

INNOVATION

FROM A HOBBY TO THE PEAKS OF TECHNOLOGY

Originally a family business, Baykar Machinery produces the world's most advanced unmanned aerial vehicles with technical experience and knowledge

BY AHMET USTA

BAYKAR MACHINERY IS an automotive auxiliary industry company that was founded in 1982 by Özdemir Bayraktar. Despite producing sensitive instruments for various automotive manufacturers with CNC machines until the late 90s, Özdemir Bayraktar, General Manager and founder of Baykar Machinery, is a mechanical engineer that has had a passion for aviation and aircraft all his life and also possesses an amateur pilots' license. "My father would spend his weekends drawing aircraft plans when we were children," says Haluk Bayraktar, Özdemir Bayraktar's son and the manager in charge of engineering. Selçuk Bayraktar, another brother, is R&D leader of the company. The role of Özdemir Bayraktar's sons is very great in directing the company toward the manufacture of unmanned aerial vehicles (UAVs), as Haluk Bayraktar is a graduate of Middle East Technical University Industrial Engineering Department and continues to pursue his doctorate in Business at Boğaziçi University. works on and devices solutions for complex problems such as how helicopters can land on straight walls with aggressive maneuvers. Selçuk continues to work on his doctorate in aviation at the Georgia Institute of Technology.

The history of global UAV production dates back to World War I. However, few developments took place until the early 90s due to the lack of microprocessors, sensors, and software technology. Technologies developed after the 90s have made it easy to convert an airplane into an unmanned vehicle by placing sufficient processing and sensing systems in it. This development process continues to develop at a rapid pace and the USA's vision report in this field clearly demonstrates the importance of UAVs in the future. According to the report, fighter fleets will become entirely unmanned within the next fifteen to twenty years. This is a crucial insight for the usage of UAVs in the Turkish Armed Forces (TSK), which has the largest active military after the USA and China. "We started out with the thought of Turkey's needs concerning unmanned aerial vehicles, its active military structure, highly developed engineering , and competitive manufacturing infrastructure," says Haluk Bayraktar, adding "We focused on import oriented guidance control systems that were bound to International Traffic in Arms Regulations (ITAR)." Baykar Machinery's decision to operate in this market is a significant turning point, as it is not easy for the Turkish Armed Forces, which supplies



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only 25 to 40 percent of its requirements domestically, to own a UAV without being dependent on external sources.

"In order for us to possess a fully independent military, we have to develop this technology ourselves," says Selçuk Bayraktar.

One of the factors that make UAVs so important is ordinary human limitations to flight. Once systems required to support human life (including safe ejection seats) are removed from the aircraft, directing it toward much more dangerous and perilous areas becomes far easier. In addition, UAVs can fly without the support of professional pilots, and can be flown by technical personnel that have only received basic training. "Looking at the areas where they are used, we see that UAVs play an important role in operations in Iraq and Afghanistan," says Haluk Bayraktar, and adds, "Particularly in recent years, missile and bomb systems possessing significant power can be added to UAVs.

PARADIGM SHIFT

"Developing its own UAVs is of vital strategic importance for Turkey, and our goal has always been to meet this need," says Haluk Bayraktar. Getting into the production of UAVs without having produced a single domestic military plane may seem strange, but Selçuk Bayraktar says, "UAVs represent a paradigm shift," adding, "Instead of decking all of Turkey in telegraph cables; you could use the latest-technology wireless networks, gaining the chance to leap before everyone else. Currently, we possess the opportunity to attain a distinct place in UAV production in the world, as we possess the required and adequate knowledge and infrastructure for this"

Producing an UAV requires expertise in several areas of engineering. In countries like the US, UAV production usually takes place by procuring components from several different manufacturers and assembling those components. Because there is no such infrastructure in Turkey for the production of UAVs, Baykar Machinery has become the sole company operating in all these areas. Baykar Machinery, which currently employs twenty engineers in disciplines ranging from machinery to electronics, computers, avionics, robotics, and control systems and a total of thirty-five employees,

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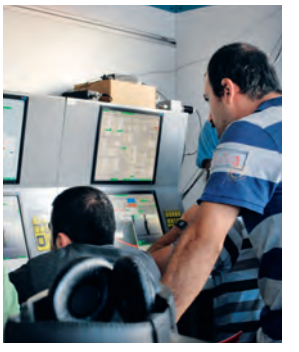
offers various UAV solutions produced entirely in Turkey. The first UAV that was produced domestically, the Bayraktar Mini UAV 200, was found to be successful in the test flights organized by the Ministry of Defense in October and November 2005. Over 150 Bayraktar Mini UAVs have entered service since the first delivery was made to the Turkish Armed Forces (TSK) at the end of 2007. "The Bayraktar Mini UAV was the first fully-domestic aircraft that entered the TSK's inventory," says Selçuk Bayraktar. The personnel, whose primary jobs do not entail piloting and who number almost 250 after training, are comfortably able to fly the Bayraktar Mini UAVs with the control systems on the ground. The Bayraktar Mini UAV, which possesses a flight time of over 20,000 hours, possesses much more advanced features than the American Raven and the Israeli Skylark.



ITAR monitors all purchases regarding manned or unmanned aerial vehicles and importing such systems is bound to very strict rules

The most advanced UAV solution currently provided by Baykar Machinery, which produced the unmanned helicopter named "Malazgirt" immediately after this success, is the tactical vehicle named "Çaldıran," which was produced on contract for the Defense Industry Undersecretariat. It is a vehicle with a 9-meter wingspan, 5.5 meter-long hull, and 14 hours of uninterrupted flight time at altitudes of 23,000 feet. The Çaldıran, which can carry 40 kilograms of weight, is equipped with a daytime camera, a thermal camera, laser pointer, laser distance sensor, and a laser guidance system for missiles. It is also the first UAV that can function entirely automatically from the time it leaves the hangar until it re-enters it. Its flight tests have been successfully completed in the presence of official delegations, and a decision has been made by the Executive Board of the Defense Industry, the highest board, for initiating negotiations.

Özdemir Bayraktar indicates that they aim to serve Turkey's vision of full independence while also underlining that their greatest aim is to reach an independent technological infrastructure in this area. Meanwhile, in addition to having products that exceed global standards, the persisting necessity of considering Turkey's UAV R&D efforts and aims as a national policy is quite significant

In the world at large, it is estimated that 30 billion dollars will be set aside for UAV purchases and 17 billion for R&D efforts until 2017. That the income generated by 800,000 tons of grain could be earned by selling a single UAV represents a peerless opportunity both in terms of Turkey's technological assets and sufficiency as well as the accession of companies like Baykar Machinery to the international platform.