaysia to Oman, from Kuwait to South Korea, with its state-of-the-art technology products, solutions, projects, and services. In the upcoming period, HAVELSAN will continue to focus on new collaborations and business development activities both in existing and new markets.

Hall 2

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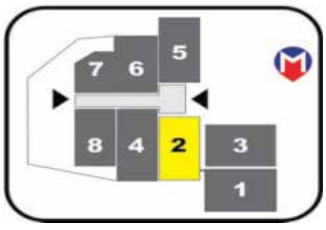
- ALTIN SPONSOR
- GÜMÜŞ SPONSOR



LEJAND
ÖNLERİ BOŞ BIRAKILACAKTIR.
- Acil çıkış kapıları
- Yangin dolaplari
- Havalandırma Bacaları (w:1.1m)
- Önü Kapatılamaz Alanlar
- Elektrik Panoları

Kolon Ölçüleri : 2.42 x 2.42m

LEGEND
THESE AREAS CANNOT BE COVERED
- Emergency Exit
- Fire extinguisher
- Air Condition units (Width: 1.1 m app.)
- Electric Panel

Pilars : 2.42 x 2.42m

Balcony H:554 cm. W: 1470cm D:185 cm.

Cargo Gate H: 515cm. W: 438 cm.

Cargo Gate H: 520 cm. W: 440 cm.

GEÇİŞ h:2,55m

GEÇİŞ h:3,55m

MAX. h:3m 1-2 GEÇİŞ

GEÇİŞ MAX h:2,35m

Emergency Exit

Emergency Exit

ASELSAN MEYDANI

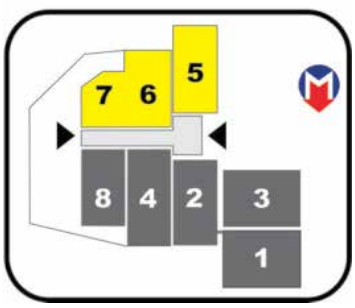
Balcony H:525 cm. W:2230 cm D:180 cm.

Balcony H:530 cm. W:2172cm D:170 cm.

Exit / Entrance


Hall 4
Hall 8
Cargo Gate
H: 543 cm.
W: 478 cm.
H : 488 cm.
W: 544 cm.
H: 500 cm.
W: 610 cm.
H: 400 cm.
W:500 cm.
ASELSAN
Electricity
HEF
ROTA VİNÇ
İMES OSB
BİTES
OPAŞ
YONGATEK
KINDHELM
RTC
ADER SAVUNMA
LIGHTINING
PROMEC
SN ARGE
HATSAN
HİDROMODE
VALBRUNA
ORDULU
BİROM
MARMATEK
NERO
MAKEL
MABAYCO
HUĞLU
BİTES
UKRAVIAPROM & MECHATRONICS PAVILION
JSC FED
JSC MOTOR SICH
SE IVCHENKO PROGRESS
LLC RADIONIX
MİLMAST
ATLAS İTHALAT
EUROLAB
YILKOMER
BAYKAR MEYDANI
BAYKAR
ÖZBEN
OPSİN
MERTSAV
ROBİT
AVAS
GİRSAN
REXİMEX
ALACALI
ASYA
KİLİM GRUP
GÜVENLİ YAŞAM
TEZMAKSAN
NETAŞ
KEYVAN HAVACILIK
TELEMAR
CET KOMPOZİT
ATA SİLAH
CALOR
EMPA
GLENAIR
SDM
ENDERUS
MENATEK
ALBANIA PAVILION
ABRAMAK
KORDSA
ER-EL
TUNCA TEKNİK
HİSAR
VARZENE
FENAC
GÖKÇELER
NUMESYS
ASPİLSAN
İŞBİR
BOTEK
THY TEKNİK
REPKON
KİPAŞ
TİCARET BAKANLIĞI MINISTRY OF COMMERCE
KMC GRUP
ORTEM
BİTAK
FLOKSER
OVİS
AIRAKS
SOLOTEK
MEGE TEKNİK
DOME
TÜRK PATENT
DÖKSAN
ALFER
MİKRO TASARIM
AKSA ARMS
ÇİLTUĞ
MERİH
SİSTEM ALUMİNYUM
SASAD
SAME
ZED
HAS ÇELİK
MENSAN
HUSAN
GES MÜHENDİSLİK
ZSR
KARDEMİR KARDÖKMAK
MİLLİ SAVUNMA BAKANLIĞI
MINISTRY OF NATIONAL DEFENCE
İMZA TÖREN ALANI 1
SIGNING CEREMONY AREA 1
ASFAT MEYDANI
MKE
ASFAT
AYB
LOWSEN
UZAY PAVİLYONU
AVS TEKSTİL
SANAYİ VE TEKNOLOJİ BAKANLIĞI
MINISTRY OF INDUSTRY AND TECHNOLOGY
ASSAN - ASSAV
İÇDAŞ
TEKNOPARK İSTANBUL
YILMAZ MAKİNA
VOLT SAVUNMA
SUNUM ALANI 1
PRESENTATION AREA 1
LEONARDO
ÖZTEK TEKSTİL
TurkCoil
QATAR PAVILION BARZAN HOLDINGS
NUROL
ELESA GANTER
INTECRO ROBOTIC
KARMETAL
GERSAN
AZERBAIJAN PAVILION
TEKNO DROM
Emergency Exit
Exit / Entrance
DEPO
A
B
C
D
E

SPONSORLU STANT RENKLERİ
- **- YILDIZ SPONSOR**
- **- PLATİN SPONSOR**
- **- ALTIN SPONSOR**
- **- GÜMÜŞ SPONSOR**



LEJAND

ÖNLERİ BOŞ BIRAKILACAKTIR.

- *Acil çıkış kapıları*
- *Yangin dolaplari*
- *Havalandırma Bacaları (w:1.1m)*
- *Önleri Kapatılamaz Alanlar*
- *Standart A.Ş Depo*

Kolon Ölçüleri :
2.42 x 2.42m

LEGEND

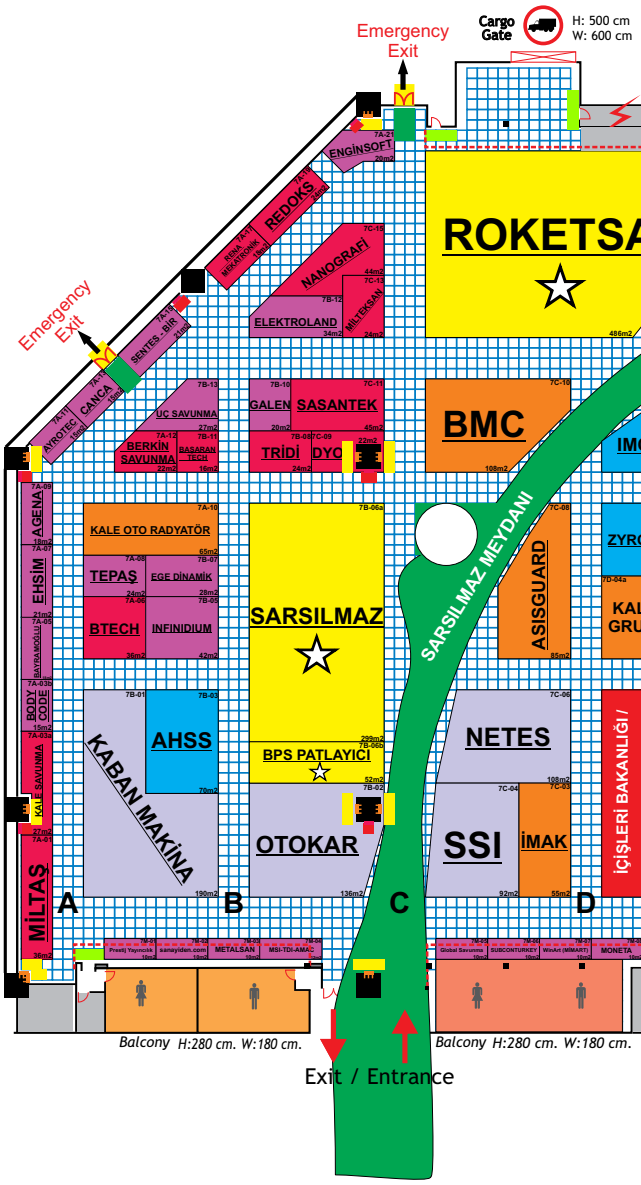
THESE AREAS CANNOT BE COVERED

- *Emergency Exit*
- *Fire extinguisher*
- *Air Condition units (Width: 1.1 m app.)*

Pillars: 2.4 x 2.4 m

Pillars: 0.5 x 0.5 m

Hall 7



Hall 5
Hall 6
Cargo Gate
H: 540 cm. W: 550 cm.
H: 500 cm W: 600 cm
Electricity H:600 cm W:120 cm.
BAKANLIK BİRİMLERİ
MINISTRY UNITS
SAHA OFİS
SAHA OFFICE
AÇILIŞ TÖRENİ
PANEL ALANI 1-2
OPENING CEREMONY
PANEL AREA 1-2
SAHA OFİS / SAHA OFFICE
TUSAŞ
TURKISH AEROSPACE
STM
SSB / PRESIDENCY OF DEFENCE INDUSTRIES
HAVELSAN
TEST - SERTİFİKASYON PAVİLYONU
STM MEYDANI
ROKETSAN MEYDANI
HAVELSAN MEYDANI
TUSAŞ MEYDANI
BAYKAR PLATFORM ALANI
HCTEK
TMS
DURATEK
ÇİLENGER PLASTİK
ADCO
TSSK
HUKD
FZK
GNG VALVE
TRT
TURKRED
LİTERATÜR KİMYA
SMS TORK
SSTEK
FRİGO MEKANİK
TSE
STEST
TÜRKLOYDU
MATİL
VORTEKS
SELÇUKLU HOROLOJİ
TEKNOKAR
EMF
KARTAL BOMBE
YETER MAKİNA
NEVKA
ÇELMER
TR UÇUŞA UYGUNLUK
ASARTECH
ÜSKÜDAR BELEDİYESİ
MAREN
METTAŞ
MİLSAN
HTR
EMTEST
INSPECCO
VECTOR
TEKNO KAUÇUK
HELİ PLAT
BİAS
TR TEST
INORES
ORSA
ER MAKİNA
TR TRANSMİSYON
KAYA GRUBU
NUMESYS
ERİN MOTOR
TDU SAVUNMA
ATP SAVUNMA
DELTA V
KOÇAK PETROL
TUSAŞ (TEI)
PAVELSİS AVİTEK
SİMUNES
KMR
GÜR METAL
RMC
CKF
KENT KALIP
SDT
TUALCOM
SHADOWLINE
İĞREK
GÜNİLİ
TİTRA TEKNOLOJİ
İMZA TÖREN ALANI 2
SIGNING CEREMONY AREA 2
KALE KALIP
ÖZEN-İŞ
NICOMATIC
ALPHA METALURJİ
NAVİST
MOBİT
INFOTRON
BRENSAN
TAIS
HİPAŞ
ENOTEK
THALES
3DÖRTGEN
LİMA
ROTOR TEKNOLOJİ
YONCA - ONUK
PAVOTEK
ANOVA
ALTUN DÖKÜM
SİMSOFT
MAC BENDING
HAKAN ELEKTRİK
YILMAZ MAKİNE
PINAR MÜHENDİSLİK
PROFEN
NETA
ICTERRA
OBSS
EMT SAVUNMA
TRON
PAKİSTAN PAVILION
SEKİZALTMIŞ
ATEŞÇİ
COŞKUNÖZ
KPM TEKNOLOJİ
İTO İSTANBUL TİCARET ÜNİVERSİTESİ
ERMAKSAN SAVER
HARP SAVUNMA
ÜNİMETAL
ELMALI
HİZMET TEKNİK
KOÇ SAVUNMA
ÖZNİL
WAT MOTOR
FNSS
AET ELECTRONICS
SONITUS ADVENS
KIRTAŞ
DMY SAVUNMA
TURMAKS
DERYA ARMS
OTOKAR MEETING ROOM
ZİRAAT KATILIM
MEETING ROOM
MINISTRY OF INTERIOR
İSO
M5 Dergi
Balcony H:280 cm. W:180 cm.
H:600 cm. W:280 cm.
Exit / Entrance
A
B
C
D
E

SDT Showcases Manpack and Vehicle-Type RF Jammer Systems at SAHA EXPO

SDT, one of the key players of the defense industry, will participate in SAHA EXPO 2022, which will be held at the Istanbul Expo Center on October 25-28, 2022, as in previous years.

During the exhibition, the company will be showcasing its Manpack and Vehicle-Type RF Jammer systems, which are well known in the sector and have piqued considerable interest. Additionally, it will also exhibit its Electronic Warfare capabilities and product range, which have been expanding in recent years, and aims to find the opportunity to introduce its products to many domestic and foreign military delegations. The company, which plans to host delegations during the exhibition, plans to hold meetings with the main contractors of our defense industry, the subsidiaries of the Turkish Armed Forces Foundation, about its products, and wants to meet with its own suppliers and subcontractors, as it manages an ecosystem of over 500 suppliers operating in the industry.

The company, which has recently attracted the attention of the sector with the news of its initial public offering, is looking forward to meeting with visitors at SAHA EXPO 2022.

STM Delivers KERKES Project

STM has successfully completed and delivered the KERKES Project, enabling UAV platforms to operate in environments with no GPS coverage.

STM has successfully concluded the Global Positioning System Independent Autonomous Navigation System Development (KERKES), which was initiated in 2019 under the leadership of the Defense Industry Agency (SSB). The acceptance process of the KERKES Project, which allows UAV platforms to operate in GPS-denied environments, has been completed.

KERKES Project

Rotary-wing and fixed-wing UAVs are seeing increasing use on the battlefield, allowing fast and reliable attacks with the support of global navigation satellite systems (GNSS) and, in particular, global positioning systems (GPS). It is well known that GPS and RF services can easily be disrupted or spoofed in the operational arena, while there are situations where these services cannot be used uninterruptedly in line with the information received from the field. This can make it difficult for UAVs to fulfill their missions.

The contract for KERKES (GPS Independent Autonomous Navigation System Development Project) was signed between the SSB and STM on August 23, 2019. With the conclusion of the KERKES Project, developed by STM engineers and involving sophisticated computer vision techniques and artificial intelligence algorithms, mini/micro class UAVs will now be able to perform missions under day or night conditions in environments where there is no GPS coverage. With the KERKES Project, which aims to allow rotary-wing and fixed-wing UAVs to carry out missions without the support of GPS, location estimation and the execution of missions can be achieved through navigation based on object recognition and deep learning capabilities. Using this system, the UAV begins its mission with a loaded map, compares the map with the data obtained from the field, and successfully completes its mission without relying on GPS. KERKES will allow UAVs to carry out their missions without being affected by enemy electronic warfare threats such as GPS jammers.

Türkiye's **First Digital Underwater Telephone** Project Signed

D-Satel, a new generation digital underwater telephone developed by KoçSavunma (Koç Bilgi ve Savunma Teknolojileri A.Ş.) in cooperation with TÜBİTAK BİLGEM (TÜBİTAK Informatics and Information Security Advanced Technologies Research Center), is expected to be a significant breakthrough in the Turkish defense industry. The indigenous and national D-Satel technology will make Türkiye one of the top actors on the global market.

KoçSavunma, the innovative brand of the Turkish defense industry, and TÜB TAK B LGEM are gearing up for the 100th anniversary of the Republic of Türkiye with an effectual project that seamlessly and digitally connects underwater and surface. The New Generation Digital Underwater Telephone (D-Satel), which advances digitalization in underwater communication to a new level, was introduced with a launch event held at the TÜB TAK Gebze Campus Gölet Test Site with the participation of KoçSavunma and TÜB TAK B LGEM senior executives.

The D-Satel technology, which will be developed and produced in collaboration by TÜB TAK B LGEM and KoçSavunma, is planned to be deployed in Turkish frigates (TF-2000), followed by all new ships, starting with the M LGEM 6, 7 and 8 ships, which are among the significant landmarks of the Turkish defense industry.

Speaking at the introduction meeting of D-Satel, Ali GÖRÇ N, President of TÜB TAK B LGEM, said the following: "With its technology and the added value it will bring to our country, I believe this public-private cooperation will spur future projects in this field. The utilization of the experience and know-how gained from the development of underwater telephones for surface vessels and RE S-class submarines for the development of a domestic digital underwater telephone that can compete on a global scale represents strong potential in terms of the domestic and national character of our defense products. D-Satel, which provides a key advantage to the Turkish defense industry to compete in international markets, will play a critical role as a technology that meets international standards in the field of digital warfare technologies of the future, while reinforcing our domestic and national stance. Collaborations that span product development, sales and exports, and after-sales services, like the one between KoçSavunma and TÜB TAK B LGEM, will also encourage well-designed business models within the Turkish defense industry."

D-Satel Will be Available on the Global Market

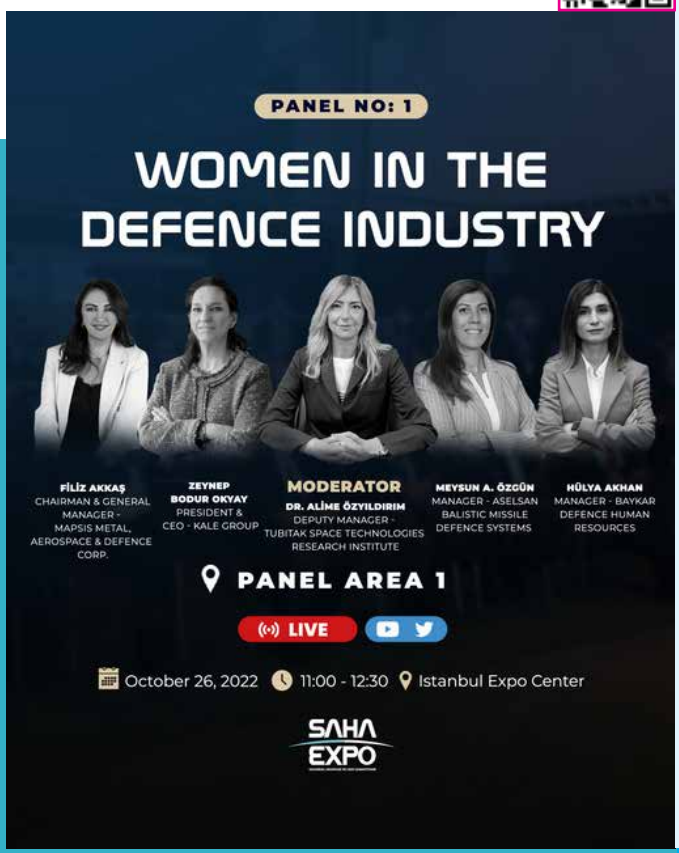
Erkut TEK NKAYA, KoçSavunma Chairman of the Board, stated that the Digital Underwater Telephone (D-Satel) project is significant in terms of showcasing the level of digitalization in the defense industry, and added, "We are proud that the cooperation between TÜB TAK B LGEM, the reputable name of our defense industry in R&D efforts, and KoçSavunma, which brings cutting-edge technologies to our country, has advanced to a new level with the D-Satel. The D-Satel project, which accelerated the digital transformation in the defense industry, came to the agenda in line with the urgent needs for new operational conditions in the field of defense and for faster and more flexible communication. In addition to the existing underwater telephone communication capabilities using audio and Morse codes, the need to use various digital protocols that allow short code messaging is accelerating the transition of underwater communication to digital platforms. The Digital Underwater Telephone (D-Satel) technology, which will be developed in collaboration by TÜB TAK B LGEM and KoçSavunma, can work with existing systems with its backward compatibility feature in addition to its digital communication capabilities. This offers a great advantage to the defense industry in terms of ensuring holism in domestic and national communication platforms and assets. I wish that the number of such projects, which strengthen the position of our defense industry in global markets, will increase and be beneficial for our country."

KoçSavunma to Develop the Technology

Within the framework of the work-sharing agreement between KoçSavunma and TÜB TAK B LGEM, KoçSavunma will bear the costs of technology development, as well as the development of transducers, mechanical design, integrated logistics support, warranty, maintenance, spare parts supply, marketing, and sales. During this time, TÜB TAK B LGEM will develop the software and hardware components of the main unit. It is reported that the first product will be ready for use within two years, including associated tests.

New Business Model in the Defense Industry

One of the key outcomes of the Digital Underwater Communication Telephone (D-Satel) project is the business model implemented by TÜB TAK B LGEM and KoçSavunma. The contract for the development of the Digital Underwater Telephone (D-Satel) was signed between KoçSavunma and TÜB TAK B LGEM on May 24, 2022. The product will be marketed under the KoçSavunma brand, and TÜB TAK B LGEM will receive service and licensing fees for each sale. KoçSavunma will produce D-Satel, which will be developed in cooperation with TÜB TAK B LGEM, and fulfill marketing activities and after-sales services for these products both at home and abroad.



LIVE

SAHA EXPO 2022 Panel 1

26 Oct Wednesday 11:00-12:30

Women in the Defence Industry

Moderator

Dr. Alime ÖZYILDIRIM
Deputy Manager - TUBITAK Space Technologies Research Institute

Panelists

Zeynep Bodur OKYAY
President & CEO - KALE Group

Filiz AKKAŞ
Chairman & General Manager - MAPSIS Metal, Aerospace & Defence Corp.

Meysun A. ÖZGÜN
Manager - ASELSAN Balistic Missile Defence Systems

Hülya AKHAN
Manager - BAYKAR Human Resources

SAHA EXPO 2022 Panel 2

26 Oct Wednesday 11:00-12:30

Regional Cooperation Opportunities in the Defence Industry

Moderator

Murat ÖZDEMİR
Presidency of the Republic of Türkiye Investment Office Advisor

Panelists

Haluk BAYRAKTAR
CEO, BAYKAR & Chairman of the Board SAHA İstanbul

Murat İKİNCİ
General Manager - ROKETSAN

Tareq Abdulraheem Al-HOSANI
CEO, Tawazun Economic Council

Faisal Al-BANNAI
Executive Chairman of EDGE Group

LIVE

LIVE

SAHA EXPO 2022 Panel 3

26 Oct Wednesday 15:00-16:30

International Cooperation in the Defence&Security

Moderator

MUSTAFA İLKER ÖZDEM
Ministry of Commerce, General Directorate of Exports, Deputy General Manager

Panelists

Dr. Uğur ZENGİN
Executive Vice President at Turkish Aerospace

Abdurrahman Şeref CAN
Head of Aircraft Department- Turkish Defence Industry Agency

(R) Air Vice Marshall Nigel MADDOX
UK Defence and Security Exports Senior Military Advisor

Angela ESSEL
Head of UK's Joint Security and Resilience Centre (JSaRC)

SAHA EXPO 2022 Panel 4

26 Oct Wednesday 16:30-18:00

Risks and Opportunities for the Defence Industry in the Changing Global Security Conjuncture

Moderator

(R) Gen.Ergin SAYGUN

Panelists

Osman OKYAY
Vice President of KALE Group & Chairman of the Board SaSaD

Hakan ALTINAY
ALTINAY Technology Group Chairman of the Board

(R) Lt.Gen. Uğur TARÇIN, PHD
Lecturer - Marmara University & SAHA MBA

(R) Lt.Gen.Alpaslan ERDOĞAN
STM ThinkTech Coordinator

LIVE

KEYVAN Aviation **Showcases its Capabilities and Services** *at SAHA EXPO*

KEYVAN Aviation, which offers the first and only certified aeronautical and navigation database service in Türkiye and the fourth in the world, is showcasing its high-tech products and capabilities at SAHA EXPO.

KEYVAN Aviation provides services of the same caliber and standards as its rivals with the aeronautical navigation data generation authorization certificate obtained from the EASA (European Aviation Safety Agency.) KEYVAN Aviation, which has detailed data for each special region in the world with the database content required for civilian and military operations, offers services to users for regional flight route planning, both military and civilian, risk management, and sensitive military operational requirements of countries, with the up-to-date Aeronautical & Navigation Database solution it generates.

In addition to search and rescue and combat missions, KEYVAN Aviation produces solutions that will minimize Türkiye's foreign dependency on navigation data services in special operations, such as V.I.P flights for government officials and end-to-end safe flight planning of the Turkish Armed Forces. The database can be used for manned aircraft operations as well as all special flights of UAV and UCAV systems.

Cooperation Agreement Signed with GE Aerospace

KEYVAN Aviation has inked a cooperation agreement with General Electric (GE) Aerospace, a major global manufacturer of avionic systems, to provide database services for flight management systems. With the signing of this agreement, KEYVAN Aviation will begin providing its aeronautical and navigation database service, developed in line with Türkiye's National Technology Move, for aircraft using flight management systems (FMS) of GE Aerospace. KEYVAN Aviation's aeronautical database will also become one of GE Aerospace's approved data providers.

KEYVAN Aviation Chairman of the Board and CEO, Mehmet KEYVAN,said that they are pleased to present their work and services to the participants and visitors at the SAHA EXPO efense and Aerospace Exhibition:

"As KEYVAN Aviation, we are participating in the SAHA EXPO Defense and Aerospace Exhibition for the first time this year. We are happy to present our work and the services we offer, especially in the military field, to SAHA EXPO visitors and participants. KEYVAN Aviation is capable of supporting V.I.P flights for government, military operations, rescue and humanitarian operations with flight planning and navigation data requirement services. In February 2022, we received approval from the EASA, solidifying our position among the countries that offer certified aeronautical and navigation databases. We recently signed a cooperation agreement with GE Aerospace. This cooperation creates innovative opportunities and value for the Turkish aerospace industry and paves the way for new prospects and initiatives in the near future. Today, we continue to grow and develop rapidly as the fourth company in the world and the first and only company in Türkiye to produce an aeronautical and navigation database, one of the pillars of the aviation industry. Our aim is to contribute to our economy, create jobs, and to increase the export profits of our country by delivering our services to other countries. We are looking forward to presenting these efforts and more to the participants of SAHA EXPO."

Kale Arge

From Türkiye's Stronghold

Indigenous Turbine Engine Solutions

KTJ3200

KTJ1750

Kale 65

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