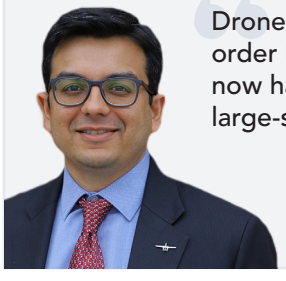
January, 2023

asteria aerospace

THE DRONE CHRONICLE



> Drone companies now have a clear growth roadmap, large order books and promising future trajectory. In India, we now have drones being used in real-world, impactful large-scale applications, while being economically viable.
>
> **(Excerpts from interaction with BBC)**

Neel Mehta,
Co-founder & Director | Asteria Aerospace Limited

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Automation & Artificial Intelligence in Indian Agriculture

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Strengthen Enterprise Security with Drone-Based Surveillance

A200 - INDIA'S FIRST MICRO-CATEGORY DRONE WITH DGCA TYPE CERTIFICATION

DGCA issues first micro-category drone certification to Asteria Aerospace under Drone Rules 2021

On the certification issued, Neel Mehta, Co-founder and Director of Asteria Aerospace Limited, said, "It is a matter of great pride for us to receive the first micro category drone certification from the DGCA. The certification makes Asteria's A200 drone fully compliant with the Drone Rules 2021, which is a requirement for drone operations in India. We are committed to leading the way in providing best-in-class, compliant drones to our customers to fulfil applications at scale."

Asteria Aerospace Limited, a full stack drone technology company, has received India's first micro category drone type certification for its indigenously designed A200 drone from the Directorate General of Civil Aviation (DGCA). Asteria's A200 drone was found to be fully compliant with the Certification Scheme for Unmanned Aircraft Systems notified in January 2022.

Asteria's A200 drone has been developed for surveying and mapping applications in GIS, agriculture, construction, mining, and other industries. The A200 has a survey-grade GPS and a high-resolution imaging camera which can be used to accurately map land parcels, making it ideal for projects like the SVAMITVA scheme, in which the government is using drones to digitize and establish clear ownership of property in rural parts of the country. In agriculture, the A200 drone can be used for precision mapping of farms to accurately monitor crop growth and health, assess damage, and capture visual records for insurance claims amongst other purposes. The micro-sized drone from Asteria can also be used by Remote Pilot Training Organizations to impart pilot training to individuals seeking to acquire Remote Pilot Certificate.

The A200 drone is a rugged, reliable, and performance-driven multirotor drone that weighs less than 2 kg and has advanced features including automated take-off and landing, 'return to safety' capability in the event of a breakdown or malfunction, single pilot operation, tool-less assembly and disassembly, and a flight time of up to 40 minutes. It is available with survey-grade PPK GPS and both RGB imaging and Multispectral imaging camera options, making it an ideal surveying and mapping drone for applications across industries.
The DGCA categorizes drones based on their weight. Drones with an all-up-weight of 250 g to 2 kg fall under the micro category of drones. The drone certification scheme was introduced by the Quality Council of India, which consulted experts from the industry, government, and academia to build the scheme. The drone certification scheme is brought into effect to facilitate the production of quality drones in India that can be exported across the world.

DRONE TECHNOLOGY: DRIVING AERIAL INNOVATION ACROSS INDUSTRIES

The Indian drone industry is growing by leaps and bounds, and new applications for drones are being uncovered with every passing day in the country. While drone technology evolved to primarily serve military forces, today it finds uses in sectors as diverse as agriculture, oil & gas, mining, telecom, and healthcare – to improve operational efficiency, safety, and cost. With rapid advancement in technology, innovation in its use, and integration with other emerging technologies such as 5G, AI/ML, IoT, drones have the potential to create a widespread impact in every industry.

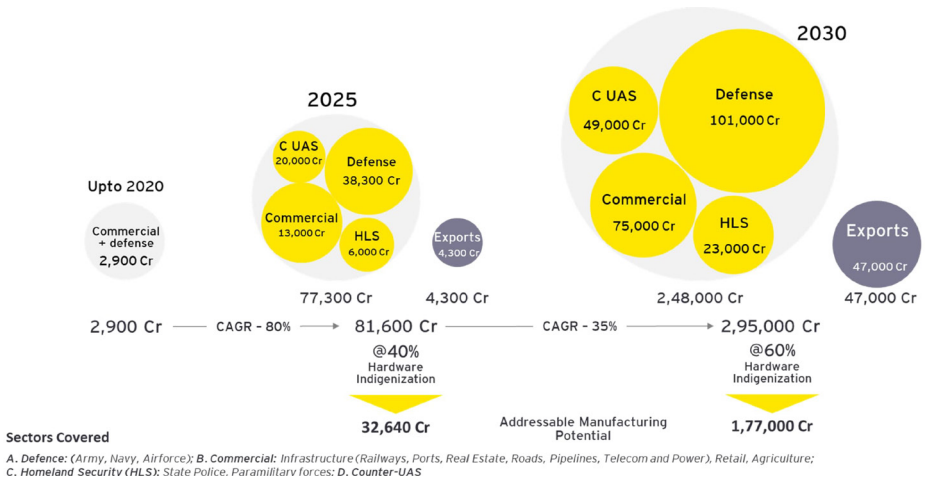
One of the largest deployment of drones in the country has been initiated as part of the SVAMITVA scheme in which drones are being used for mapping the land parcels of 6.6 lakh villages across India to create accurate digitized property records. Today, more than 2 lakh villages have already been surveyed using drones making this a globally unprecedented technology for rural development.

POWER OF AERIAL INTELLIGENCE AT YOUR FINGERTIPS WITH SKYDECK

SkyDeck is a cloud-based drone operations platform that facilitates the delivery of Drone-as-a-Service solutions to enterprises across several industries, including agriculture, mining, oil & gas, telecom, construction, and energy & utilities. It is an end-to-end collaborative platform that can be used to automate flight missions, manage data on the cloud, and collaborate across projects to enhance drone operations.

SkyDeck is a unified dashboard that utilizes the power of aerial data captured through drones for drone fleet management, scheduling and executing drone flights, data processing, visualization, and AI-based analysis of aerial data. SkyDeck ensures operational transparency, improves collaboration between stakeholders, and provides secure and centralized management for scaling drone programs across multiple applications.

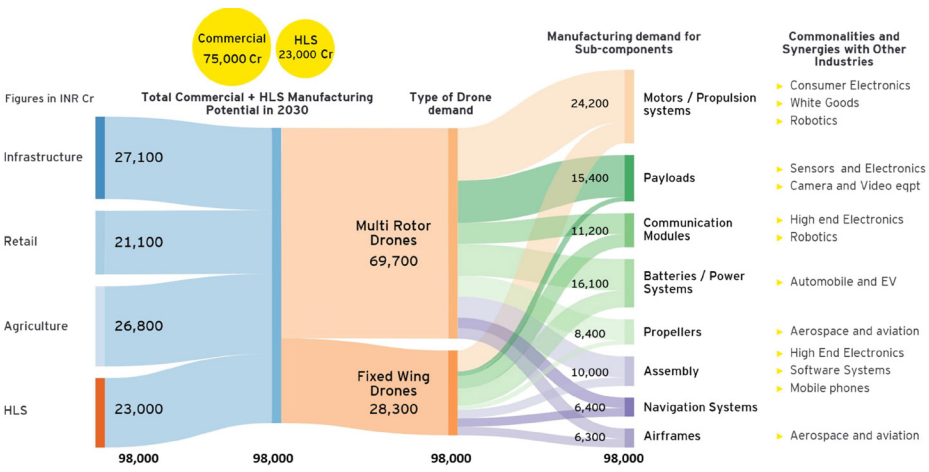
OPPORTUNITY TO REALISE INR 1.8 LAKH CRORE OF AGGREGATE DOMESTIC MANUFACTURING POTENTIAL BY 2030 - EY-FICCI DRONES REPORT-2022



EY-FICCI Drones Report-2022

The rise of the drone manufacturing industry in India will result in significant manufacturing trickle-down effects across the subcomponent value chain, right across motors/ propulsion systems, payloads, communication modules, batteries/power systems, propellers, assembly, navigation systems and airframes. These subcomponents have commonalities and synergies with allied industries, which would get a fillip in turn.

The commercial sector largely comprises infrastructure, retail and agriculture. Taken together with homeland security, it is estimated that the commercial sector will have a manufacturing potential of 98,000 crore in 2030 across fixed wing and multi-rotor drones. The manufacturing demand for the sub-components of these drones would find extant commonalities and synergies with multiple industries as depicted below.



EY-FICCI Drones Report-2022

For India to meet its manifest destiny as a drone manufacturing hub, it is essential that various ministries and departments synergize their efforts to ensure rapid progress and to overcome roadblocks on a war-footing. In conjunction, the industry needs to scale rapidly and systematically. To enable this scale-up of industry, it is crucial for the government to play a market-maker role and generate demand by adopting drone technology in transformative projects like SVAMITVA.

A two-pronged collaborative approach, encouraging startups as well as supporting large companies, would be the key to all-round success. It would be pertinent to identify a few 'anchor' companies willing to commit to manufacturing drones in India in as little time as is practicable. The government should provide an opportunity to such 'anchor' companies to present their plans and their expectations, to include the outcomes toward orchestrating a holistic and timely push towards drone manufacturing in the country.

India has introduced market leading regulations and policy interventions under the guidance of the Honorable PM, addressing both- the demand side (through drone policy) and the supply side (though PLI and import bans). The rest of the world will catch up subsequently in terms of this regulatory ecosystem and the drone market will rapidly grow worldwide, but India has a unique advantage right now. Thus, we need to act quickly to cement our position in both manufacturing and services - both to serve the local economy and be ready for the global boom.

An analogy from the IT Industry would be appropriate. One of the reasons we were able to dominate the IT services industry and be the Number One Provider of IT services in the world is that we were able to tap into our young, technically qualified workforce at a time where internet penetration and IT adoption was booming worldwide. We have a similar chance to be the Number One provider of drone related offerings globally.

WARFIELDS TO AGRIFIELDS: DRONES ARE DELIVERING ACTIONABLE INSIGHTS

As drones become increasingly sophisticated, their inclusion in military warfare is prevalent. During its ongoing war with Russia, Ukraine launched TB-2 drones - seemingly their most lethal weapon. The drones provided closed-air support and reconnaissance over the Russian air defence and even carried laser-guided smart micro munition missiles. In retaliation, Russia launched nearly 400 kamikaze drones to target Ukrainian infrastructure. The advancements in drone technology have led to an increase in their usage beyond commercial and recreational purposes.

According to the Drone Market Report 2022, the global drone market is worth an estimated $30.6 billion, with a compound annual growth rate (CAGR) forecast at 7.8% until 2030. This figure encompasses both the commercial and the recreational drone markets.

"Drone is a sunrise sector. The advances in sensor technology, autonomy, computer vision and 5G technology will redefine the usage of drones across industries for security, surveillance, asset inventory, logistics, critical deliveries and more," said Neel Mehta, co-founder and director of Asteria Aerospace.

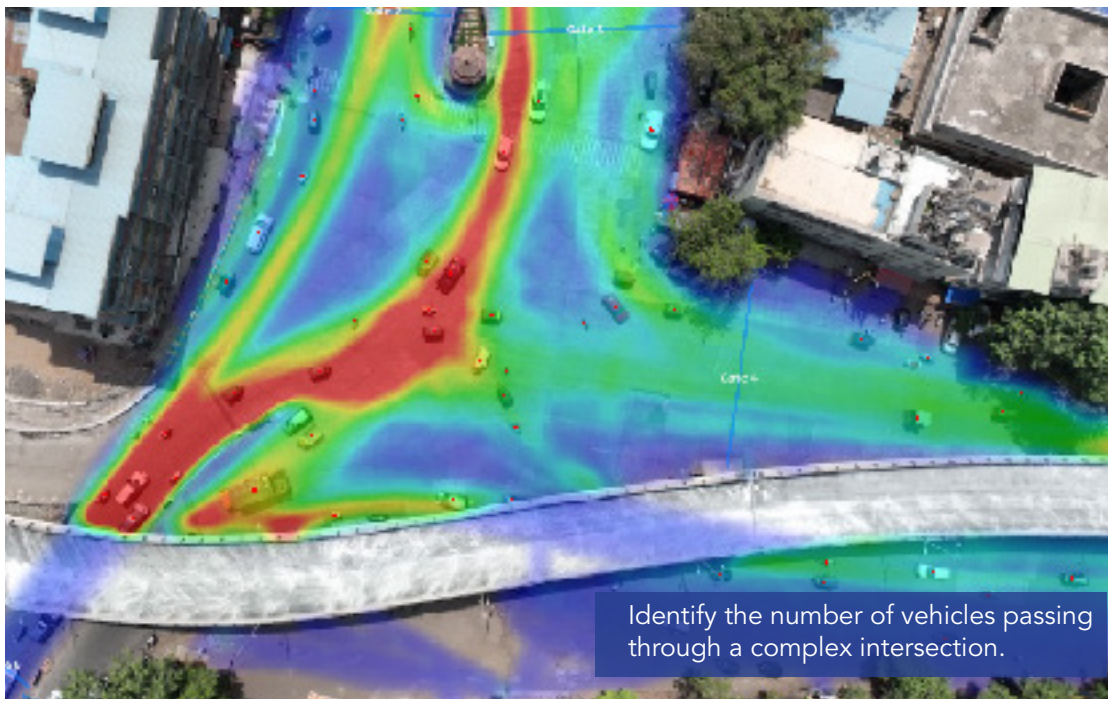
AUTOMATION & ARTIFICIAL INTELLIGENCE IN INDIAN AGRICULTURE

India is one of the biggest agrarian economies in the world. A majority of people in rural India still relies on farming as the primary source of income. India is only second to the United States when it comes to the total arable area with 394.6 million acres while it tops the list of the countries with the largest gross irrigated crop area with 215.6 million acres. Also, agriculture contributed nearly 20% to the overall GDP of India in FY 2020-21, a jump of more than 2% from its contribution in FY 2019-20.

Drones and the related drone operations platforms automate the data collection, analysis, and visualization processes and thus enable farmers to make faster and more accurate decisions for improvement of their farming practice. With drones performing in-field inspections, seed production companies can cut expenses by reducing the number of personnel required for manual analysis and inspection, minimise the ill-usage or non-usage of agri inputs, eliminate the process of manual reconciliation of data, put fixed assets and resources to a more effective use, and better utilize contracted seed production farms for higher yield.

TRAFFIC ANALYSIS WITH DRONE-BASED AERIAL INTELLIGENCE

Reliance BP Mobility Limited's collaboration with Asteria Aerospace



Identify the number of vehicles passing through a complex intersection.

About Reliance BP Mobility Limited

Operating under the brand 'Jio-bp', Reliance BP Mobility Limited (RBML) is an Indian fuels and mobility joint venture between Reliance Industries Limited (RIL) and BP. The joint venture leverages Reliance's presence across the country and its millions of consumers through the Jio digital platform. BP brings its extensive global experience in high-quality differentiated fuels, lubricants, retail, and advanced low carbon mobility solutions.

In addition to marketing conventional fuels, RBML provides advanced mobility solutions and alternate fuelling options to its customers such as Electric Vehicles (EV) charging points, and Battery Swapping Stations (BSS). The company's aviation brand 'air bp-Jio' is a leading supplier of Aviation Turbine Fuel across India. The brand 'Jio-bp Fuel4U' caters to on-demand doorstep delivery of diesel and is a market leader in the segment.

"Digital First" is amongst the five fundamental values of RBML. RBML leverages digital technologies to complement its lean organization towards driving process excellence. Building on our pioneering technology in fuel retail, Jio-bp believes in being digital disrupter of the era. Towards continued advancement of our digital ecosystem, Jio-bp is creating new Digital Business Models, investing in predictive analysis, shifting to multi-cloud solutions, increasing CRM adoption, and adopting hyper automation.

As the only oil marketing company boasting of a stable business, a growth business and a start-up business under the same umbrella; Jio-bp success story has been scripted on the backbone of technology. The adoption includes strengthening conventional technology and network deployment of industry 4.0 technologies.

Need for Innovation in Retail Fuel Site Selection

The right selection of site locations plays a crucial role to obtain maximum return-on-investment (ROI) for RBML. For site selection/validation, RBML requires vehicular traffic analysis at roads/intersections of interest near the proposed locations. Having staff manually conduct this analysis by physically visiting all these locations is a difficult, time-consuming and costly task that doesn't guarantee accurate and transparent results. RBML required a faster, more accurate and cost-effective way of gathering traffic data for site selection to ensure that its network expansion plans reach the desired outcome.

Site Selection Needs	Challenges in Manual Methods of Data Collection
Analyse traffic at roads/intersections of interest near the proposed location	Manually analysing traffic in intersection locations with multiple entry/exit roads, flyovers, is very difficult and time-consuming.
Access to data related to detection, classification, count, and speed of vehicles of interest	Collecting accurate data across multiple vehicle categories and data points manually is cumbersome.
Digital, transparent traffic records at different times of the day/week to measure ROI	Manually collected traffic data records can be prone to error and cannot be easily audited.

Asteria Aerospace's Role

RBML realised that digitization will be a key enabler and differentiator to enhance customer experience and operational excellence in their journey to expansion. RBML reached out to Asteria Aerospace to explore if the unique aerial vantage point of drones can be used to collect, digitize, and analyse traffic data for new site selection.

Asteria developed and deployed a solution for RBML to capture drone-based aerial videos above traffic intersections/roads of interest and further analyse the videos using AI/ML algorithms to generate unique traffic data insights. Asteria Aerospace simplified the process of transitioning from traditional technology to drone technology and enabled RBML to conduct traffic analysis using aerial videos captured through drones.

With drone technology expertise from Asteria, RBML was able to capture aerial videos above a location of interest, and at the same time, analyse the collected data using AI/ML algorithms to get actionable insights. By leveraging drone capabilities, RBML was able carry out flying operations in complex scenarios – intersections with multiple roads and flyovers while tracking the number of vehicles passing through different roads on a given complex intersection with over 90% accuracy.

Technology at Work

Outcomes

Asteria Aerospace, with its drone-based solutions, was able to deliver the following outcomes: Full digital and transparent record of traffic at complex intersections and highway locations using drone videos; automated detection and classification of more than seven different vehicle categories using AI/ML; traffic analysis data such as vehicle count, speed, direction across each vehicle category at multiple times of the day; Analysis of traffic speed and flow by defining gates on road locations to gather the type, count and speed of vehicles flowing in a particular direction of interest; and visualization of traffic patterns using heatmaps.

Benefits

Some of the benefits that RBML experienced with its collaboration with Asteria Aerospace include access to digitized, transparent, and auditable records of traffic data; complete understanding of traffic flow at a location with maximum situational awareness; and traffic data-driven decision making for site viability and ROI.

Business Impact

A collaboration with Asteria Aerospace provided RBML with a more efficient and error-free method of collecting and analysing traffic data to assess the viability and return of investment of setting up fuel outlets at different locations across the country.

A200-XT Micro UAV

- Flight Altitude: Up to 400 m (Above Ground Level)
- Flight Speed: 40 km/hr
- Flight Time: Up to 40 mins
- Range: 5 km (Line of Sight)
- Temperature: -20°C to 55°C
- Wind Resistance: 40 km/hr

DRONE TECHNOLOGY HAS THE POTENTIAL OF TRANSFORMING ENTERPRISE APPLICATIONS AT SCALE

We all envision a future in which automation is commonplace and technology and people work in tandem to build a smart and sustainable planet. If this is what the future looks like to you, it would be tough not to bring drone technology into this discussion. Experts who have been keeping a close watch on how drone technology is progressing are extremely optimistic about the future of drones and how they are going to change the enterprise landscape in the coming years.

Drones, also referred to as unmanned aerial vehicles (UAVs), have started to make a real difference for businesses in India. And while military drone uses still outnumber enterprise applications today, the future is expected to be bright for enterprise drones. If drone technology continues to make headway as it has been for the last few years and the support from the government continues to flow in, drones for enterprise applications will soon take over a large share of the drone market in India. From agriculture, telecommunications, and construction to energy & utilities, mining, infrastructure, delivery, and many more, the possibilities are endless.

Drones make things a lot easier. For instance, inspecting a telecom tower would traditionally require a technician to climb up and then perform the audit. This method puts the life of the technician at risk and is not as efficient as well.

On the other hand, performing telecom tower inspections with drones is a much more efficient method that provides accurate results and ensures the safety of the personnel. Similarly, drones are being used in several industries to perform tasks that were earlier performed by humans. There are several benefits that enterprises can realise by putting drones to work.

Also, the global commercial drone market is expected to explode in the next few years. According to a report released by Global Market Insights, the commercial drone market will reach a valuation of a whopping 17 billion dollars by 2024. The basis for this expansion in the commercial drone market globally, as highlighted by the global market research and consulting service provider, is the continuously growing number of applications that drones can be used in the enterprise sector for.

Today's advanced drone solutions are capable of serving multiple business purposes. What enterprises need to do in order to make the most of what they offer is find the right drone technology partner. Asteria Aerospace Limited is one such drone technology company that is helping enterprises realise the true potential of drones.

HOW ARE DRONES THE FUTURE OF SURVEYING AND MAPPING?

Conducting regular topographical surveys is very important for several industries, such as construction, mining, and infrastructure amongst others. Data collected from these surveys helps enterprises in these industries operate at a higher efficiency. However, the way these surveys are done holds key to the accuracy of the gathered data. As the traditional methods of surveying are fraught with inefficiencies, drone technology is providing a far better alternative.

Drones make the job of GIS companies easier than it used to be. By conducting surveys with drones, it becomes easier to collect, process, and deliver data in a more accurate, safer, and timely way. Surveys conducted with the help of drones can save a lot of time. Data collected from a drone survey can be processed on the same day, which means you spend less time in not only gathering and processing data but also making the right decisions

Drone surveys are cost-effective. Surveys conducted using drones cost much less than those conducted manually or through manned aircraft and satellites amongst other alternatives. With the help of drones, it is easier to survey areas that are otherwise difficult to access. For harsh terrains, cliffs, and other areas, where conventional surveying is challenging and time-consuming, drones offer a great advantage.

STRENGTHEN ENTERPRISE SECURITY WITH DRONE-BASED SURVEILLANCE

Drone technology has advanced tremendously over the years. No wonder both government agencies and private enterprises have started to realise how they can implement drone programs to not only identify potential security threats but also act faster to deal with them. The global perimeter security market size is estimated to reach USD 1,86,330 million by 2028 at a CAGR of 6.9% during the review period. Considering that perimeter security is only a part of the overall enterprise security market, we can expect the market to grow exponentially in the years to come.

There are two types of drones within enterprise security space. Routine surveillance drones act as monitoring and response systems that are both rapid and precise in helping enterprises meet actual as well as perceived security threats. Premise security drones are a great support to both security personnel and emergency responders. These drones provide real-time visibility of events and help enterprises prepare against breaches.

One of the biggest benefits of drones in security is that they allow security personnel to identify vulnerabilities that are not captured by traditional monitoring systems. Drones with thermal or infrared imaging allow 360-degree surveillance in pitch dark conditions. Drones are easier to deploy than traditional methods of security. They limit the use of human resources and thus the associated errors as well.