EDGE

ACROSS AIR AND SPACE

Disruptive solutions
for a changing world

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Power to protect

In the six years since it was formed, the UAE's national defence house EDGE has become one of the industry's dominant forces, helping nations protect their interests and secure their prosperity with innovative and cost-effective solutions. In this publication, produced with FlightGlobal, we look at the changing nature of conflict around the world, and how EDGE – through disruptive technology and collaborations with leading global players – is helping its customers prepare for and respond to an ever-widening range of security threats.

Images: EDGE

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Al Marar: The nature of modern conflict is changing

EDGE

Maintaining an EDGE

The UAE defence house's innovative, disruptive and affordable technologies are helping equip customers with the assets they need to protect their national security, as more industry players around the world line up to be part of the six-year-old group's success, says its CEO

In the ancient Chinese treatise The Art of War, Sun Tzu identified the importance of intelligence to achieving military superiority over foes. When it comes to current conflicts and threats, the observations of the general and strategist are no less relevant than they were 2,500 years ago.

Rapid developments in technology – from AI to radars and advanced sensors on surveillance drones and satellites – are making it easier for those charged with protecting a nation's interests and safety to make sense of an enemy's capabilities and intentions, and, if necessary, act on that knowledge.

EDGE plays a key role in delivering those capabilities to customers around the world. "We are focused on getting the right information at the right time to the decision-maker," says Hamad Al Marar, managing director and CEO of the Abu Dhabi-headquartered defence house, which celebrated its sixth anniversary this year.

Today, risks to national security and interests may not come only from conventional armed forces, but from insurgents, drug smugglers, illegal immigrants, or saboteurs intent on doing damage to airports, IT networks, gas pipelines, or other essential infrastructure.

"The nature of modern conflict is changing," says Al Marar. "We are seeing increasing instances of cross-border smuggling and incursions. You just need to look at what effect low-cost swarming armed drones can do, or how just one individual with a drone can close an airport."

Obtaining the right equipment to detect and respond to – and ideally deter – an ever-widening spectrum of dangers, at an affordable price, is the objective of almost every government in the world as they strive to stay one step ahead of resourceful adversaries and asymmetric threats.

EDGE was formed in November 2019, as the result of the consolidation of various military and security industrial assets within Abu Dhabi, the capital of the United Arab Emirates. Since then, through rapid organic growth and a series of overseas acquisitions and partnerships, it has expanded to become one of the world's biggest defence and security companies, with $5 billion in revenues and 17,000 employees.

With over 35 businesses across five clusters – Platforms & Systems, Missiles & Weapons, Space & Cyber Technologies, Technologies &

Pictured flying over the XRANGE testing island, the REACH-S MALE drone is designed for tactical ISR and light ground attack operations

EDGE

Industrialisation, and Homeland Security – its capabilities range from ammunition to uncrewed air systems and surveillance payloads for satellites to short- and long-range missiles.

However, Al Marar insists that to ensure domestic defence capabilities for the UAE and give it a lead in export markets, EDGE does not have to do everything itself. "We don't need to design our own fighter, for instance," he says. "In terms of sovereignty we need to dominate where it is important, and those areas include air defence and intelligence."

EDGE has acquired or initiated joint ventures or partnerships with a series of foreign companies, both as a way of expanding its own capabilities or accessing an overseas market through technology transfer and industrial investment.

WORLDWIDE GROWTH

In recent years, it has taken significant or majority stakes in Estonian firm MILREM ROBOTICS, FLARIS, a Polish manufacturer of personal jets, and Switzerland's ANAVIA, a developer of unmanned rotorcraft. In Brazil, its portfolio now includes controlling shares in smart weapons manufacturer SIATT and CONDOR, a specialist in non-lethal technologies.

"Our aim is to reduce bureaucracy and to be agile"

"These collaborations have several advantages for us," says Al Marar. "They open the door for our systems to be used as part of another system, as well as giving us access to innovation." While EDGE can take the decision to invest in in-house capabilities, buying into an existing business often "saves us effort and risk".

EDGE's expansion of its industrial footprint outside the UAE has also helped it this year pass the significant milestone of achieving more than half its revenues from overseas markets – this year, the proportion is likely to be 53%.

Securing contracts with the likes of Brazil means EDGE's systems are now being demonstrated in very different environments. "We have proven surveillance technology on the UAE border and the Brazilian border," says Al Marar. "It means that we are scalable."

Elsewhere, EDGE has been investing in in-house capabilities. Two of the most significant are the launch earlier this year of its own propulsion unit, POWERTECH, and the opening of XRANGE, the GCC region's first dedicated product testing ground, on an island off the Abu Dhabi coast, in 2023.

The establishment of POWERTECH, in Abu Dhabi's Tawazun Industrial Park, was driven by EDGE's need to secure a reliable supply of piston and jet engines for its own portfolio of missiles and uncrewed air systems, although the company will also compete on the open market. Volume production is due to begin next year.

"This is very strategic and important for us, and our own consumption represents a big demand," says Al Marar, who maintains that long delivery schedules for third-party propulsion systems prompted the move. "The question for us was 'Are we in this market or not?' If we are, we must do it."

Meanwhile, although it will also be available to third-party customers, establishing XRANGE means EDGE can instantly assess its products without having to buy slots at an overseas facility. The 350sq km island has its own secure airspace and includes runways, missile firing ranges, and even a recently abandoned village and beach for

exercises in urban warfare and amphibious landing.

"We can now test our assets without waiting in queues for weeks or even months," says Al Marar. "We identify and go back and make fixes instantly, and that takes you far in terms of readiness and time to market."

Cutting lead times in this way plays into EDGE's claim that it wants to be seen as effective, affordable and nimble. "We are fast to market, but not recklessly so," says Al Marar. "Our aim is to reduce bureaucracy and to be agile. On the production floors, people are quick to show you challenges and concerns. Their feedback results in things changing. A lot of our ideas come from our people."

EDGE's extensive portfolio of defence solutions includes the AL TARIQ family of long-range missiles

EDGE

SWIFT ACTION

Al Marar, who assumed his role in February 2024 after four years as part of the group's senior management team, continues: "We are able to respond fast and at the right quality and price, and when a country is neutral like the UAE, we are able to address politics, readiness, and economics."

Although the launch of EDGE as the UAE's sovereign defence group came with much fanfare, the country had an industrial heritage in missiles, ammunition, and land systems long before 2019, pioneering the use of uncrewed air systems, both as an operator and – through its ADASI unit – a designer and manufacturer.

"We were an early adopter of drones as long ago as the early 2000s for the surveillance of oil fields and pipelines as well as our borders, so this has always been a driver for us," says Al Marar, who previously led EDGE's Missiles & Weapons cluster.

The creation of EDGE allowed the UAE to exploit the synergies of bringing all its diverse competences under one roof with a single research and development and investment strategy, as well as a powerful umbrella brand for the international market – as exemplified by its prominent presence at the Dubai Airshow and other defence and technology fairs around the world.

The next frontier for EDGE is space – as part of a wider UAE objective to become a player in everything from planetary exploration and satellites to manned spaceflight. EDGE's priority, as part of that national mandate, will be to put "eyes in the sky" in terms of sensors and other payloads on observation satellites.

"Space is all about data," says Al Marar. "We need real time awareness of what is happening on Earth, that ability to see, whether that is navigating and operating our assets, securely locating our forces, monitoring the weather, or helping us respond to disasters. For us, space is the future."

While EDGE is a state-supported entity, Al Marar insists it gets no special favours from the domestic customer. "Yes, the UAE government buys from us as the national company, but we must be competitive even at home, and this makes us competitive abroad," he says.

Al Marar maintains EDGE's growing reputation has led to a string of technology companies from around the world approaching his team keen to discuss potential partnerships. "People can see us gaining traction," he says. "And they want to be part of our success."

Switzerland's ANAVIA is a developer of unmanned rotorcraft, including the HT-100

EDGE

Making a difference

EDGE's Platforms & Systems cluster is behind some of the group's leading products and brands and is central to its growth ambitions through acquisitions, partnerships and organic expansion, says its president Khaled Al Zaabi

From armed loitering drones to armoured land vehicles, unmanned helicopters to aerostructures, EDGE's Platforms & Systems cluster contains some of the group's best-known brands, deepest expertise, and longest-established products – and its reach continues to grow.

In aerospace, ADASI has been producing uncrewed air systems for the UAE and overseas customers since 2007 – it became part of EDGE upon the latter's creation as the UAE's consolidated defence and security house in 2019.

A pioneer in the segment, its line-up includes the JENIAH unmanned combat air vehicle, the SHADOW family of guided strike munitions/countermeasures drones, and surveillance platforms such as the GARMOOSHA.

In the land and sea domains, the cluster's businesses span shipbuilding and ship repair through Abu Dhabi Ship Building (ADSB), to NIMR and AL JASOOR, makers of armoured vehicles. The EPI unit supplies structural parts for Airbus and Boeing airliners and is also a manufacturing components source for many EDGE products.

"Our aim is to have a very wide spectrum of solutions to meet a variety of challenges and use cases, and to have a high degree of competence in each one," says Khaled Al Zaabi, the president of the cluster.

He notes that one of the keys to the cluster's success is its vertical integration, with deep knowledge of design and integration as well as production, from parts to full assembly. "We have a good grasp of avionics and systems, and we have the know-how to develop platforms," he says.

EDGE's recent decision to launch its own propulsion business is part of that vertical integration philosophy. POWERTECH is close to certifying its first piston and turbojet engines and plans to launch volume production next year, with EPI making parts.

EDGE

Al Zaabi: Our aim is to have a very wide spectrum of solutions

The intention is to create a sovereign capability in engine production in the UAE, with the potential of POWERTECH engines ultimately powering other OEMs' products. However, the most important reason behind the launch is to secure supply for EDGE's own platforms, maintains Al Zaabi.

"There are not that many third-party propulsion options out there, and most of those are working at capacity. Additionally, there are many hoops of export approvals to go through. Without us doing this, we would forever be a follower," he says.

POWERTECH will empower EDGE's designers to have "limitless imagination", he states. "Currently, the first question engineers ask is what engine is available, and can they design a platform around it, instead of firstly looking at the challenge and then coming up with a solution. This will mean we hold our destiny in our hands."

He accepts that "looking at it from the outside, the decision to launch our own engine company might seem brave or even crazy", but he insists: "We have the right ingredients to venture into this area and the will to do it."

The fact EDGE will initially be purchasing its own products helps. "Starting a propulsion company today without this would be impossible" says Al Zaabi. "You would need capex and instant demand. OEMs want to deal with companies with a proven track record. We start with a long backlog of orders from the internal customer."

In terms of capability, it is also less of a leap in the dark than some might imagine. "We have been in the manufacturing industry with EPI for nearly 20 years and have a culture of precision manufacturing, so for us it is more of an incremental knowledge step," he says.

And from a wider UAE point of view, Sanad, the Abu Dhabi-based commercial maintenance, repair and overhaul business which is owned by Al Zaabi's former employer Mubadala, "already does very complex work on engines".

The Platforms & Systems cluster has also been central to EDGE's recent acquisition drive, as the group looks to diversify its suite of products and intellectual property and achieve industrial footholds in key export markets, including the USA and Europe.

The JENIAH unmanned combat air vehicle is one of ADASI's marquee products

EDGE

In 2023, EDGE secured majority stakes in two European companies: MILREM ROBOTICS of Estonia, a specialist in autonomous and robotic ground systems, and Swiss-based ANAVIA, which makes remotely operated rotorcraft of up to 750kg.

"We were looking for companies that are doing something that we don't do today," says Al Zaabi. "There is a long list of products that we are already developing in ADASI, for example, but there are solutions that we don't do."

EXPORT STRATEGY

While that plays into the imperative to "secure UAE sovereignty" in as many areas of defence as possible, a second factor behind the acquisitions has been to "make sure EDGE is an economic driver for the UAE by being an exporter", he continues.

"That means producing competitive products. Demand from the UAE alone cannot sustain a business like ours through the peaks and troughs, so we have to look at different markets, including Europe and the US."

For European nations, who want to create jobs and investment in their own industrial base and have sovereignty concerns of their own when it comes to IP, a design and manufacturing footprint is often crucial, says Al Zaabi. Often this means establishing firewalls to retain certain technologies within country.

All this is something Al Zaabi and his colleagues are happy to demonstrate. "This is the concept of a European EDGE," he says. "We are committed to full tech transfer and security of supply chains to create genuine European products."

This could entail "developing solutions for Europe and Europe only, including those for which the UAE is not even a customer". He adds: "Our objective is to add value to and complement existing industry, which will lead to local job creation."

The same goes for the USA, the world's biggest defence market and also defence industry, where the Department of War [formerly Defense] has already procured EDGE products.

These include MILREM's THeMIS (tracked hybrid modular infantry system), an autonomous vehicle designed to resupply frontline troops over the "last mile", one of 19 nations, including eight NATO members, that have done so.

Al Zaabi describes the new venture with US manufacturer Anduril Industries to develop a vertical take-off and landing uncrewed air vehicle as "something we are super excited about." Anduril, he says, "shares our culture and mindset", which will allow EDGE to "directly address" DoW requirements.

EDGE, says Al Zaabi, is "globally, one of the top OEMs in the world. Our ambition is to maintain that trajectory to the top of the leader board". However, despite the backing of the UAE, one of the richest nations per capita, he insists that the company gets no free passes and must strive hard to achieve its goals.

"We have an extremely demanding end user that has access to most of the technologies in the world, so they impose a high bar. They push us hard to provide the right solution," he says.

"They are a customer that is tech-savvy but also extremely commercially aware, and one that is thinking decades down the road. It means we come out of it really honed to address global demand."

Al Zaabi is 'super excited' about partnership with Anduril to develop the Omen VTOL platform *(See P15)*

EDGE

Measure for measure

With almost every country facing pressure on defence spending, dealing proportionally with security risks is vital. That is where EDGE can help, with value for money solutions to confront a range of threats, such as relatively unsophisticated armed drones fired en masse against a target

With certain airborne threats, confusing or disabling the drone or aircraft is often a more desirable approach

EDGE

Speak to any defence minister and they will admit to three objectives: to maintain an effective deterrence against a wide range of threats by having the best equipment available for their armed forces; to procure as much as possible domestically to ensure national sovereignty; and to stick to a budget.

Of course, those aims require the sort of political and economic trade-offs that lead to sleepless nights. No country can afford every capability it might like – fifth-generation fighters and aircraft carriers are out of reach for most. Seeking best value and addressing the most pressing national security risks is crucial.

Where you buy is also important. Most countries would love to source as much as possible from national industries. This secures supply chains; retains valuable intellectual property (IP) in-country (or allows states to choose with whom they share it); and creates high-tech jobs and the potential of export revenue.

However, not even the world's military and industrial powerhouses, such as the USA, have the luxury of a purely domestic supplier base. Investing in home-grown technologies and infrastructure is expensive and takes time, even for those who can, in theory, afford it.

Usually, the law of comparative advantage, or simply the fact that no national expertise or manufacturing base exists, compels countries to look for more economic and efficient solutions abroad.

AFFORDABLE DEFENCE

There is also the question for politicians and armed forces chiefs of lethality imbalance. Recent conflicts, such as that in the Red Sea, have shown the deadly effectiveness of relatively low-cost loitering munitions and other armed drones, and raised the question of how to counter them.

One answer has been to deploy billion-dollar air defence systems, designed to deal with the threat of highly sophisticated long-range cruise missiles rather than so-called kamikaze drones, mass produced for a few thousand dollars each and fired in swarms. Effective perhaps, but hardly value for money.

This sledgehammer-to-crack-a-nut quandary faces growing numbers of countries as they reassess the airborne threats they face. And it is one EDGE is determined to address with, among other offerings, its affordable counter-UAS systems.

"Countries need a full spectrum of solutions," asserts Khaled Al Zaabi, president of EDGE's Platforms & Systems cluster. "You don't need a [Lockheed Martin] F-16 or a [Raytheon] Patriot to take out a Shahed [Iranian-made drone]."

He adds: "The counter solution should always be cheaper to deploy than the threat. The solution is not a battery of missiles unless the threat is an enemy fighter or a strategic missile. No one glove fits all. It's all about providing a solution in a cost-effective manner."

Although EDGE provides counter-UAS systems that destroy the target, when it comes to swarming attacks, confusing or disabling the drone is often a more desirable approach, he says, and that is where directed energy weapons or DEWs come into play.

> Seeking best value and addressing the most pressing national security risks is crucial

Another example of a new, technologically disruptive solution that offers customers a cost-effective and highly versatile option to strike strategic targets is DARK WING, a high-speed, precision, multirole guided munition that can be launched from air or ground.

"DARK WING isn't just another missile," says Al Zaabi. "It's a new family of effectors designed to change how we think about precision strike. It combines modular seekers, configurable warheads and multiple deployment options, and can conduct different mission sets without a different platform for every role.

That versatility is what makes it truly highly cost-effective. With every component built on EDGE technology, it remains sovereign, scalable and compatible with existing systems. It blurs the line between drones and missiles and brings industrial scale, flexibility, and affordability to a market that has long been defined by single-purpose solutions."

As part of its focus on value, EDGE stresses its ability to deliver price-competitive solutions and dependable delivery schedules because of its vertical integration, whether that is engines built in-house by its new POWERTECH entity or controlling the supply chain through its parts manufacturing unit EPI.

EDGE has invested heavily in developing its own capabilities since its formation in 2019. As well as POWERTECH, it has set up a dedicated test and evaluation facility on an island off

the coast of Abu Dhabi, XRANGE.

Under its president of Technologies and Industrialisation, Dr Chaouki Kasmi, EDGE has devoted considerable effort to research and development, establishing centres of excellence for electro optics and radar and electronic warfare, as well as its Learning and Innovation Factory (LIF), a crucible for new shopfloor ideas.

Part of Kasmi's remit is to drive down the cost of manufacturing and of bringing new products to market by streamlining the industrialisation process under what are known as industry 4.0 principles, and LIF plays a role in this.

"There is a huge acceleration in this area," he says. "It's easy to talk about industry 4.0, but it's difficult to adopt and design new techniques without this sort of internal test facility, or sandbox. It is a way of trying out innovations before adopting them across the organisation."

Process innovation, six sigma principles, rethinking shopfloor design, adopting robotics into production lines – all can be piloted at LIF. "We are ready for whatever wave hits us," he says.

Artificial intelligence too plays a part in his industrial revolution. "It is never ending because every day there is another innovation in AI," he says. "We are looking at the use cases for AI across all our entities."

To the outside world, EDGE may be a defence contractor, but underneath it is a tech business, he says: "We are leading the way in the likes of AI, quantum, and new generation materials. All our cluster presidents are technology experts and enthusiasts."

Despite this, there are times when EDGE has decided not to do everything itself, but to look overseas to fill technological gaps in its portfolio. "Three years ago, we mapped out what capabilities we were missing, explains Rodrigo Torres, group chief financial officer.

"If we'd waited to develop that expertise in-house, we might have taken years. So instead, we started to identify those companies that could accelerate our progress," he says.

EDGE's launch of its own engine manufacturing capability is part of its drive to add value and control the supply chain

EDGE

STRATEGIC PARTNERSHIPS

EDGE's approach to acquisitions and collaborations has also established strategic industrial footholds in key export markets. And it has given those companies partnering with or joining EDGE the opportunity to harness capital and resources while retaining IP and securing or creating jobs.

The past three years alone have seen EDGE add more than a dozen foreign companies to its roster either through joint ventures or majority stake acquisitions – where the seller keeps its management team and identity.

Purchases have included autonomous land systems manufacturer MILREM ROBOTICS of Estonia, and Switzerland's ANAVIA, which makes vertical take-off and landing systems of up to 750kg for missions such as surveillance, mapping, inspection and light cargo.

ANAVIA's key products include the HT-100 unmanned rotorcraft, capable of carrying loads of 60kg, and its larger sibling, the HT-750, with a payload capability of 750kg. Both types are projected as replacements for manned helicopters.

> To the outside world, EDGE may be a defence contractor, but underneath it is a tech business

In Brazil, EDGE acquired 51% of CONDOR, a specialist in non-lethal technologies, and a 50% stake in smart weapons developer SIATT, while its recent joint venture partners include Spanish technology company Indra – to make radar systems – and Italian shipbuilder Fincantieri.

EDGE's philosophy with acquisitions is to acquire overall control but to leave existing owners with a significant share and management in place. "We don't try to change the company," says Torres. "We want the existing team to stay and develop the company."

In terms of joint ventures, motives may include helping a partner open a door to UAE and Gulf markets on one hand or giving EDGE easier access to NATO customers on the other. In other cases, it is about securing a platform to install EDGE technology.

And EDGE is still on the look-out for acquisition or joint venture targets. "We continue to seek new capabilities and products that are out there, including in segments that we are not in, like subsea," concludes Torres. "Ultimately, we are looking for partners that share our spirit. It is all about win-win."

The versatility of DARK WING is what makes it highly cost-effective

EDGE

Island of opportunity

In the shallow coastal waters southwest of Abu Dhabi city, a short drive from the E11 highway, Abu Al Abyad is the largest island in a long archipelago. Flat, sandy, and with clusters of trees and bushes, it would be largely unremarkable except for the fact that the entire 350sq km expanse is the only multi-domain training, testing, and evaluation range in the Middle East, Africa and much of Asia.

Established in 2023 on a former royal island – the palace and an uninhabited village remain – XRANGE provides local and international customers a chance to fire short-range missiles, fly unmanned and piloted aircraft, trial signal-jamming technologies, and even conduct special forces urban warfare and amphibious landing exercises. Accessible from the mainland by a single road and bridge with a succession of security gates, the facility is a safe and secure environment.

Run by a team of experienced range experts from around the world, XRANGE serves as a technology accelerator, helping engineers make evidence-based decisions about the safety and operational use of their products, fast tracking development, and shortening time to market. Its facilities include runways, firing ranges, its own dedicated airspace with an electronic warfare corridor, and a real 2.5sq km village for close-quarter battle training.

The resource is vital for EDGE's ambitious growth plans. "This is strategic. Without this, we couldn't proceed," says Haitham Awinat, the acting CEO of REMAYA, the EDGE entity responsible for XRANGE. "Our mandate was to give industry fast access to testing. Now, what used to take weeks or months, booking time at an overseas facility, can be done in days or even hours."

Because XRANGE was a "new capability" for the UAE, REMAYA began with a "blank sheet", according to Awinat. This was a challenge and an opportunity. It had to build the site in a "very short space of time" without a template. On the other hand, REMAYA was able to include a wide range of features, which are still being added to. A "can do" attitude from the start means "we never say no to requests, unless there is a safety or environmental issue", says Awinat.

The island's size is one of its biggest advantages. There is room for flight trials, alongside live missile and explosive tests – weapons can be fired air to ground or even ship to shore. A drone village, with streets and alleyways created from 350 shipping containers, allows for artificial intelligence training of autonomous aircraft to recognise urban structures and patterns. This is something that is useful for both military and civil applications, such as urban parcel deliveries.

Recent expansion has included a second, 1.2km asphalt runway alongside the existing 3.8km runway, to support an expansion of uncrewed air systems operations. There are also plans for a vehicle blast and ballistics test centre to test the resilience of civilian or military armoured vehicles to withstand threats such as anti-tank mines or rocket-propelled grenades.

A development plan that kicked off in May will see the opening of more hangars, additional offices, and a second command and control centre. Eventually, there will be an accommodation block to allow visiting personnel to overnight on the island. The aspiration is to increase the proportion of international customers using XRANGE to 30% by 2028, says Awinat.

EDGE

With its runways and other test facilities, XRANGE serves as a technology accelerator

The next frontier

Exploiting opportunities beyond the Earth's atmosphere – both in the defence and commercial arena – is a priority for EDGE, which is playing a key role in an evolving UAE space ecosystem

The UAE has travelled far in space since launching its first satellite – Thuraya-1, a telecoms platform built by Boeing – 25 years ago. Since then, its progress has been extraordinary, with the nation sending astronauts to the International Space Station in 2019 and 2023 and its Hope probe to Mars in 2020.

The latest project is 813 – the Arab world's first home-grown Earth observation satellite and named after the year said to mark the start of the Islamic Golden Era of intellectual advancement – developed by teams from 11 Middle Eastern countries, led by the UAE.

EDGE is "well positioned to be a champion in the evolving national space ecosystem", working with a series of local partners and with the UAE Space Agency as the "guiding force", explains Waleid Al Mesmari, president of EDGE's Space & Cyber technologies cluster.

"We are an advanced technology development house and a manufacturing powerhouse," says Al Mesmari. "Our role is to help create sovereign capabilities to forward the interests of the UAE, whether that is in the military sphere, or in climate conservation, disaster relief or building smart cities."

Just over a year ago, EDGE launched its new space company, FADA, a name derived from the Arabic word for the cosmos, with a mission chiefly to develop Earth observation payloads as well as other satellite technologies.

One of its flagship projects is the launch of a low-Earth orbit (LEO) constellation of advanced imaging satellites for the UAE based on synthetic aperture radar (SAR) technology, named Sirb after the Arabic term for a flock of birds. Sirb is a UAE Space Agency-led initiative.

Other programmes include AIN, a LEO optical satellite that provides high-resolution images for use in areas such as maritime surveillance, search and rescue, and climate change monitoring.

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Al Mesmari: Our role is to help create sovereign capabilities to forward the interests of the UAE

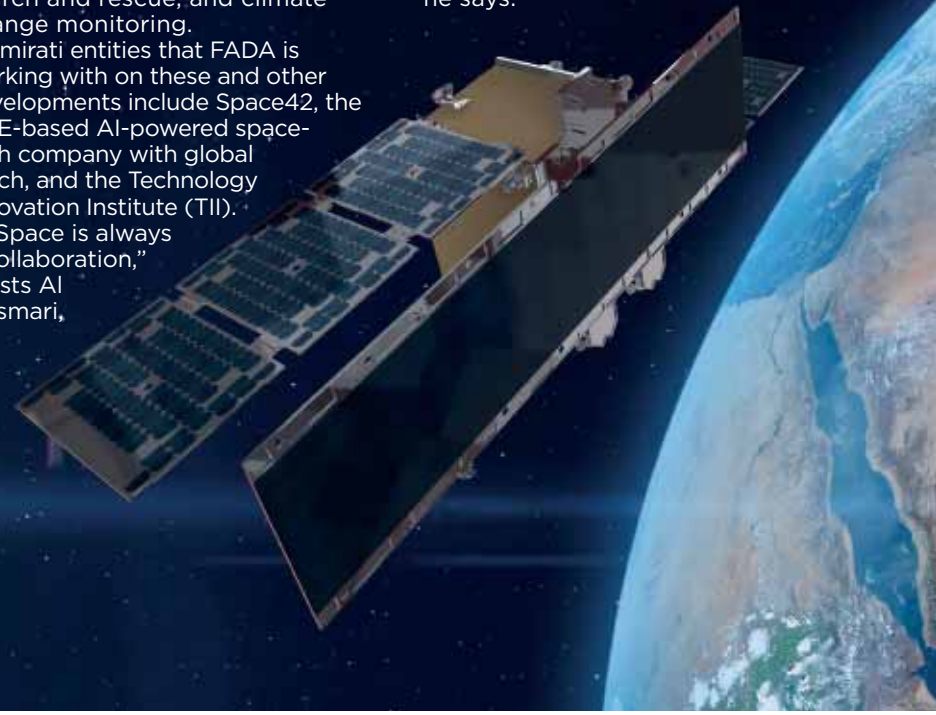
Emirati entities that FADA is working with on these and other developments include Space42, the UAE-based AI-powered space-tech company with global reach, and the Technology Innovation Institute (TII).

"Space is always a collaboration," insists Al Mesmari, with the various organisations, from research bodies to small businesses in the supply chain "all complementing each other".

EDGE's chief contribution to the UAE's space effort is to be a design authority and production resource, he adds, harnessing the group's experience in military technologies such as SAR and sensors, together with the manufacturing base of subsidiary companies such as HALCON and EPI.

And while EDGE's DNA is in the defence world, its approach to the space sector is to design technologies as dual use. "From the beginning, our strategy has been around how space can lend itself to the two domains. Our mindset is to serve both the commercial and military markets," says Al Mesmari.

"Our Earth observation capabilities and expertise in data analytics enable us to provide different applications such as disaster relief, water resourcing, urban planning, and vegetation management," he says.



"The security side is important to us too, building secure systems that can protect the UAE's interest. But by dual use licensing we can extend our market access and market share, helping to protect the prosperity of the UAE while extending a helping hand to our brothers and sisters throughout the world."

As in many other spheres, AI is playing a prominent role in the development of EDGE's space technologies, allowing the customer to make sense of vast swathes of information, explains Al Mesmari.

INTELLIGENT SYSTEMS

"When you are ingesting data from different sources, you need a way to process, cleanse, and analyse it to enable the right decision-making process," he says. "AI will help us go through this trove of data to identify, for example, which are friendly vessels, and which are potentially dark vessels."

Al Mesmari "has a dream" of constellations of satellites that "manage themselves and talk to peers", including working in harmony with lower-altitude drones. "So, with perhaps some minimal command-and-control input on Earth, these satellites are taking decisions," he says.

He offers the example of SAR-based satellites teaming with uncrewed air systems equipped with electro-optic (EO) sensors to assess the progress of a volcanic eruption. "There might be an instance when the EO won't work, so the satellite itself decides to switch to SEO, all without a human in the loop," he says.

While EDGE has a "responsibility to address national security and sovereignty" issues with its space endeavours, it also has a goal of being an export champion, maintains Al Mesmari.

"EDGE is a developer of advanced technology with affordable prices to cater for East, West, North, and South," he says. "The neutrality of the UAE allows us to access many different markets."

One solution it is bringing to market is a "federated image portal" that will allow business or government customers such as farmers or urban planners to quickly access images from a range of providers. "It's a new concept, a one-stop shop," says Al Mesmari. "We are disrupting the status quo, and that's what we do at EDGE."

As with EDGE's other business units, FADA is also playing a key role in engaging and nurturing the next generation of talent. With the UAE Space Agency and Space42, it recently hosted a Space Roadshow at six Emirati schools and universities, highlighting the many opportunities in the UAE's burgeoning space sector.

> AI is playing a prominent role in the development of EDGE's space technologies

Sirb is a UAE Space Agency-led initiative

UAE Space Agency

Connecting the battlefield

Network-centric warfare has been a mantra for military planners since the turn of the century, and industry, including EDGE, is responding with an array of technologies that give commanders more tactical awareness and ways of striking the enemy than ever

The way wars are fought changes fundamentally every generation or so. The industrialisation of weaponry meant the attritional, trench-based grind of the First World War was very different to the swift confrontations of the 1800s, while three decades later, the evolution of long-range bombers, aircraft carriers, U-boats, and tanks revolutionised conflict again. The helicopter, fighter jet, and cruise and ballistic missile were among significant breakthroughs in the second half of the century.

From the turn of the millennium, network-centric warfare – where battlespace dominance is achieved through central control of dispersed military assets using information technology – has become the decisive doctrine. Today, advances in electronic warfare (EW), autonomy, stealth, cyber technologies, satellites, and artificial intelligence (AI) offer military chiefs greater tactical awareness and more options than ever.

Equipment such as smaller and lighter drones and faster, more versatile smart munitions – coupled with data sourced from a network of satellites or surveillance platforms in the skies – means even junior commanders on the ground have a real-time knowledge of the battlefield and a range of solutions unavailable to their predecessors.

EMERGING TECHNOLOGIES

Just some of the developments that strides in AI, autonomy, unmanned traffic management (UTM), and ISTAR (intelligence, surveillance, target acquisition, and reconnaissance) make possible are swarming drones – uncrewed air vehicles that act in concert like a flock of birds or school of fish – and loitering munitions that can circulate unseen over a target for hours waiting for the ideal opportunity to strike.

To that list can soon be added quantum technology, which will make possible even more reliable navigational and timing systems on weapons, and more secure battlefield communications. All these are technologies that EDGE is developing considerable expertise in. "We are designing for current and future warfare," declares Omar Al Zaabi, president of the group's Commercial cluster.

This is highlighted by EDGE's current portfolio of platforms, missiles, weapons and other capabilities, as well as some of its key products under development. One of the most notable of the latter is Omen, a next-generation medium-sized vertical take-off and landing (VTOL) autonomous air vehicle on which it is collaborating with US defence technology firm Anduril and unveiled at this year's Dubai Airshow.

Omen will offer the speed, endurance and autonomous performance of larger, fixed-wing platforms in a VTOL format that means it can operate independently of runways, a crucial advantage in a conflict zone where the nearest airfield might be many kilometres distant. The aircraft will also provide secure beyond-line-of-sight connectivity, another vital factor in battlefield awareness, whether over land or sea.

Meanwhile, the AL TARIQ range of precision guided missiles from the EDGE entity of the same name gives battle planners the ability to launch accurate, all-weather, long-distance stand-off engagements against stationary or moving targets, in a GPS-denied environment. The system uses imaging infrared and laser dual-mode seekers and has lock-on before launch

EDGE has developed expertise in a range of missile and unmanned technologies

EDGE

Technological breakthroughs are enabling commanders to have better awareness of the enemy's movements and intentions. Pictured flying over the XRANGE testing island is the HUNTER 2-S autonomous loitering munition

EDGE

(LOBL) and after launch (LOAL) capability. Maximum range is 120km, but EDGE is working on extending it to 200km.

Lighter weaponry from EDGE's HALCON stable that is in service includes the 290km-range, 1,100kg take-off weight SABER, an air launched cruise missile, developed for the UAE air force, and able to fly at 20,000ft. The turbofan-powered platform can carry a payload of 350kg and cruise at Mach 0.8, using satellite communications to navigate.

Meanwhile, two of the loitering platforms from EDGE's ADASI entity that play a role in the networked battlefield include the SHADOW 50, a 9h-endurance uncrewed aerial vehicle that can deliver precision strikes up to 250km away. With advanced guidance features and onboard video navigation, the 2.14m-long SHADOW 50 can deliver payloads of up to 50kg.

TACTICAL PRECISION

At the lighter, tactical end of the market, the fixed-wing, 13kg HUNTER 2-S loitering munition has an endurance of 45min and range of 50km. The weapon, capable of carrying a 2kg payload, is tube-launched and hovers over the target zone, with a remote pilot designating the target and deciding when to engage.

EW and sensors also feature high in EDGE's development objectives in the tactical warfare arena, with two recently established centres of excellence – for radar and EW, and also for electro optics – under the leadership of Dr Chaouki Kasmi, president of Technologies and Industrialisation. As

AI "is everywhere" when it comes to the evolution of electronic warfare

with almost every other new product area from EDGE, AI "is everywhere" when it comes to the evolution of EW, radars, and sensors, says Kasmi.

At the Dubai Airshow, EDGE is unveiling its latest radar. The AL HARRIS-X (AHX), is a multi-function, next generation active electronically scanned array (AESA) – or as EDGE describes it a "digital element scanning array" – radar that is moving from prototyping to test phase. The product uses AI to process data tracks and give command and control operators the critical information they need about an incoming asset's trajectory or profile, while speeding up decision making.

According to Kasmi, AI – along with other breakthroughs such as autonomy, datalinks, and the miniaturisation of platforms and payloads – is driving a revolution in tactical warfare, enabling commanders to have even more awareness of the enemy's movements and intentions, precise targeting, and a reduced risk of collateral damage. These are trends that EDGE – as one of the world's most technologically-led defence companies – is addressing daily with its ever-evolving offering of products and solutions.

Beyond platforms and payloads, EDGE is advancing the digital

The AHX is a next-generation AESA radar

EDGE

backbone of the battlefield, integrating cyber and electronic threat intelligence within a unified C5ISR framework. Under an AED 4 billion contract, the group is also equipping the UAE armed forces with a suite of secure communications systems, including KATIM sovereign encryption boxes, anti-jam software-defined radios, and sovereign data links.

"The strength of any force now rests on the integrity of its networks and the information it relays," says Waleid Al Mesmari, president of Space and Cyber Technologies. "Our goal is to guarantee secure, continuous connectivity and a unified operational picture across every domain."

Dominating the skies

Sixth-generation jets, UCAVs, and counter-UAS systems are among the solutions nations are turning to in their quest for air superiority over rivals. EDGE is playing a major role in delivering key technologies

The latest, sixth generation of fighter jets, due to enter service by 2040, will redefine the concept of air superiority. The likes of the Boeing F-47, under development for the US Air Force, the UK/Italian/Japanese Global Combat Air Programme (GCAP), and the Franco-German Future Combat Air System (FCAS) will feature advanced stealth and artificial intelligence-powered threat analysis and be capable of real-time data exchange with other aircraft and ground stations.

Beyond the West, China, with its J-XX, and Russia, with the Sukhoi Su-25 Checkmate – revealed at the Dubai Airshow in 2021 – have their own advanced combat aircraft projects in the works, signaling that the drive for air dominance, in a future conflict or as a deterrence, remains a major objective for all the big powers. With almost all these programmes, the intention will be that partner nations come in as industrial participants and customers.

Although the sixth-generation types are almost certain be flown with a pilot on board – at least in their initial iterations – all are designed to operate as part of a wider network of piloted and uncrewed assets that uses AI and autonomous systems to speed decision making. Those technologies, together with the emergence of ever more sophisticated and capable drones, are set to transform combat tactics and the way armed forces achieve air superiority.

While Top Gun fighter pilots are still likely to be in demand for many decades to come, autonomy has become decisive in the race for dominance in the skies, with Fortune Business Insights forecasting that the global autonomous aircraft market will triple in size to more than $22 billion by the end of the decade, propelled by AI-enabled mission systems, the need for value-for-money operations, and the ability to achieve force projection while reducing risks to pilots in contested environments.

Uncrewed air vehicles (UAVs) are becoming ever more relevant in the air domain as force multipliers, and AI is set to enhance their capabilities further, according to Hamad Al Marar, managing director and CEO of EDGE, who notes that the UAE – through EDGE predecessor companies – was "an early adopter" of drone technologies in the early part of the century. "They play a role in both air defence and intelligence. Autonomy has always been a driver for us," he says.

Autonomous assets are these days able to offer commanders a series of options when it comes to achieving air superiority. While uncrewed combat air vehicles (UCAVs) able to operate with minimal human intervention are still on trial, there have been huge advances in the capability of surveillance drones, counter-UAS systems, and so-called loyal wingmen programmes. These are AI-controlled unmanned aircraft able to operate alongside piloted jets in electronic warfare, decoy, and air defence suppression roles.

The compact JERNAS-M can carry payloads of up to 100kg EDGE

EDGE has been an early adopter of drone technologies, including the SINYAR jet-powered UCAV

EDGE

The best-known example of a loyal wingman platform – or collaborative combat aircraft (CCA) – is the Boeing MQ-28 Ghost Bat. Developed by Boeing in Australia for the Royal Australian Air Force – and the first type designed in the country since the Second World War – the MQ-28 has accumulated more than 150h of flight time since taking to the skies in 2021. Trials have included establishing data links with a Boeing E-7A Wedgetail airborne early warning and control aircraft and operating in concert with multiple aircraft.

While EDGE does not have a purpose-built CCA in its portfolio, the ADASI JENIAH UCAV can perform many loyal wingman duties, such as suppressing enemy air defences and providing critical precision strike capabilities across land and sea. Unveiled in prototype form at the IDEX defence fair in Abu Dhabi early this year, the fully autonomous, low observable, less than 4t maximum take-off platform cruises at Mach 0.7 and can deliver payloads of up to 480kg.

TACTICAL INTELLIGENCE

ADASI's medium-altitude, long-endurance (MALE) REACH-S is another example of an asset equipped for an air superiority role. The 120kg payload, fixed-wing UAV is designed for tactical intelligence, surveillance, and reconnaissance (ISR) and light ground attack operations, can take off and land autonomously, and has a 200km range. A sister platform, the compact JERNAS-M, has many of the same capabilities, and can carry payloads of up to 100kg.

While EDGE has developed more than a dozen UAV and UCAV platforms in house, it is also working with overseas partners on programmes in the air dominance and aerial intelligence segments. One of the most notable is its tie-up with US-based Anduril Industries, announced on the first day of this year's Dubai Airshow. Under a joint venture, the two companies will develop a medium-sized, vertical take-off and landing (VTOL) autonomous air vehicle called Omen.

Anduril's proven Lattice command-and-control architecture will enable the aircraft, which will be part-designed and manufactured in the UAE, to operate on autonomous, collaborative missions. According to EDGE, Omen will offer the speed, endurance, and autonomous performance of larger, fixed-wing platforms in VTOL format, able to operate independently of runways. The two companies will work together to develop a series of payloads.

The joint venture with California-based Anduril – the first of its kind between EDGE and a major US contractor – shows how the UAE company is now regarded as a peer of some of the world's leading defence players. "There is no longer a major gap in terms of technologies," says Khaled Al Zaabi, president of EDGE's Platforms & Systems cluster. "We have advanced solutions in HALE [high-altitude, long-endurance] and MALE. In many instances, we can offer the same mission capabilities [as US or European manufacturers], but at a fraction of the price."

While offensive assets are a vital part of achieving aerial superiority in any conflict, equally crucial is networked, integrated air defence – directed energy weapons, interceptors, and other sensor technologies to counter threats from mortars to loitering munitions or so-called kamikaze drones and hypersonic missiles. One of EDGE's most significant contributions in this field is its alliance with Rheinmetall on the Skynex short-range air defence system.

Powering up

EDGE entity EPI is today a highly respected supplier of build-to-print aerostructures, mostly for commercial airliners – its products include components for the Boeing 777X's vertical stabiliser and engine pylons for the Airbus A320.

"Today, we're an airframer that happens to make turbo machinery components. Tomorrow, we will be a turbo machinery company that happens to make aerospace components."

That is the bold claim of EPI CEO, Michael Deshaies. Bold, because the engines he refers to – from EDGE's newest offshoot, POWERTECH, a neighbour in Abu Dhabi's Tawazun Industrial Park – are still some way off volume production.

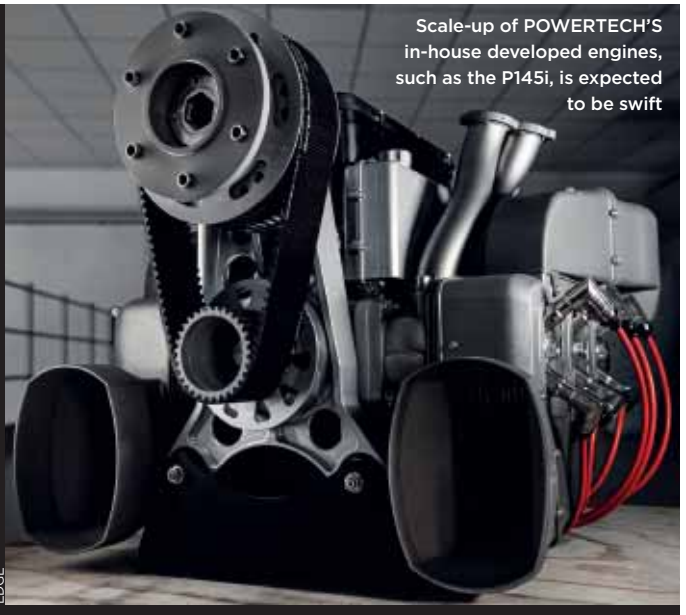
However, as Deshaies points to blueprints for a new kilometre-long engine production complex adjoining EPI's current manufacturing plant, there is no doubt of EDGE's ambition to become the largest manufacturer of propulsion systems for uncrewed air systems (UAS) in the next few years.

Its aspirations are driven by need. EDGE is a major producer of UAS and missiles and wants to be an even bigger player. Thus far, its products have been powered by engines sourced off the shelf. But supply chain snags have made the market less reliable – hence EDGE's decision to rapidly invest in in-house capability.

And despite POWERTECH's early products still being at the development stage, scale-up is expected to be swift, with POWERTECH's CEO Marian Lubieniecki anticipating the launch of output next year.

"We'd originally earmarked 2027 for production, but decided to shorten the timeline by one year," he says. "We are now aiming to be ramping up production in the middle of next year, with full-scale production in 2027."

By then, POWERTECH is aiming for an initial annual output of between 1,000 and 2,000 microjet engines – ranging in thrust from 400 N to 1,200 N – as well as "a couple of hundred" pistons for powering small to mid-size drones. "It might be more, but that's our initial target," says Lubieniecki.



Scale-up of POWERTECH'S in-house developed engines, such as the P145i, is expected to be swift

EDGE

While EPI is new to engine manufacturing – which often involves precision rotating parts made of superalloys rather than the rigid titanium and aluminium components common in aerostructures – Deshaies is confident EDGE has the skills and machinery for the job.

It has invested heavily in state-of-the-art seven- and nine-axis milling and turning machines, as well as creating a "propulsion manufacturing innovation centre" to prepare for what Deshaies calls a "massive development to handle propulsion manufacturing."

Lubieniecki says POWERTECH has three guiding objectives: to produce propulsion systems that fit the customer's requirements, to help the UAE achieve national sovereignty in propulsion manufacturing, and to create a sustainable, long-term business.

"All the pieces of the puzzle are in place," he says. "We have the resources to mass produce, and we need to start as soon as possible. We don't have the luxury of waiting until the end of the decade, because someone else will eat our lunch."

Under a partnership announced at IDEX in 2023 with the German firm's subsidiary Rheinmetall Air Defence in Switzerland, EDGE unit HALCON is supplying the system's missiles, with SKYKNIGHT. The multi-target, short-range air defence weapon is the first counter-missile, counter-UAV, and counter-rocket, artillery, and mortar (C-RAM) designed in the UAE. Four missile launch units can intercept up to 80 targets simultaneously. The SKYKNIGHT development is nearing completion. "We are putting a lot of effort into getting it to the end of its maturity cycle with 70% of the development complete," says Saif Al Dahbashi, president of EDGE's Missiles & Weapons cluster. While EDGE has complete design authority and manufacturing responsibility for the missile, it is cooperating with Rheinmetall on the control nodes and multi-sensor unit. "We are involved with the programme across the board," he says.

The HALCON SKYKNIGHT forms the missile component of the Skynex short-range air defence system

EDGE

According to Al Dahbashi, nations are increasingly looking at having a full array of air defence solutions. While Raytheon dominates the top of the market with the Patriot anti-ballistic missile system, "layers are important" when dealing with a range of threats. This means identifying them and choosing the correct response – which may involve disrupting, jamming, or redirecting a missile instead of destroying it. And while this process has traditionally been manual, AI will speed decision making when minutes and even seconds are crucial.

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