



C H I N A A E R O S P A C E
S T U D I E S I N S T I T U T E

“PRIVATE” CHINESE AEROSPACE DEFENSE COMPANIES



ANDREW W. HULL AND DAVID R. MARKOV
WITH ERIC GRIFFIN

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Printed in the United States of America
by the China Aerospace Studies Institute

ISBN 9798642284261

To request additional copies, please direct inquiries to
Director, China Aerospace Studies Institute,
Air University, 55 Lemay Plaza, Montgomery, AL 36112

Graphic Design by Heisey-Grove Design

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CHINA AEROSPACE STUDIES INSTITUTE

CASI's mission is to advance understanding of the capabilities, development, operating concepts, strategy, doctrine, personnel, organization, and limitations of China's aerospace forces, which include: the PLA Air Force (PLAAF); PLA Naval Aviation (PLAN Aviation); PLA Rocket Force (PLARF); PLA Army (PLAA) Aviation; the PLA Strategic Support Force (PLASSF), primarily space and cyber; and the civilian and commercial infrastructure that supports the above.

CASI supports the Secretary, Chief of Staff of the Air Force, the Chief of Space operations, and other senior Air and Space leaders. CASI provides expert research and analysis supporting decision and policy makers in the Department of Defense and across the U.S. government. CASI can support the full range of units and organizations across the USAF, USSF, and the DoD. CASI accomplishes its mission through conducting the following activities:

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- CASI conducts conferences, workshops, roundtables, subject matter expert panels, and senior leader discussions to further its mission. CASI personnel attend such events, government, academic, and public, in support of its research and outreach efforts.
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CASI supports the U.S. Defense Department and the China research community writ-large by providing high quality, unclassified research on Chinese aerospace developments in the context of U.S. strategic imperatives in the Asia-Pacific region. Primarily focused on China's Military Air, Space, and Missile Forces, CASI capitalizes on publicly available native language resources to gain insights as to how the Chinese speak to and among one another on these topics.

FORWARD

As the United States continues its shift away from the Post 9-11 era toward the era of Great Power Strategic Competition, it is important to understand with whom we are competing and the manner in which they are competing with us. Too often, we view things only through our own ‘lens’ and forget to look at how our competitors see the world and organize within it.

One of the biggest challenges that the U.S. faces today is trying to understand and dissect the military industrial base of China. The Chinese economic system, and indeed the entire structure and relationship between the Chinese Communist Party (CCP) and the state organs of the People’s Republic of China (PRC) and their “private and commercial” sector is vastly different than our own.

Following the great divestiture of “PLA Inc” by General Secretary Jiang Zemin in 1998, and after gaining admittance to the World Trade Organization in 2001, the CCP sought to remake the face of their military industrial base. The CCP transferred what had previously been People’s Liberation Army (PLA) companies into ‘private’ or ‘commercial’ hands. The PRC made a number of reforms to their economic system, under the leadership of the Party. And they sought to make China appear to be moving toward a “Socialist Market Economy”. The truth, however, was far more opaque.

Going all the way back to the days of Mao Zedong, the CCP has maintained a policy of Military-Civil Integration (军民结合). Most recently, Xi Jinping has sought to strengthen and deepen this policy, which now goes by the term Military-Civil Fusion (军民融合). In both cases, the military is the first and primary part. This was largely lost on American companies and administrations during the 1990s and 2000s as China “opened up” and became entrenched in the modern global market and supply chain. However, under General Secretary Xi, this program has taken on more significance, as has the importance of Party Committees within ‘private’ and ‘commercial’ companies. CASI has a forthcoming report on the Military-Civil Fusion system.

While by no means an exhaustive list, and companies continue to enter and leave the market all the time, this report is part of our series in trying to better understand the overall aerospace landscape within the PRC. While the first publication in this series, *Lumbering Forward*, sought to describe the State-Owned Enterprises (SOEs) involved in PRC aerospace, this publication seeks to simply describe the ‘commercial’ aerospace industry of the PRC. We have attempted to identify commercial aerospace companies, and further break out those companies with one of three traits:

- The company has an official (codified) relationship with a State-Owned Enterprise or state entity (non-military) that may indicate unfair access to intellectual property/research not typically available to a private commercial entity.
- The company receives funding from an SOE or state entity (non-military) that may be indicative of an unfair advantage in a competitive market.
- The company receives funding or research support from a military entity that is not tied to a procurement purchase (i.e. it is not a simple exchange of PLA money for a product).

At the very least, we hope this makes the competition more apparent, and the ties to Party, State, and Military a little more clear. At best, this will help western companies understand what they are competing against, and help them, and their governments, know who they may in fact be partnering with, as China continues its going out strategy, particularly as part of the Belt and Road Initiative.

CASI would like to thank the team at the Institute for Defense Analyses for their work on this project, and MSgt Eric Griffin for digging deeper into the links between these companies and the Communist Party and its PLA.

Dr. Brendan S. Mulvaney
Director, China Aerospace Studies Institute

SECTION I: BACKGROUND

General Secretary Xi Jinping and other senior Chinese Communist Party leaders are implementing policies designed to make China a science and technology superpower as well as to build a military capable of fighting and winning high-tech wars. General Secretary Xi has promulgated a strategy for achieving military modernization. He emphasizes the importance of “unifying” Chinese power by reducing barriers between commercial industry and the defense industrial base. Initiatives are underway to make large, state-owned defense enterprises more efficient, globally competitive, and innovative by drawing upon the commercial sector for inspiration and innovative dual-use products. This initiative is manifested in the national “Military-Civil Fusion” campaign launched in 2012.

Chinese leaders envision military and civilian innovation resources being “constructed together and shared” (共建共享). Their ultimate goal is to create “military-civil fusion” (军民融合) as a means of reducing barriers between the private sector and the defense industrial base to bolster the Chinese innovation system for dual-use technologies through “integrated development” (融合发展). Success, however, requires combining market forces with state guidance to guarantee full military-civil fusion.



Chinese Poster Touting Military-Civil Fusion¹

China's leadership believes opening the military equipment market to "private" and "commercial"ⁱ firms will make dual-use breakthrough technologies available to the military more quickly and thus effectively tackle "bottleneck issues" in the production of weapons and equipment. Long Hongshan, chief engineer at the State Administration of Science, Technology, and Industry for National Defense underscored this view by asserting China will spare no effort to boost private companies' participation in developing and producing military equipment.²

Private firms are seen having an overwhelming edge in many high-tech areas because they are well informed about the latest global breakthrough technologies, are more agile than state-owned companies in pursuing new technologies, and are driven by profit incentives to push technological change to customers rather than take the traditional "sit and wait" approach of hidebound state-owned defense industries. It is also hoped that the participation of, and competition with, private firms will reduce acquisition costs for the Chinese People's Liberation Army (PLA).

The Chinese leadership is taking unprecedented steps to facilitate the entry of private firms into the defense industrial base. Over the past 5 years or so, the Chinese leadership has encouraged private firms to market products to the PLA. This encouragement has taken several forms. In May 2014, the General Armament Department of the PLA introduced policies intended to reduce market access thresholds for private businesses, ensure fair market competition and encourage private enterprises to participate in the production, maintenance, and research and development of military equipment.³ Policies also included simplifying licensing procedures, improving pricing mechanisms, and reforming procurement systems and tax policies for military equipment.⁴ Three years later, the General Office of the State Council issued the policy guidance "On Promoting the Deep Development of Military and Civil Fusion of National Defense Science and Technology Industry," which advocated further expanding military research and production capacity by "breaking the boundaries" between military and civilian sectors.⁵

Examples of this policy abound. The PLA opened the Jiuquan Satellite Launch Center to private space launch companies. Thirteen technical experts from private companies were appointed to the PLA Rocket Force's National Defense Science and Technology Expert's Panel upon its founding. The *PLA Daily* report announcing the appointments went on to emphasize that the experts from private industry would receive the same treatment as their counterparts from state-owned enterprises.⁶ Another example is the Wing Loong II unmanned aerial vehicle. Over 300 private companies provide approximately 60% of its 130 million parts.⁷ Additionally, the state-owned Chengdu Aircraft Corporation subcontracted final assembly and integration of Wing Long II export orders to the private sector firm Xin Jing Aviation (鑫旌航空) because Chengdu lacked sufficient final assembly and integration capacity to meet market demand.⁸

The Chinese government also encourages private firms through targeted state funding. *Financial Times* estimates (based on public documents and State media reports) that China has created a capital fund of RMB 387 billion (\$55.6 billion) to fund private sector companies that develop technology with potential military applications.⁹ Local governments and state-owned companies pooled resources to create at least 14 funds to finance private companies with defense applications between 2016 and 2018.¹⁰ Another study identified 42 military-civil fusion investment funds collectively, totally at least \$73 billion.¹¹ One of those funds, the "Military-Civil Fusion and Aerospace Information Industry Development Fund," concentrates on developing the aerospace industry. Such funds provide decreasing levels of funding to new private firms for a set period. At the end of that period, companies are expected to sink or swim on their own.

The efforts to increase the participation of the private sector in military procurement are bearing fruit. Various reports from China have scoped the growth of private commercial companies supporting defense-oriented programs, an example being an April 2017 story in *Global Times* that claimed that more than 1,000 Chinese

i The terms "private" and "commercial" are used here in the most generic sense in that they are not wholly owned by the Chinese state, CCP, or PLA. Although these terms have specific meanings and connotations to an American audience, it is important to realize that companies operating within the PRC are never truly independent from the Communist Party, even private firms must have a CCP Party Committee. Additionally, the Military-Civil Fusion program and associated laws mandate that private or commercial firms turn over any and all requested material or technology to the state upon request.

private commercial companies had gained approval “to enter the military industry.” *Global Times* also reported that a number of private space-related companies in China grew from 80 to 141 between 2016 and 2019.¹²

Over the last few years, there has been an increasing number of private Chinese commercial companies marketing defense products at AirShow China, especially manufacturers of unmanned aerial vehicles, and dual-use products at the Consumer Electronics Show (CES) over the last few years. At AirShow China 2014, for example, nearly 25 private commercial companies exhibited products. By AirShow China 2016, that number exploded to over 250 private commercial companies displaying unmanned systems and major aerospace sub-systems. These numbers continued to increase at AirShow China 2018 to over 350 private commercial companies. According to the most recent numbers published in China in 2018, nearly 1,400 “private” commercial entities are now providing finished products and sub-assemblies to various Chinese state-owned defense enterprises and directly to the Ministry of National Defense.

SECTION 2: APPROACH

This paper uses open-source information to identify and describe Chinese private companies in the defense aviation, aerospace, and space sectors. Although the list of companies is extensive, it is not all-inclusive. Undoubtedly, there are some private Chinese defense and dual-use companies that do not appear because of their ever-growing numbers or their non-appearance at arms exhibitions. What appears are the private Chinese defense companies that could be identified within the time and resource constraints of the project.

The companies were selected for inclusion in this paper based on several criteria. First, the candidate had to be a company rather than some other type of entity, e.g., association or institute. Second, it had to be a private company and not a state-owned enterprise. Third, business activities had to be in the aviation or aerospace sectors. Fourth, the enterprise had to be producing a complete end item, sub-system going into an end item, and/or materials used in constructing the final system. Companies supplying consumables like food, petroleum products, or tires were excluded.

Identifying “defense” companies was more challenging. For the purposes of this report, “defense” is defined in several ways. First, a defense company is an enterprise that explicitly advertised that it was making a product for the People’s Liberation Army or police/public security forces. Alternatively, a defense company is one that stated it engaged in military-civil fusion. The products of some companies fell in neither of the first two categories but were dual-use items inherently applicable to both civil and defense goods, e.g., aviation manufacturing processes, aviation materials, aerial reconnaissance, aerial crop spraying. Companies with dual-use products were included because many such dual-use items are finding their way into defense products.

Data gathered about enterprises of interest is presented in a common format: (1) company name in English, (2) company name in Chinese, (3) company logo, (4) company website address,¹³ (5) location (usually the full address in the form presented by the Chinese) in English, (6) address in Chinese, and (7) short description of the firm’s activities and product lines. Individual company entries are collected into general aerospace product categories, e.g., unmanned aerial vehicles, aircraft engines, materials, satellites, and space systems. Sometimes product lines fell into more than one category. In those cases, we chose the single category that seemed best, but listed all product lines in one entry rather than have multiple entries for a single company. Individual enterprises are listed alphabetically within each category based on the corporate name. In a few instances, companies are known under more than one name. In those cases, we provided both names in the same entry.

SECTION 3: IMPACT

Western observers often discuss Chinese military-civil fusion as if it was a *fait accompli*. That is not the case, at least for now. This continues to be more aspirational at present. Nevertheless, there are a number of key questions to address. How successful will the Chinese be in realizing full military-civil fusion across the entire technology spectrum? What will be the impact on Chinese aerospace capabilities? What does Chinese military-civil fusion mean for American military aerospace capabilities? Each of these questions is worthy of in-depth analysis but goes beyond the scope of this paper. Nevertheless, we will offer a few preliminary thoughts on those topics and identify some factors that will influence the implementation of the overall Chinese military-civil fusion strategy.

The following factors are some of the influences that will shape the course and determine the success of military-civil fusion.

- **Law of Large Numbers:** The sheer size of investment alone almost guarantees some positive outcomes, some of which will be unexpected, just like America's enormous investment in the manned space and "Star Wars" programs.
- **Evenness of Success:** Success will likely be uneven across sectors because of the differing capabilities and experiences of private firms with defense needs and processes. For one thing, the PLA Air Force's ability to incorporate commercial technologies that will require changes to its procurement system, operational concepts, and standard for reliability may also lead to uneven absorption of dual-use technologies from private companies. As one study noted, some technologies such as artificial intelligence offer great potential to boost combat power but currently lack the high level of reliability desired in military systems and so may be confined to a reserve role until they and supporting technologies become more mature.
- **Commitment of Private Firms:** It also remains to be seen how many private companies have gotten on the military-civil fusion bandwagon just to take advantage of newly available resources rather than to provide tangible contributions to PLA capabilities. The level of seriousness by companies in marketing to the PLA is a make-or-break factor for the success of military-civil fusion.
- **Corporate Experience:** Success in translating commercial technologies into military systems will greatly depend on the nature of the private companies and their experience with defense products. Firms like GuoXing Aerospace Technology will have an advantage in translating potential dual-use systems into military technologies because its founders came from military units and research institutes doing defense research and development. Another example is A-Star Aviation Industries Company, whose founders came from China Electronic Technology Corporation (CETC). A-Star has shown clever and cutting-edge electro-optical targeting systems and electronic warfare systems for fighter aircraft at both the Moscow Air Show and AirShow China. The ability of A-Star to develop advanced military products stems in part from its employees' familiarity with military requirements and military systems. The authors' experience from attending the Consumer Electronics Show (CES) in Los Vegas over the last few years suggests that the military potential of many advanced civilian technologies goes unrecognized by commercial firms.
- **Technological Sophistication of Chinese Firms:** One of the cardinal principles of Chinese discussions of military-civil fusion is the assertion that private sector firms are on the cutting edge of technology and/

or have access to advanced foreign technologies. This is not true in all sectors. Chinese civilian aircraft engines, for example, are just as far behind world standards as are Chinese military aircraft engines.ⁱⁱ This situation is likely to persist for a long time because of the relatively poor quality of Chinese civilian aircraft engine technology and aggressive efforts by major foreign producers to keep the Chinese from obtaining critical proprietary processes and techniques. The contributions of private firms in the aircraft engine sector, therefore, will probably be limited to second-order technology breakthroughs in areas like materials. This suggests that the payoff of investments in military-civil fusion will be uneven across the entire spectrum of military products.

- **Market Forces versus State Guidance:** As noted earlier, Xi Jinping has emphasized the full implementation of military-civil fusion will require combining market forces with state and Party guidance. Effectively combining these diverse perspectives will be difficult.
- **Impact of Politics:** The Chinese Communist Party under Xi Jinping has increasingly strengthened its control inside both state-owned and private enterprises. Party committees now have a major role in making investment decisions and personnel appointments. The same is happening to foreign firms operating in China. The Party is pressuring foreign companies to amend joint venture agreements to allow the Party to have the final say over business operations and investment decisions. The primacy of politics over economics and technological decision-making criteria does not bode well for dual-use technology transfer and innovation. China's experience operating the first Su-27 fighters received from Russia illustrates the potential dampening effect of politics on technology. The Chinese were disappointed in the performance of the first Su-27s. Upon investigation, the Russians found the problem lay in the PLA Air Force assigning the politically best pilots instead of the technically most proficient aviators to fly the Su-27. Will the Chinese leadership curb their appetite for politically-based decision-making? Doing so could go a long way in accelerating the passage of cutting-edge high-tech into the PLA.
- **Transforming Research and Development into Achievement:** According to Chinese researchers, despite heavy investment in defense research and development, China's rate of transforming research and development into achievement has traditionally been comparatively low to that in the West. The transformation rate for Chinese aerospace and weapons industry was 15% to 20% in 2008. That compares to Western European countries typically operating at a 50% to 60% level and the United States at about 80%.¹⁴ *ShanghaiDaily.com* published an article in June 2014 noting the same phenomenon in a non-defense industry where the utilization rate for patents was "very low" for all types of Chinese industry according to Chinese government sources.¹⁵ The Chinese are trying to improve the situation, as evidenced by a May 2019 *People's Daily* article describing China's efforts to increase the payoff of investment in research and development.¹⁶ Success, in doing so, will determine the level of the relative effectiveness of military-civil fusion.
- **Readiness and Willingness of the PLA to Absorb and Assimilate Advanced Technology:** Military-civil fusion will fail to live up to its goals if innovative, cutting-edge technologies do not translate into PLA capabilities. Transition is not guaranteed. Chinese military literature is replete with anecdotes about PLA units receiving high-tech equipment but not using it because of low personnel skill levels and/or human and logistics limitations at the unit level. There are even some stories of units receiving new equipment without operational or maintenance manuals.

The news media and professional defense journals are awash with articles expressing concern for the implications of Chinese military-civil fusion for U.S. military capabilities, but for now, it is still too early to judge the ultimate impact of Chinese military-civil fusion because the process has only just begun. Chinese literature is emphasizing the hope and potential of military-civil fusion rather than offering case studies focusing on the fruits of the process. If the Chinese do not yet know the outcome, neither can analysts in the West.

ii For more information on the Chinese aeroengine sector, please see CASI's report "China's Aeroengine Industry", April 2020.

SECTION 4: TIES TO PARTY, STATE, AND PLA

In addition to identifying companies, a deeper analysis was needed in order to paint a more detailed picture of the level of risk that might be involved when dealing with one of these companies. This was done through open-source research looking for any indications of additional state, party, or military ties. When information was found that suggests additional relationships, a “supplemental” section was added to the corresponding company’s profile. If no additional information was found, no supplemental section was added, but that does not necessarily indicate a lack of relationship, just that one was not able to be documented. The following table is a summary of findings from the supplemental research.

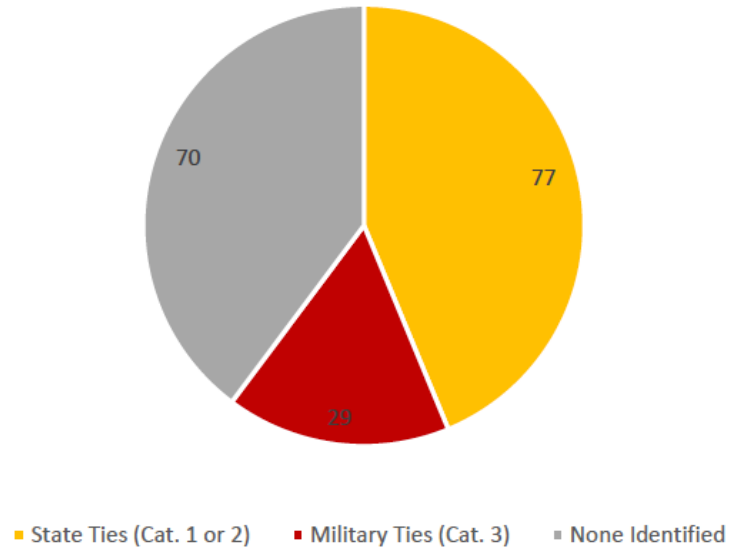
Much of the information described in the table below could be found from a simple scan of the company profiles on their own main webpages. In an attempt to either gain favor and/or take advantage of the opportunities provided by the state for being involved with this initiative, many “privately owned” businesses have shifted their efforts to increase the focus on the military-civilian fusion. Additionally, there remains a substantial list of reasons why one should remain vigilant when considering cooperation with any foreign entity, especially in the area of defense contracting in the PRC. Not only are many of the CEOs, board members, and employees former PLA members, but in a number of cases they are active party members with strong ties to the CCP, and the PRC government. This is of particular note because, as of this writing, retired PLA officers are prohibited from working for State Owned Enterprises (SOE) and their subsidiaries, but they are allowed to work for consulting firms, or private and commercial companies, who work with those SOEs. Additionally, as has been reported on elsewhere, all companies- SOE, commercial, and private- are required to have a Communist Party Committee within the leadership structure. The influence of these committees have varied over time, as well as company by company, but they are required by law, and under the leadership of General Secretary Xi Jinping, seem to have increased in importance and activity.

Further, while investment information is sometimes publicly available, it is not always easy to find the underlying connections to state-owned enterprises who have a large stake in the holdings of any particular privately-owned business in China. All of these factors were considered when sorting information to make subsequent decisions for the information provided in this table. It is also important to note that in some cases, due to limited internet access to some **websites** behind the great firewall, the absence of an entry on this list is not an indication that a particular company is void of one of the risks mentioned above. Ultimately, we decided on three scenarios that most accurately categorized each company as being of potentially high risk:

1. The company has an official (codified) relationship with a State-owned Enterprise (SOE) or state entity (non-military) that may indicate unfair access to intellectual property/research not typically available to a private commercial entity.
2. The company receives funding from an SOE or state entity (non-military) that may be indicative of an unfair advantage in a competitive market.
3. The company receives funding or research support from a military entity that is not tied to a procurement purchase (i.e. it is not a simple exchange of PLA money for a product).

This chart assigns the corresponding number to each company depending on which criteria it mee/ts from one or more of the three situations outlined above.

Risk Factors in PRC Commercial Aerospace Defense Firms



108/183 = 59% have questionable participation with either SOE and/or Government agencies. 35/108 (32%) of those had direct ties to and or obvious evidence of participation with the PLA.

For a more exhaustive list of companies outside of the aerospace industry, there is a recent report done by the Office of Commercial and Economic Analysis (OCEA) titled “PLA-Affiliated Company Assessment” which gives an in-depth look into a wide range of companies and their potential affiliations with the PLA.

SECTION 5: COMPANIES

UNMANNED AERIAL VEHICLES (UAV)

Beihang UAS Technology Co., Ltd.

北京北航天宇长鹰无人机科技有限公司

Website www.buaauas.com/en/about/company

Location Jiaojang District, Taizhou City

[台州市椒江区]



Beihang UAS Technology is an offshoot of the Beijing University of Aeronautics and Astronautics (BUAA). It develops and produces medium-altitude long-endurance UAVs, light aircraft, and airborne/ground equipment.¹⁷ Among its products is the TYW-1 strike-capable reconnaissance UAV. It also produces the BZK-005E (Changying / Long Eagle) long-range reconnaissance UAV used by the PLA for long-range reconnaissance and electronic intelligence missions. The Beihang offers the BKZ-005 for export. The company exhibited at AirShow China 2018.



TYW-1 Strike-Capable Reconnaissance UAV¹⁸

Beijing Chunyi Aviation Technology Co., Ltd.

北京淳一航空科技有限公司

Website www.cyuav.com.cn

Location: Room 350, Dachao Art District,
Songzhuang Town, Tongzhou District, Beijing
[350室, 大曹艺术区, 宋庄镇, 北京市通州区]



Beijing Chunyi Aviation Science and Technology Co., Ltd. mainly designs and develops fixed-wing drones, multi-rotor drones, unmanned ships, and target aircraft.¹⁹ It also does composite materials manufacturing, and product processing and manufacturing. The company's products are widely used in forest fire prevention, emergency disaster reduction, pipeline inspection, weather detection, artificial rainfall, anti-drug reconnaissance, aerial photography, and other fields. The practicability and reliability of its drones have been well received by customers such as the State Surveying and Mapping Bureau, the Oceanographic Administration, and the Meteorological Monitoring Center. Its popularity is playing a positive role.²⁰ Attended the 10th China Drone Conference and Exhibition 2019.

Ties to the CCP and/or PLA: The company has cooperated extensively with users in industries such as the State Grid, the National Seismological Bureau, the Ministry of Civil Affairs, the Bureau of Surveying and Mapping, PetroChina, and other major aviation professional colleges industries. In military use, their drones can be used for the test and training of ground anti-terrorism and air combat weapons.

Beijing Dabai Technology Co., Ltd.

[北京大白科技有限公司]

Website: www.dbuav.com

Location: No. 1 Xiazhuang South,
Wangzuo Town,
Fengtai District, Beijing 100074
[北京市丰台区王左镇下庄南1号100074]



Dabai Technology develops fixed-wing UAVs and their ancillary equipment and incorporates advanced computer development systems. It has continuously developed six different fixed wings models. Dabai series drones are widely used in geological mapping, exploration, aerial photography, forestry patrol, aerial reconnaissance, and other industries.²¹

Ties to the CCP and/or PLA: They have established strategic cooperative relationships with many large state-owned companies and agencies.



DB-4 Multi-Purpose UAV²²

Beijing Hangjing Innovation Technology Co., Ltd.

北京航景创新科技有限公司

Website: www.flightwin.com

Location: Building 7, No. 85,
Hongan Road, Fangshan District, Beijing
[北京市房山区鸿安路85号7号楼]



Beijing Hangjing Innovation Technology is mainly engaged in R&D, production, sales, and service of industrial-grade unmanned intelligent systems based on drones. The company has many types of core products, as well as a number of patented technologies and software copyrights, which have been widely used in agriculture, power, fire, logistics, emergency rescue, military police, environmental protection, and other industries.²³

Beijing Honeycomb Aerospace Technology Co., Ltd.

[北京蜂窝航天科技有限公司]

Website: honeycombs.com.cn

Location: No. 5 Haiying Road,
Fengtai District, Beijing
[北京市丰台区海英路5号]



Beijing Honeycomb Aerospace Technology Co., Ltd. specializes in design, development, production, technical training, and after-market service of UAVs and related software systems. Additionally, it claims to be “the leading domestic level” firm in small satellite research and production, space testing, and launch services.²⁴

Ties to the CCP and/or PLA: Defense industry, individual tactical reconnaissance systems, UAV equipment integrated system, police patrol surveillance, aircraft targeting, missile targeting.

Beijing Li Ou Aeronautics Technology Co., Ltd.

北京翎鸥航空科技有限公司

Website: www.liou-aerotech.com

Location: 2-039 Zhongguancun
Artificial Intelligence Innovation and Entrepreneurship Base
[2-039中关村人工智能创新创业基地]



Beijing Li Ou Aeronautics Technology relies on experts and professors from aviation colleges to do R&D on UAVs and flight control systems. The company produces a variety of UAV products with independent intellectual property rights in three series: (1) unmanned helicopters, (2) unmanned multi-rotor UAVs, and (3) large (1,500 km range) fixed-wing UAVs. The company attended AirShow China 2018.²⁵

Beijing (Northern) Sky Way Aviation Technology Development Co., Ltd.

北方天途航空技术发展(北京)有限公司(简称天途航空)

Website: www.ttaviation.com

Location: Tiantu Aviation Building,
Building 1, Shantou Industrial Park,
Ma Chikou Town,
Changping District, Beijing

[北京市昌平区麻池口镇汕头工业园区1号楼天图航空大厦]



Sky Way Aviation Technology produces mostly VTOL UAVs and some fixed-wing UAVs. The company uses commercial-off-the-shelf technology airframes that it integrates with flight control systems developed by Sky Way Aviation. The company participates in the National Eleventh Five-Year, Twelve-Five, 863, and 973 UAV Projects. It is a member of the Aviation Branch of the China Agricultural Engineering Society. It is listed as the National Defense Key Laboratory of Beihang University and a strategic partner of the Automation Department of Tsinghua University.²⁶

Beijing Rong Ding Yue Technology Co., Ltd./

Dong Fang Rong Ding

融鼎岳(北京)科技有限公司

Website: www.rdybj.cn

Location: 618, Block A,
Jiahao International Center,
116 Zizhuyuan Road,
Haidian District, Beijing

[北京市海淀区紫竹园路116号佳豪国际中心A座618]



Beijing Rong Ding Yue Technology/ Dong Fang Rong Ding is a high-tech enterprise engaged in intelligence unmanned systems and low-altitude security innovation R&D. The technical team has solid cooperative relationships with many military institutes and key enterprises in industry and maintains close ties with related military equipment departments. The company builds both UAVs and anti-drone systems. Its UAVs are used for a wide variety of purposes, including national defense, public security, civil defense, counter-terrorism.²⁷ The company received “weapon equipment quality management system certification” in September 2018.

Ties to the CCP and/or PLA: Provide military monitoring support, aerial mapping for bases, shooting ranges, military training, and major military activities.



SV360 Small Fixed Wing UAV²⁸

Beijing Tianyi Hechuang Technology Development Co., Ltd.

[北京天翼合创科技发展有限公司]

Website: www.tyhcuas.com

Location: Room 4B220, No. 11 Huadao Road, Science,
and Technology Park,
Changping District, Beijing
[北京市昌平区科技园华道路11号4B220室]



Beijing Tianyi Hechuang Technology Development is a high-tech enterprise that does independent design, development, and mass production of various types of UAVs and high-end aviation models. The company has mastered a series of patented technologies (pneumatic) design, processing technology, flight control design, and integration based on high-strength composite materials and designed and integrated a complete set of independent technologies. Intellectual property processing production line. It participated in the Fifth China UAV Exhibition 2014 that was mainly devoted to military-civil fusion.²⁹

Changzhou Huaao Aviation Technology Co., Ltd. / X-UAV

[常州华奥航空科技有限公司]

Website: www.x-uav.cn

Location: Building 16, Xixiashu Tools Industry Base,
Xinbei District, Changzhou City
[常州市新北区西夏墅工具产业基地16号楼]



Changzhou Huaao Aviation Technology Co., Ltd. is a high-tech company specializing in R&D, production and sales of UAVs. Its products cover military, agricultural, survey, disaster relief, and other fields.³⁰

Chengdu Frontier Power Technology Co., Ltd.

[成都前沿动力科技有限公司]

Website: <http://www.adicn.com/list-10-1.html>

Location: 19th Floor, Block G5, No. 1858,
Middle Section of Yizhou Avenue,
High-tech Zone, Chengdu
[成都市高新区宜州大道中段1858号G5座19楼]



The Chengdu Frontier Power Technology Co., Ltd. is a nationally recognized military-civilian enterprise jointly established by overseas returning scientific research teams and technical backbones of domestic universities, military and aerospace, weaponry, and other scientific research institutes, focusing on high-end equipment such as aircraft. At present, there are three main areas of business: autonomous and controllable computer-aided engineering software, a series of platforms based on aircraft dynamics performance simulation and evaluation systems, and a series of unmanned aerial vehicles products based on fixed-wing vertical take-off and landing.³¹

Chongqing Lejiao Aviation

[重庆乐教航空]

Website: uav.lejiaotech.com

Location: No. 11-6, Building 3,
Langjun Center,
No. 28 Huanglong Road, Longta Street,
Yubei District, Chongqing
[重庆市渝北区龙塔街黄龙路28号朗军中心3号楼11-6号]



Lejiao Aviation focuses on low-altitude drone control, technical services, training, and industrial-grade UAV airborne equipment development. UAV industry application services and modernization solutions include agriculture and forestry plant protection / power line inspection / pipeline inspection / aerial mapping / emergency response / film and television news, etc. Lejiao Aviation also trains UAV operators.³²

Chongqing Xinghuan Aviation Technology Co., Ltd. /

Aero-Starloop High Tech Co. Ltd.

[重庆星环航空科技有限公司]

Website: www.aero-starloop.com

Location: No. 28, Zhenxing Road,
Changping Park,
Science and Technology Park,
Changping District, Beijing
[北京市昌平区科技园昌平公园振兴路28号]



Xinghuan Aviation Technology is a high-tech enterprise specializing in the research, development, production, sales, and service of turboshaft powered unmanned helicopters, and related products Chairman Tian Song told reporters, “The turboshaft drone products have the advantages of stable flight, safe and reliable, high intelligence, large load capacity and good wind resistance.” They are applied to military defense and maritime affairs. Patrol, emergency rescue, power inspection, environmental testing, and other fields.³³ It displayed the Star Ring SLH-90T Turbine Shaft Unmanned Helicopter at the first China International Intelligent Industry Expo 2018. The design of the Star Ring SLH-90T appears to be optimized for signature reduction and may be coated with signature reduction material. The company participated in AirShow China 2018.



Star Ring SLH-90T Turbine Shaft Unmanned Helicopter at the first China International Intelligent Industry Expo 2018³⁴

Chongqing Yifei Zhilian Technology Co., Ltd.

重庆市亿飞智联科技有限公司

Website: <http://www.eflytec.com/>

Location: Liangjiang Aviation Industry Training
Base of Liangjiang New Area
[凉江新区凉江航空工业培训基地]



Chongqing Yifei Zhilian Technology Co., Ltd. provides military-grade high-reliability drones and related subsystems. The company's line of VTOL UAVs is used in remote sensing aerial survey, maritime cruise, power line, highway monitoring, border patrol, forest fire-prevention, environmental monitoring, agricultural meteorology, military reconnaissance, pipeline inspection, urban emergency, and many other fields. The company's YF130 compound wing drone is used for electronic countermeasures, detection, communication relay, etc. in military applications as well as for emergency rescue, security monitoring, environmental monitoring, forest fire-prevention, logistics, and transportation.³⁵

Danyang Tianda Intelligent Technology Co., Ltd.

[丹阳市天大智能科技有限公司]

Website: tianda.en.made-in-china.com

Location: No.19 Qi Liang Road,
Danyang City,
Jiangsu Province
[江苏省丹阳市七粮路19号]



Danyang Tianda Intelligent Technology Co., Ltd. is a high-tech company specializing in R&D, design, manufacture, sales, and service of high-tech agricultural equipment. Its product line includes nine pesticide spraying UAVs.³⁶

DEDA Technology Co., Ltd. / Beijing Tectang Science and Technology Co., Ltd.

北京德可达科技有限公

Website: www.tectang.com

Location: No.43 Taizhou Road,
Guangling District,
Yangzhou City, Jiangsu
[江苏省扬州市广陵区泰州路43号]

DEDA Technology developed and produced the TC-1235, TC-1210, and TC-1250 cross double rotor helicopters.³⁷ Other products include the CCNS5 aerial photography flight navigation and sensor operational management control system and IGIplan aerospace design and quality assessment software.



Model of TC Series UAV and Tang Liang Founder of the Company³⁸

Eagle Brother UAV Co., Ltd.

深圳天鹰兄弟无人机创新有限公司

Website: <http://ebuav.com/index.html>

Location: 1st Floor, HTM Sci & Tech Plaza,
3rd, Ganli Rd.

Longgang District, Shenzhen

[甘里路3号HTM科技广场1楼 深圳市龙岗区]



Eagle Brother UAV develops, produces, and sells drones. The firm also develops UAV application software, provides technical services, conducts technology transfer, and does technical consultation related to agricultural UAVs. Its research team comes from a number of places, including the National University of Defense Technology.³⁹ Its TY-787 intelligent agricultural protection drone can be automatically deployed, can fly automatically, without manual operation. The TY-787 is equipped with a 3D autonomous obstacle avoidance system that can identify the working environment and terrain by means of sensors and vision systems. It also automatically generates flight maps and trajectories to avoid barriers and in-flight obstacles dust. The firm exhibited the TY-787 at the first China International Intelligent Industry Expo 2018.

Ties to the CCP and/or PLA: Research Partners from Beihang University, Beijing University of Posts and Telecommunications, Nanjing University of Posts and Telecommunications, CAS (Chinese Academy of Sciences), and National University of Defense Technology. Eagle Brother research teams are also working with the technical teams from enterprises such as Huawei and AVIC.

EWATT (Yiwate) Technology Co., Ltd.

易瓦特科技股份有限公司

Website: www.ewatt.com

Location: High-tech Building,

No. 6, Shiqiao 1st Road,

Jiang'an District, Wuhan

[武汉市江岸区石桥一路6号高科技大厦]

EWATT 易瓦特

EWATT [Yiwate] Technology Co., Ltd. claims it is the leading producer of civil UAVs in China covering the design, development, production, sales, and service of a full range of industrial-grade UAVs. EWATT sells products and services to customers in the government, power, public security, news, emergency, environmental protection, forestry, logistics, and many other industries. As the world's leading industrial-grade drone leader, EWATT is the first public company in China to use civil drones as its main business. The company focuses on the development and application of industrial-grade UAVs throughout the industry chain; the company has been approved as a provincial-level engineering technology research and enterprise technology dual center, with comprehensive strength at the forefront of the industry.⁴⁰

Flying Eye Drone Technology Co., Ltd. /

Tianjin Feye UAV Technology Co., Ltd.

[飞眼无人机科技有限公司/天津...]

Website: www.feyeuav.com

Location: Tianjin Lingang Economic Zone

[天津临港经济区]

F-EYE | 飞眼无人机

Flying Eye Drone Technology Co., Ltd. has more than 20,000 m² UAV R&D, assembly and commissioning, system integration, and training bases in Tianjin, Xi'an, and Beijing. The company's current products include innovative products such as oil-electric hybrid all-electric vertical take-off and landing fixed-wing UAVs, multi-rotor UAVs and plant protection drones, which can be widely used in border patrols, police counter-terrorism, and power grid inspection lines, geographic mapping, environmental monitoring and monitoring, agriculture and forestry protection and other fields. One of its major products is the FY-31 reconnaissance drone and the stealthy FY-36 drone.⁴¹

Ties to the CCP and/or PLA: Liaoning, Shanxi Power Grid, Tianjin Armed Police, and Beijing Land and Resources Bureau have all purchased the company's drones and are current customers



FY-31 Reconnaissance Drone⁴²

GDU Technology Co., Ltd.

普宙飞行器科技(深圳)有限公司

Website: www.gdu-tech.com

Location: 11th floor, Tower 1,
Novel Park, No.4078,
Dongbin Road,

Nanshan District, Shenzhen 518000

[深圳市南山区东滨路4078号小说园1号楼11楼518000]



GDU Technology concentrates on drone research and development, production, and sales. GDU is experienced in drone flight control, image stability, power system development, and infrared image technology. Its GDU SAGA model is a light industrial UAV system with military quality, folding design, and super industrial performance, as well as having a variety of intelligent payload support and open platform integration capabilities. It is capable of working in the fields of public safety, forest fire-prevention, petroleum, electricity, traffic, and maritime patrol.⁴³ The company exhibited at Milipol 2019.

Ties to the CCP and/or PLA: Chairman is also member of All-China Federation of Industry and Commerce, and attends the National Committee of the Chinese People's Political Consultative Conference

GFA Aviation Technology Beijing Co. Ltd. /

Beijing Jinpengda Aviation Technology Co., Ltd.

GFA航空科技北京有限公司 / 北京金朋达航空科技有限公司

Website: www.bjgfa.com

Location: No. 6, Qihang Street,
Doudian Town,

Fangshan District, Beijing

[北京市房山区窦店镇启航街6号]



GFA Aviation Technology Beijing Co. Ltd. is a private, military, and high-tech company integrating R&D, manufacturing, and service. Its product line includes unmanned target drones, unmanned helicopters, supporting airborne equipment, simulation systems, and aviation turbojet engines.⁴⁴ The company exhibited at AirShow China 2018.

Ties to the CCP and/or PLA: R&D of high-performance military / civilian unmanned helicopters and military target aircraft. Gradually becoming a fully-equipped private military industrial enterprise. In December 2019, Liu Wei, the secretary of the district Party committee, visited Beijing Jinpengda Technology Co., Ltd. to inspect the production and construction situation



B3A Type Target Drone⁴⁵

Guangzhou EHang Intelligent Equipment Co., Ltd.

广州亿航智能技术有限公司 (亿航智能)

Website: www.ehang.com

Location: Building No.3 of Yixiang Science Park,

No.72, Nanxiang 2nd Road,

Luogang Street, Huangpu District,

Guangzhou, Guangdong Province, China, 510700

[中国广东省广州市黄埔区萝岗街道南翔二路72号宜祥科技园3号楼 510700]



EHang Intelligent Equipment Co., Ltd. claims it is the world's leading producer of autonomous aerial vehicle platforms. EHang provides customers in various industries with autonomous aerial vehicle products and commercial solutions, including passenger transportation, logistics, smart city management, and aerial media solutions. The company sees itself as the forerunner of cutting-edge AAV technologies and commercial solutions in the global Urban Air Mobility industry.⁴⁶

Ties to the CCP and/or PLA: 2018 Xi'an High-tech Zone and Ehang Intelligent signed a strategic investment agreement to build Ehang's intelligent drone air cargo headquarters in Xi'an. Provincial Party Committee Member and Municipal Party Secretary Wang Yongkang, Mayor Shangguan Ji Qing, Municipal Committee Standing Committee and Secretary-General of the Municipal Committee Lu Kai, Municipal Committee Standing Committee, Secretary of the Party Working Committee of the High-tech Zone, Secretary of the Space Working Party Party Working Committee, Li Yi, and the Office of the Municipal Party Committee and the Municipal Engineering Information Committee participated in signing ceremony

Guilin Hanglong Kexun Electronics Technology Co., Ltd.

桂林航龙科讯信息技术有限公司

Website: www.hluav.com

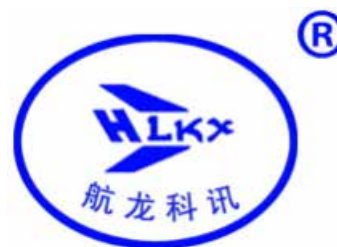
Location: Room 417, 4th Floor,

University Science and Technology Park,

Guilin National High-tech Zone,

Guangxi Zhuang Autonomous Region

[广西壮族自治区桂林国家高新区大学科技园四楼417室]



Guilin Hanglong Kexun Electronics Technology is a national high-tech enterprise dedicated to the R&D, production, sales, and service of unmanned aerial vehicles and image and data transmission systems. Its UAVs are used for aerial remote sensing mapping, maritime cruise, emergency response, reconnaissance monitoring, power line inspection, oil and gas pipeline inspection, forest fire monitoring, meteorological environment detection, and other fields.⁴⁷ In one project, Kexun Electronic Technology joined forces with the 5th and 17th factories of the PLA in a UAV development effort.

Ties to the CCP and/or PLA: Guilin Hanglong Kexun Electronic Technology Co., Ltd. uses the Party Central Committee and the State Council to strengthen the national strategy of military-civilian integration, relying on the Chinese People's Liberation Army, with the scientific and technological aid of the PLA's 5718 military factory.

Hangzhou Ruijie Intelligent Air Robot Technology Co., Ltd.

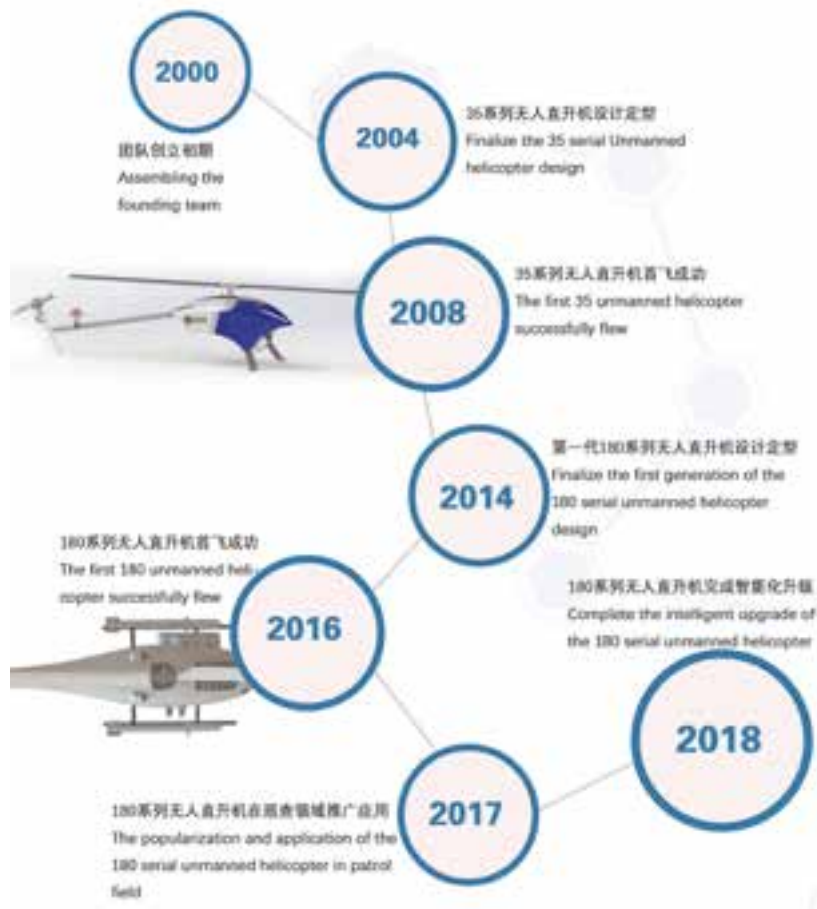
杭州睿杰智能空中机器人科技有限公司

Website: www.ruijiesmart.com

Location: 9 Buildings,
1818-2 Wen Yi West Road, Yuhang Street,
Yuhang District, Hangzhou, Zhejiang
[浙江省杭州市余杭区余杭街文一西路1818-2号9栋]



Ruijie Intelligent Air Robot Technology Co., Ltd. aims to be “a model of Military-civil fusion and to become a first-class domestic enterprise in the field of artificial intelligence and unmanned systems.” Its product line consists of the RJ-H-180 UAS, RJ-EH-35 UAS, and RJ-DH-180 heavy oil version of an unmanned helicopter.⁴⁸ The company exhibited at AirShow China 2018.



Hangzhou Ruijie Intelligent Air Robot Technology Co., Ltd. Timeline: 2000 to 2018⁴⁹

Henan SunHawk Aviation Industry Co., Ltd.

河南三和航空工业有限公司

Website: <http://en.sunhawk.cc>

Location: Tonghang 1st Road,
Lantian Road, Shangjie District,
Zhengzhou City

[郑州市上界区蓝田路通航一路]



Henan SunHawk Aviation Industry Co., Ltd. was established in 2014 with a registered capital of 66 million yuan. It is a professional company specializing in the design, research and development, manufacturing, and sales of rotorcraft and large load, long haul unmanned aircraft.⁵⁰ Some of the company's self-rotating rotorcraft "Sun Eagle", unmanned rotorcraft "Crossing Eagle", industrial drone "Sky Eye" and quad-rotor aircraft "Sky Sword" is in the leading position at home and abroad.⁵¹ The company has displayed the Sun-Hawk armed UAV at 10th China Drone Conference and Exhibition 2019.

Ties to the CCP and/or PLA: Researched and developed a military-type integrated unmanned rotorcraft and an unmanned reconnaissance rotorcraft, which have been applied in the military field and have been highly evaluated by the military.



Sun-Hawk Armed UAV Displayed at 10 China Drone Conference and Exhibition 2019⁵²

Hunan Bohang UAV Technology Co., Ltd.

[湖南博航无人机技术有限公司]

Website: cn.ttfly.com/com/bohang1

Location: No. 196 Changxing Road,
Longping High-Tech Park,
Furong District,
Changsha City, Hunan Province

[湖南省长沙市芙蓉区龙平高科技园区长兴路196号]



Hunan Bohang UAV Technology Co., Ltd. is a private joint-stock enterprise specializing in industrial-grade UAV product development, system integration, and application services. The company mainly produces and sells a variety of products such as drones, drone autopilots, farm operations management systems, and small aeroengines. Among them, the UAV includes two types of models: remote sensing telemetry and agricultural

plant protection. The company can also provide professional services such as remote sensing aerial photography, agricultural plant protection spraying, power inspection, water conservancy environmental monitoring, resource exploration, land surveying and mapping, public security fire detection, traffic monitoring, etc. according to the specific needs of users.⁵³

Hunan Kunpeng Zhihui UAV Technology Co., Ltd.

湖南鲲鹏智汇无人机技术有限公司

Website: www.kpzhuav.com

Location: 1501, Building 1,
Core City Science and Technology Park,
No. 588 Yuelu West Road,
High-tech Zone, Changsha,
Hunan, China

[湖南省长沙市高新区岳麓西路588号核心城市科技园1号楼1501]



Hunan Kunpeng Zhihui UAV Technology Co., Ltd. is a science and technology enterprise consisting of experts and doctors who have been transferred from several national defense science and technology universities. It is an important military and civilian firm in the field of drones in the National Defense Science and Technology University and Changsha City. The company specializes in R&D, production, sales, training, and overall solutions for vertical takeoff and landing fixed-wing UAVs, as well as the technical development of flight control systems and aerospace products.⁵⁴

Ties to the CCP and/or PLA: Company was approved to set up a collaborative research and development center for post-doctoral research mobile stations and a post-doctoral innovation and entrepreneurship practice base with the Hunan Provincial Gov't

Jiangsu Digital Eagle Science and Technology Development Co., Ltd.

江苏数字鹰科技股份有限公司 (数字鹰科技)

Website: www.digitaleagle-uav.com

Location: Room 201-208, Building A1,
No. 999 Gaolang East Road,
Wuxi, Jiangsu 204500

[江苏省无锡市高浪东路999号A1楼201-208室204500]



Digital Eagle Science and Technology Development develops and produces UAVs and customized special drone systems for police assistance, aerial photography, aerial monitoring, agricultural spraying, power line inspection, surveillance, security monitoring, maritime patrol, and emergency rescue.⁵⁵

Jiangsu Jincheng Aviation Technology Co., Ltd.

[江苏金城航空科技有限公司]

Website: N/A

Location: Taixing Military and Civil Integration Industrial Park

[泰兴军民融合工业园区]

The company is a new type of high-tech aviation technology enterprise that integrates the operation and service of industrial drone products and integrates research and development, production, sales, and service. As a domestic manufacturer of drone systems and supporting products, it has provided advanced drone products for armed police, public security, military, land, water conservancy, environmental protection, agriculture and forestry, national power grids, petrochemicals, geophysical and prospecting. Strength and technical strength have become one of the leading companies in the domestic high-end UAV field. The company exhibited at AirShow China 2018 and the 10th China Drone Conference and Exhibition 2019.⁵⁶

Ties to the CCP and/or PLA: Has provided advanced drone products for armed police, public security, military, land, water conservancy, environmental protection, agriculture and forestry, national power grids, petrochemicals, geophysical and prospecting



Armed JC-210 Unmanned Helicopter⁵⁷

Jiangsu TANYO Aviation Technology Group Co., Ltd.

江苏天域航空科技集团股份有限公司

Website: www.jstanyo.com/en/company

Location: No. 18, Hongtu Road,
Xinbei National High-Tech Zone,
Changzhou, Jiangsu

[江苏省常州市新北国家高新区红土路18号]



Jiangsu TANYO Aviation Technology Co., Ltd. is located in Changzhou National High-Tech Development Zone, which is the national key level 3 security unit. It does R&D and produces unmanned rotary-wing UAVs for crop spraying, anti-terrorism, firefighting, and rescue missions. Its main product is the autonomous AT-3N smart pesticide spraying UAV. The 60th Research Institute of the General Staff of the People's Liberation Army developed the AT-3N's engine. TANYO Aviation Technology also developed the TY-I, TY-II, and TY-III UAVs for geographic information acquisition, forest fire inspection and artificial precipitation, and emergency investigation activities.⁵⁸

Ties to the CCP and/or PLA: On August 18, 2016, Tianyu Aviation held a project cooperation signing ceremony with the former General Staff of the People's Liberation Army, and the company established a stable and reliable front-end project team relying on the strong research and development capabilities of the General Staff and other 60 scientific research cooperation units.



AT-3N Smart Pesticide Spraying UAV⁵⁹

Jiaxing Zhongchuang Aviation Technology Co., Ltd.

嘉兴中创航空技术有限公司

Website: www.zf-aviation.com

Location: Jiaxing Science and Technology Park

[嘉兴科技园]



Jiaxing Zhongchuang Aviation Technology is a high-tech company jointly established by overseas returnees and domestic experts in the field of drones. The company is located in Jiaxing Science and Technology Park. Its main products are pesticide spraying unmanned helicopters, unmanned helicopter professional flight control systems, engineering unmanned helicopter control systems.⁶⁰

Jingdong UAV Research and Development Center

京东无人机(JD-UAV) part of (JD Department)

Website: <https://x.jdwl.com/>

Location: Jingdong

[京东]



Jingdong UAV, Research and Development Center, is an affiliate of the Jingdong X Division. It focuses on logistics development by means of UAVs. The firm has done a lot of technical practice and accumulation in flight control, active obstacle avoidance, intelligence, and cluster flight. Working with Shaanxi Province, the Jingdong UAV Research and Development Center created the world's first global logistics demonstration province and set up a complete practice scenario for unmanned aerial vehicle application and supervision in China. It has gradually built a UAV intelligent logistics network.⁶¹ The company has developed and delivered three series of UAVs.

Langxing UAV System Co., Ltd. /

Star UAV System Co., Ltd.

朗星无人机系统有限公司

Website: www.staruas.com/gywm

Location: 299 Xihanggang Avenue,
Shuangliu District, Chengdu, Sichuan
[四川省成都市双流区西航港大道299号]



Langxing UAV System Co., Ltd. designs, does system integration and produces large industrial drones. The company, together with the Institute of Engineering Thermophysics, designed the AT200 cargo drone (based on the P750XL manned aircraft) to meet the needs of both civil and military operators.⁶²

Ties to the CCP and/or PLA: Actively participates in the research and development of military products with the support of the “military-civilian fusion and common innovation” policy



AT200 Cargo Drone⁶³

Mianyang Flight Aviation Technology Co., Ltd.

绵阳富莱特航空科技有限公司

Website: www.mymnshn.com and mymnshn.cn/

<http://cn.tffly.com/com/myflt/introduce/>

Location: Minshan Industrial Park,
Putisi Village, High-Tech District,
Mianyang, Sichuan

[四川绵阳高新区普西斯村岷山工业园区]



Mianyang Flight Aviation Technology is a civil-military-military integrated high-tech enterprise that specializes in research, development, and production of high-altitude, high-speed UAVs, including subsonic military target drones. Company services include aerodynamic configuration design, guidance methods, and flight control. The company also does precision machining of metal parts of the airframe and molding of carbon and glass fiber composite parts prior to final assembly.⁶⁴ The company exhibited at AirShow China 2018.



BD-10-001 (left) and BD-10 (right) Target Drones⁶⁵

MicroMultiCopter Aviation

科比特航空团队 (Corbett Aviation Team)

Website: www.mmctuav.com

Location: MMC Tech Park,
No.1 Yihe Road, Shilong Community,
Shiyan Street, Bao'an District,
Shenzhen City, Guangdong Province 518108

[广东省深圳市宝安区石岩街道石龙社区义和路1号MMC科技园518108]



The product line of MicroMultiCopter Aviation includes UAVs, flying platform, flight control system, motor, payload, and other accessories. The UAVs can perform inspections, public safety, search and rescue, surveying and mapping, environmental protection missions.⁶⁶

Ties to the CCP and/or PLA: Partners with China Southern Power Grid, China Electric, State Grid Corporation of China

Qihang Launching Technology Co., Ltd.

启航弹射科技有限公司

Website: www.qihanglt.com

Location: No. 1 Changjiang Road,
Economic and Technological Development Zone,
Jiaozhou City, Shandong

[山东省胶州市经济技术开发区长江路1号]



Qihang Launching Technology manufactures light-, medium-, and heavyweight pneumatic catapults for UAVs, target drones, and missiles.⁶⁷

Ties to the CCP and/or PLA: Provides full-range launch solutions for unmanned aerial vehicles, target aircraft, target missiles, light missiles and other UAVs in the 50-600 Kg range. Performs other military and scientific research.



D(S)TH-G14-MAT Series of Large Pneumatic Catapult Launcher⁶⁸

Qingdao Sen System Technology Co., Ltd.

青岛欧森系统技术有限公司

Website: www.sunicuav.com

Location: 9th Floor, East Tower,

Kaixuan Building,

No.43 Donghai West Road,

Qingdao, Shandong

[山东省青岛市东海西路43号凯旋大厦东塔9楼]



Qingdao Sen System Technology develops VTOL UAVs and UAV-related products such as the helicopter emergency parachute fault safety system, maritime distress system, and inflatable buoyancy autonomous flight control system.⁶⁹

Shanghai UVS Intelligent System Co., Ltd.

上海优伟斯智能系统有限公司

Website: www.uvssys.com

Location: Building A5,

No. 288, Jinyu Road,

Jinshan Industrial Zone, Shanghai

[上海市金山工业区金裕路288号A5栋]



UVS Intelligent System builds intelligent unmanned system platforms. Its product line includes the U650 large amphibious UAV and Freedom S100 light-sport aircraft. UVS developed the U650 in cooperation with domestic and foreign aerospace and ship original equipment manufacturers, avionics, mission load, and data link suppliers.⁷⁰

Ties to the CCP and/or PLA: Partners include AVIC, COMAC, China Aerospace, China Power Group

Shenzhen Keweitai Industrial Development Co., Ltd.

深圳市科卫泰实业发展有限公司

Website: www.keweitai.com

Location: 2nd Floor,

Building C3,

Hengfeng Industrial City,

Hezhou, Xixiang,

Baoan District, Shenzhen

[深圳市宝安区西乡贺州恒丰工业城C3栋2楼]



Shenzhen Keweitai Industrial Development is a high-tech firm that does R&D and production of drones, robots, intelligent equipment, microwave communications, satellite communications, and digital video systems. The company offers an "Intelligent UAV Airport" that integrates ground-air automation control technology to provide a base of operations for small unmanned aerial vehicles. It has also exhibited an "anti-drone gun."⁷¹

Ties to the CCP and/or PLA: Provide high-end and advanced wireless mobile video transmission systems for the State Council Emergency Management Office, China Central Television, the People's Liberation Army, the Armed Police Force and a large number of public security and law enforcement departments and TV stations.

Shenyang Woozoom Technology Co., Ltd.

[沈阳Woozoom科技公司]

沈阳无距科技有限公司

Website: www.woozoom.net

Location: No.24,
Century Road,
Hunnan District, Shenyang
[沈阳市浑南区世纪路24号]



Shenyang Woozoom Technology Co., Ltd. is a high-tech company dedicated to designing, developing, manufacturing, system integration, sales, and services of UAV and peripheral products. The company has been dedicated to the UAV field for many years, developed many cutting-edge technologies in the field, obtained many authorized patents. The main products include a series of flight control systems for different types of UAVs, such as multi-rotor UAVs, fixed-wing UAVs, and unmanned helicopters. The company also offers several complete UAV platforms, including Tandem Wing & Tiltrotor UAV, Vector Multi-rotor UAV, Unmanned Chinook helicopter, Unmanned Powered Parachute, UAV data cloud monitoring system, etc. The major applications of the products include aerial surveying and mapping, electrical power inspection, power line inspection, surveillance and security, search and rescue, environmental monitoring, wind power generation, military reconnaissance, and forestry inspection.⁷² The company exhibited at China Surveying Mapping and Geoinformation Technology Equipment Expo 2018.⁷³

Shenzhen Gaoke New Agricultural Technology Co., Ltd.

深圳高科新农技术有限公司

Website: www.szgkxn.com

Location: 5th Floor, Building A,
National Engineering Laboratory Building,
Gaoxin Nanqi Road, South District,
Science Park, Nanshan District, Shenzhen
[深圳市南山区科学园南区高新南七路国家工程实验楼A栋5楼]



Shenzhen Gaoke New Agricultural Technology is a high-tech enterprise specializing in plant protection UAVs. The company cooperated with South China Agricultural University to complete the application of Beidou satellite on agricultural drones and verify the effectiveness of drone spraying solid fertilizer and pesticides in different crops.⁷⁴

Ties to the CCP and/or PLA: Z3 Drone: Gaoke Xinnong Z3 unmanned aerial vehicle is a 30kg fuel-fueled drone jointly developed with 60th Institute of the General Staff of the People's Liberation Army.

Shenzhen Global Eagle UAV Co., Ltd.

全球鹰(深圳)无人机有限公司

Website: <http://gl-uav.aircraftnurse.com/category?cid=9819>

Location: 2/F, Building 60,

Dayun Software Town,

No. 8288 Longgang Avenue,

Longgang District, Shenzhen

[深圳市龙岗区龙岗大道8288号大运软件城60号楼2楼]



Global Eagle UAV cooperates with Beijing University of Aeronautics and Astronautics in developing industrial-grade UAVs for agricultural plant protection, aerial survey, disaster rescue, and other application fields, and provide related application technology services.⁷⁵

Shenzhen Harwar International Aviation Technology Co., Ltd.

哈瓦国际航空技术 深圳 有限公司

Website: www.harwar.com/en/

Location: Harwar International Aero Industrial Park,

28 Xinhua Road,

Guanlan, Longhua

New District, Shenzhen

[深圳市龙华新区观澜新湖路28号哈华国际航空工业园]



Harwar International Aviation Technology Co., Ltd. does research and development of industrial-grade unmanned aerial vehicles. Its headquarters is in Shenzhen and has established an R&D center both in Shenzhen and in Bremen, Germany. Harwar has established a strict management system and a quality guarantee system. It has passed the ISO9001, ISO14001, QC80000 quality system certification, the U.S. Federal Communications Commission (FCC) certification, the EU member states CE certification, the First Testing Institute of Ministry of Public Security of P. R. CHINA certification, the National Photoelectron Information Product Quality Supervision and Inspection center certification, and the CEPRI China Electric Power Research Institute testing and certification. Harwar has more than 190 patents such as the invention patent, PCT international patent, utility model patents, appearance patents, software copyright, and etc. and gained a lot of honorary titles such as the China Police Equipment Technology Innovation Award, the United Arab Emirates Police UAV excellent product award, Top Twenty UAV Enterprise, etc.⁷⁶ The company attended the China Surveying Mapping and Geoinformation Technology Equipment Expo 2018 and 5th China Military Expo 2019.⁷⁷

Shenzhen Huachuang Aviation Technology Co., Ltd.

[深圳市华创航空科技有限公司]

Website: <http://www.xfsb119.com/com/szhc/>

Location: 6/F, East Longxing Building,

Huarong Road,

Dalang, Longhua

New District, Shenzhen

[深圳市龙华新区大浪华荣路龙兴东楼6楼]



Huachuang Aviation Technology Co., Ltd. is an innovative high-tech enterprise specializing in R&D, production, sales, and service of multi-rotor UAVs. Its products are widely used in agricultural plant protection, power lineage, power line inspection, public security, fire rescue, security monitoring, oil pipeline inspection, film and television aerial photography, etc. After years of efforts by the R&D team, it has reached the domestic leading level status in the field of large-load long-haul drones.⁷⁸

Shenzhen Huaye Agricultural Aviation Technology Co., Ltd.

[深圳市华业农业航空技术有限公司]

Website: N/A

Location: 3rd Floor, Building C,

Huifu Industrial Zone,

No. 3 Pingji Avenue,

Longgang District, Shenzhen

[深圳市龙岗区平集大道3号汇福工业区C座3楼]



Huaye Agricultural Aviation Technology develops and manufactures agricultural aviation technology, including insect spraying UAVs and flight control systems. The A51 multi-rotor agricultural drone has full autonomous operation capability (no need for remote control), and it breaks through the problem of nighttime operation of drones. It has successfully realized 24 hours of operation around the clock and has adaptive terrain capabilities.⁷⁹

Ties to the CCP and/or PLA: Part of the “Pan-Pearl River Delta Military-civilian Integration Unmanned Equipment Industry Alliance”

Shenzhen INNLOI Technology Co., Ltd.

(深圳市INNLOI科技有限公司)

Website: innofpv.com

<http://innloi.com/lxwm>

Location: Shenzhen

[深圳]



Shenzhen INNLOI Technology Co., Ltd. is a technology-oriented and application service and technology firm that customizes designs and produces UAVs, including several types of pesticide spraying UAVs. It also produces crop-spraying equipment for UAVs.⁸⁰

Shenzhen Jiutian Innovation Technology Co., Ltd.
(Shenzhen Joyton Innovation Technology Co., Ltd)
九天创新科技有限责任公司

Website: <http://www.joyton.cn/jianjie.html>

Location: Shenzhen
[深圳]



Jiutian Innovation Technology is an independent start-up company headquartered in Shenzhen with R&D centers located in Beijing and Shenzhen. It independently does structural design, flight control system, ground control system, and aerodynamic performance systems for UAVs. Various models are used for inspection, surveying, and mapping, police, fire, and agricultural protection. The Tianyou-1 multi-rotor plant protection UAV, for example, sprays pesticides according to programmed coordinates.⁸¹

Shenzhen Yidian Aviation Technology Co., Ltd. /
AEE Aviation Technology Co., Ltd.

AEE深圳一电航空技术有限公司

Website: www.aee3.com

Location: Yidian Science and Technology Park,
Tangtou Road, Songbai Road,
Shiyan Street, Baoan District, Shenzhen
[深圳市宝安区石岩街道松柏路塘头路一点科技园]



Shenzhen Yidian Aviation Technology is a high-tech enterprise specializing in aircraft systems, drone systems, and high-end intelligent photoelectric systems. Its products are widely used by military, police, and industry. It is a subsidiary of AEE Aviation Technology. Yidian Aviation Technology claims to be a model enterprise that implements the national “military-civil fusion strategy.” The company is the only company that participated in the drafting of the military standard of the Unmanned Aircraft System of the General Armament Department and the industry standard of the “Unmanned Aircraft System” of the Ministry of Public Security.⁸²

Ties to the CCP and/or PLA: Part of Pan-Pearl River Delta Military-civilian Integration Unmanned Equipment Industry Alliance



Armed AEE Civil-Military Dual-Purpose Unmanned Helicopter⁸³

Sichuan AOSSCI Technology Co., Ltd.

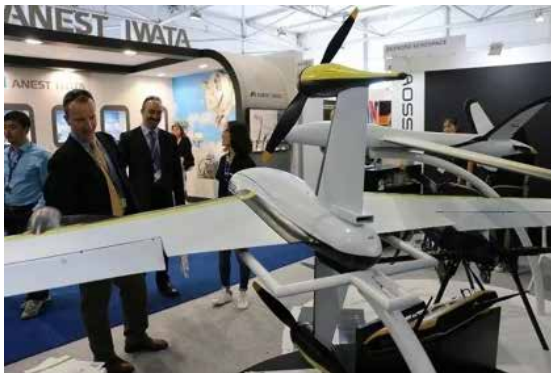
四川傲势科技有限公司

Website: https://en.aossci.com/?a=news_detail&id=507
(<https://www.aossci.com/?a=article&id=40>)

Location: 1800 Yizhou Avenue,
High-tech Zone, Chengdu
[成都市高新区宜州大道1800号]



AOSSCI Technology claims that it has seized the opportunity to promote “Military-civil fusion” and “Mass Entrepreneurship and Innovation” to develop unmanned aerial vehicles. In doing so, AOSSCI takes advantage of its own long-term research and development and production contacts with top aircraft research institutes. AOSSCI’s product line includes the X-Swift UAV and X-Fute VTOL UAV.⁸⁴



AOSSCI Technology Booth at Paris Air Show 2017⁸⁵

Sichuan Tengdun Technology Co. Ltd.

[四川腾盾科技有限公司]

Website: N/A

Location: Building 7,
Guobin Headquarters Base,
No. 50 Jinke East Road,
Jinniu District, Chengdu
[成都市金牛区金科东路50号国宾总部基地7栋]



Sichuan Tengdun Technology Co. Ltd. is a military-civil fusion high-tech company jointly created by aviation technology experts and large state-controlled investment companies. The company consists of 20 top national experts and 100 cutting-edge technicians. Tengdun Technology is committed to R&D, manufacturing, and flight-testing intelligence flight vehicles. The TB-001 Scorpion cargo drone (capable of carrying a 2.8-ton payload a distance of 6,000 km) is the company’s flagship program. The company also has a modified version of the TB-001 that can para-dropped supplies, which the UAV performed in December 2017 to a Huawei repair crew fixing a cell tower in the mountainous Yunnan Province. Tengdun Technology is also collaborating with SF Express Delivery Company to build another version of the TB-001 capable of carrying a 1.2-ton payload. The Internet also has a picture of the TB-001 fitted with munitions under the wings.⁸⁶ The company president told the media, “All can carry weapons.” Tengdun Technology attended the 12th China International Aviation and Aerospace Exhibition 2018 and exhibited two VTOL UAVs at the 14th China-ASEAN Expo 2017.



TB-001 Fitted with Munitions⁸⁷

Sichuan Zhonglian Hangtai Technology Co., Ltd.

四川众联航泰科技有限公司

Website: www.sczlh.com

Location: 2nd Floor, Block C,

No. 2, South Road,

Keyuan, High-tech Zone,

Chengdu 61004

[成都高新区科苑南路2号C座2楼61004]



Zhonglian Hangtai Technology is a high-tech company specializing in the research, development, production, sales, and service of military aerospace vehicles and some special civil aircraft. The company produces large and medium-sized unmanned aerial vehicles supporting products, unmanned aerial vehicles related software and hardware products, general aviation materials delivery equipment, wireless communication systems and equipment, aviation instrumentation. The firm also self-developed an aerodynamically shaped under-wing external rescue pod. The pod's control system calculates the airdrop timing through the ballistic calculation, combined with the parachute characteristics and meteorological data. The drone drops the pod according to the airdrop timing. The pod opens the parachute according to the given time delay and makes a slow landing according to the predetermined trajectory to achieve airdrop.⁸⁸

Ties to the CCP and/or PLA: One of ZHT customers SF signed a strategic cooperation agreement with the Air Force Logistics Department of the Chinese People's Liberation Army to carry out long-term cooperation on the establishment of an air force logistics military-civilian integration military logistics system, and issued the "Air Force Logistics Military-civilian Integration Strategic Cooperation Unit" qualification card⁸⁹



Air-Droppable Rescue Pod⁹⁰

Tianjin Aurora UAV Technology Co., Ltd.

天津曙光敬业科技有限公司

Website: a-uav.com

Location: Tianjin Airport Logistics Processing Zone,
Dongli District

[东丽区天津空港物流加工区]



Tianjin Aurora UAV Technology Co., Ltd. is a high-end enterprise that develops UAVs. The company's business has six main core areas: (1) design and production of small, medium, and multi-type unmanned aerial vehicles, (2) UAV systems (engines, airframes, electronic equipment), (3) UAV operations (flight, mission execution), (5) technical support for UAV research and development in universities and research institutes, and (6) UAV as an overseas drone equipment expert for after-sales service and technical support.⁹¹

Ties to the CCP and/or PLA: Gained extensive experience through cooperation with the National Geospatial Information of Wuhan and the PLA.

Wuhan Albird UAV Co., Ltd.

[武汉爱鸟无人机有限公司]

Website: aibirduav.en.china.cn

(<http://www.aibird.com/h-col-103.html>)

Location: Optical Valley of Wuhan University Science Park

[武汉大学科技园光谷]



Wuhan Albird UAV is a business unit of Wuhan University that specializes in developing and producing advanced reconnaissance and mapping UAVs. The company has gained extensive experience through cooperation with the National Geospatial Information of Wuhan, military, and other professionals from the UAV industry. The company also develops its own UAV software.⁹²

Ties to the CCP and/or PLA: Receive investments from Shanghai Huace Navigation Co. (partially state owned)



Albird KC3000 fixed-wing Mapping and Surveillance UAV⁹³

Wuxi Hanhe Aviation Technology Co., Ltd.

无锡汉和航空技术有限公司

Website: www.hanhe-aviation.com

Location: 2nd Floor, Leo,

National Software Park,

No. 18 Zhenze Road,

New District, Wuxi City

[无锡市新区振泽路18号国家软件园狮子座2楼]



Hanhe Aviation Technology develops and manufactures agricultural protection UAVs. The company claims to rank third in the field of engineering drones after Beihang and Tsinghua and to rank first in private enterprises in agricultural UAV engineering.⁹⁴

Ties to the CCP and/or PLA: Strategic cooperation framework agreement between Wuxi Hanhe Aviation Technology Co., Ltd. and the Anhui Wire Branch of Beijing Steel Wire Group and Beijing Tianqing Power International Clean Energy Consulting Co., Ltd. Cooperates extensively with the Chinese Academy of Sciences, China Southern Airlines, China Ordnance Group, the South Machinery Institute of the Ministry of Agriculture, South China Agricultural University, Shanghai Jiaotong University, and the Shenyang Institute of Automation of the Chinese Academy of Sciences



Mercury 1 Crop-Spraying Unmanned Aerial Vehicle⁹⁵

X-Control System Co., Ltd.

北京艾肯拓科技有限公司

Website: www.xcontrols.com

Location: A305, Beijing

Baolan Financial Innovation Center,

No. XIN 137 Xizhimenwai Street,

Xicheng District, Beijing

[A305, 北京宝兰金融创新中心, 北京市西城区西直门外大街137号]



X-Control describes itself as “a world’s leading company of research, development, and manufacturer on unmanned systems and solutions.” The product line covers UAVs with a gross weight from 0.5 to 5,000kg for civilian, industrial, and military-grade applications.⁹⁶

Ties to the CCP and/or PLA: June 28, 2019 Beijing Aikentuo Technology Co., Ltd. officially signed an agreement with the industrial park management committee and Chuangcheng Company on the annual production of 300 military and civilian drones

Xiamen Origin Drones Technology Co., Ltd.

厦门天源欧瑞科技有限公司

Website: www.origindrones.com

Location: Xiamen, Fujian

[厦门福建]



Xiamen Origin Drones Technology Co., Ltd. has more than 16 years of experience in airplane design and is committed to the design, manufacture, and sale of industrial UAVs and the supporting facilities. Origin Drones provide FRP/CFK fixed-wing airplanes and multi-copters around the world. Currently, the UAVs for surveying and mapping markets are its main products, and there are already several UAVs, especially for surveying and mapping markets coming to the market.⁹⁷ The company “Deeply participates in the construction of military-civilian integration.” The company has attended a number of exhibitions, including: (1) China Surveying Mapping and Geoinformation Technology Equipment Expo 2017, (2) Focus 2019 Shenzhen International Exhibition UAV, and (3) Gutian Conference to promote Guangdong-Jiangxi dual-use technology achieves. The third conference was sponsored by the Research and Ordering Bureau of the Military Commission Equipment Department, Military-civil fusion Development Research Center of National Defense University, and Guangdong and Jiangxi Provincial Party-Military civilian Integration Office. The company demonstrated reconnaissance, security, and natural resource application unmanned aerial vehicles to the military-industrial group and 13 military units at the Third Guangdong-Jiangxi conference.⁹⁸

Ties to the CCP and/or PLA: “Recently, sponsored by the Longyan Municipal Party Committee of the Communist Party of China and the Longyan Municipal People’s Government, the Research and Ordering Bureau of the Military Commission Equipment Development Department, the Military-civilian Integration Development Research Center of the National Defense University, Fujian, Guangdong, and Jiangxi Provincial Party-Military-civilian Integration Office...Xiamen Tianyuan Orui Co., Ltd. brought three drones to participate in the activities, namely Tianyuan · Tianxuan, Tianyuan · Yaoguang, Tianyuan · Tianshu, and carried a variety of reconnaissance drones as the flying platform. , Natural resources, and security application solutions have received wide attention from the military industry group, and have negotiated by up to 13 military units.”



Xiamen Origin Drones Technology Display at Third Guangdong-Jiangxi Conference⁹⁹

Xi'an Binguo Intelligent Aviation Technology Co., Ltd.

西安冰果智能航空科技有限公司

Website: www.bingouav.com

Location: 1st Floor, Building F,

Zhichao Innovation Space,

No. 999 Caotan 10th Road,

Weiyang District,

Xi'an, Shaanxi

[陕西省西安市未央区草滩十路999号智超创新空间F座1楼]



Xi'an Binguo Intelligent Aviation Technology develops and produces a full range of multi-functional UAVs. The company was chosen as one of the top ten innovative enterprises of the 5th Military-Public Technology Promotion Conference Application Promotion Conference for its innovative UAVs. Binguo Intelligent Aviation Technology also signed a strategic cooperation agreement in November 2018 with the Shenzhen Defense Cloud Technology Co., Ltd.¹⁰⁰

Ties to the CCP and/or PLA: November 2018, the strategic cooperation signing ceremony of Defense Cloud (Shenzhen) Technology Co., Ltd. and Xi'an Binguo Intelligent Aviation Technology Co., Ltd. was successfully held in Xi'an. This cooperation aims to lay the foundation for more cooperation between the two sides in the field of military and civilian integration.

BG-CM5巡飞弹



巡飞弹是我公司自主设计的一款可适应各种复杂地形的军用中小型无人机。巡飞弹采用创新型独特外形设计以适应各种复杂地形环境。采用独特机身设计，双涵道动力系统，支持180°俯仰转弯、三角翼布局、升力阻旋、垂直起降、独特转弯。提供垂直起降和巡航模式两种飞行模式，同时支持长时间的滞空待命，具有较强的机动自持能力。

BG-CM5巡飞弹 技术参数

飞行参数	最大起飞	1kg	机架	机身材料	碳纤维复合材料/钛合金
	起飞重量	1kg		机身尺寸	翼展700mm
	续航时间	20min		机长650mm	轴距127
	巡航速度	120km/h	动力系统	工作电压	4s-6s锂电 (14.8V-25.2V)
				最大爬升力	4.8kg

BG-CM5 Military UAV¹⁰¹

Xi'an Zhongtian Feilong Intelligent Technology Co., Ltd. /

Xi'an Zhongtian Guide Control Co., Ltd.

西安中天飞龙智能科技有限公司 / 中天引控科技股份有限公司

Website: <http://www.zhongtianyinkong.com/index.html>

Location: 7/F, Bldg.1,

Beihang Science and Technology Park,

No.588, Feitian Rd.,

Space Base

Xian, Shaanxi, 710010

[陕西省西安市航天基地飞天路588号北航科技园1号楼7楼710010]



Zhongtian Feilong Intelligent Technology develops and produces UAVs. Its products include the Feilong-1 unmanned attack aircraft, Feilong-1 unmanned long-range reconnaissance aircraft, Feilong-81 quadrotor drone, Feilong-82 autonomous take-off, and landing quadrotor drone, and Feilong-91 fixed-wing light small drone.¹⁰² The company exhibited at AirShow China 2018.

Ties to the CCP and/or PLA: “Under the general trend of national military-civilian fusion, we have embarked on a road of rapid development of military enterprises...”

Xin Jing Aviation Technology Co., Ltd.

西安鑫旌航空科技有限责任公司

Website: <http://xinjinghangkong.com/>

Location: No. 2 Building

No. 19 Lantian Road,

Aviation Base, Xian

西安航空基地蓝田路19号2号



Xin Jing Aviation does final assembly and integration of Wing Loong II unmanned aerial vehicles being exported. The firm is also the end-to-end producer of a flying wing design unmanned aerial vehicle weighing 550 kilograms and having a wingspan of 5.5. meters.¹⁰³

Ties to the CCP and/or PLA: Entered agreement in 2017 w/ Xi'an aviation base and Shenzhen Qianhai Hongfu Qirong Investment Company to advance military-civilian fusion. A key manufacturer of military products, the company attaches importance to the construction of military production systems, and has successively obtained the GJB9001 weapon equipment quality management system certification

Yifei Zhikong (Tianjin) Technology Co., Ltd.

一飞智控(天津)科技有限公司

Website: www.efy-tech.com

Location: Company headquarters in Beijing
with branches in Guangdong,

Qingdao, Xiong'an

[公司北京总部 在广东设有分公司, 青岛, 雄安]



Yifei Zhikong (Tianjin) Technology Co., Ltd. (also called “efy technology”) specializes in providing industrial-grade UAV products and system solutions. The product solutions cover the fields of flight control systems, multi-

machine control, logistics and transportation, patrol inspection and painting, and drone system customization.¹⁰⁴ The company exhibited at AirShow China 2018.

Ties to the CCP and/or PLA: On April 9, 2018 Yifei announced a new round of strategic financing of nearly 100 million yuan. The financing was led by the “Aerospace National Team” AVIC Trust Holdings Co., Ltd. The funds supported the development of the next-generation commercial drone flight control technology and the integration of the intelligent aviation industry in the international market.

Zero Tech

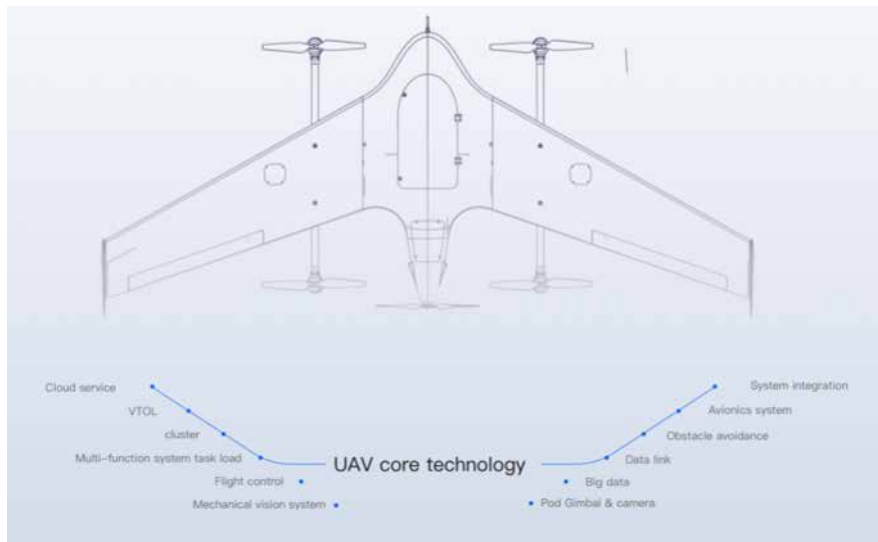
零度智控 (北京) 智能科技有限公司

Website: www.zerotech.com

Location: Building No. 9,
Zhongguancun Software Park,
Haidian District, Beijing 100193
[北京市海淀区中关村软件园9号楼100193]



Zero Tech’s R&D team from Tsinghua University has been developed core techniques and research of flight controllers for civil and military UAVs. The R&D team has applied for over 500 intellectual property rights, and nearly 300 were authorized. The numbers of owned intellectual property rights rank fifth among the world’s drone industry that fully covers UAV related key technology sectors. The company also produces two UAVs to do security and surveillance, patrol and reconnaissance, and surveying and mapping.¹⁰⁵



UAV Core Technology¹⁰⁶

Zhong Tian Guide Control Technology Co., Ltd. /

ZT Guide Control

中天引控科技股份有限公司

Website: <http://www.zhongtianyinkong.com/>

Location: 7/F, Building 1,
Beihang Science and Technology Park,
No.588, Feitian Road, Space Base,
Xian, Shaanxi

[陕西省西安市空间基地飞天路588号北航科技园1号楼7楼]



Zhong Tian Guide Control Technology Co., Ltd. (also called ZT Guide Control) primarily concentrates on manufacturing electronic and industrial equipment. However, in January 2019, the company announced the first successful flight test of the Fei Long-1 (“Flying Dragon”) / FL-1 medium altitude long endurance UAV that the company had previously exhibited at AirShow China 2018.¹⁰⁷ The company is also developing the FL-2 stealth-capable flying-wing transport UAV, which will be capable of carrying up to 6 tons. The FL-2 was displayed at a 2019 civil-military equipment and technology expo in Xi’an.¹⁰⁸ Other products included unmanned ground vehicles, precision attack munitions, and “defense cloud.”



Model of FL-2 Transport UAV¹⁰⁹

Zhuhai Longhua Helicopter Technology Co., Ltd.

珠海隆华直升机科技有限公司

Website: www.lonhuauav.com

Location: No. 10, Dingwan 8th Road, Sanzhao Town,
Jinwan District, Zhuhai

[第10号, 珠海市金湾区三肇镇丁湾八路]



Longhua Helicopter Technology manufactures VTOL UAVs for a variety of missions, including agriculture, forest firefighting, power line inspection, and public safety/anti-terrorism and military. Agricultural and forest firefighting UAVs are equipped with liquid spraying features. Longhua Helicopter Technology unveiled the XV-2 large load agricultural plant protection UAV at the first China International Intelligent Industry Expo 2018. The XV-2 carries a maximum load of 70 liters. The company claims the XV-2 is one of the largest plant-protection

UAVs in the world. It is capable of over-the-horizon flight and has autonomous route planning flight functions. The XV-3 conducted a successful air-to-ground missile test launch in September 2018.¹¹⁰ The company participated in AirShow China 2018 and the China Intelligent Equipment Civil-military Forum and Expo 2018.

Ties to the CCP and/or PLA: July 2015, XV-1 unmanned helicopter product information developed by Zhuhai Longhua Helicopter Technology Co., Ltd. passed the General Equipment Department of the General Equipment Department of the People's Liberation Army Equipment information procurement service center related certification, signaling the product has entered the army's weapons and equipment procurement information network, expanding the company's products into the military field in the future.



XV-2 Agricultural Protection UAV at the China International Intelligent Industry Expo¹¹¹

Zhuhai Ziyun Unmanned Aerial Vehicle Co., Ltd.

珠海紫燕无人飞行器有限公司

Website: ziyanuav.com

Location: Zhuhai

[珠海]



Ziyan's current main products are unmanned electric helicopters for high-speed inspection, rescue, border patrol, anti-terrorism, special operations, and air security, training target aircraft, small and medium-sized fast logistics platforms. Ziyan's air intelligent unmanned cargo platform can be widely used in civil and military markets.¹¹² The company attended the Military-civil fusion Expo 2019.

Ties to the CCP and/or PLA: June 2018, Ziyan and a Jing'an Company of the Ministry of Public Security signed a strategic cooperation agreement, which opened Ziyan in the police equipment industry.



Ziyan Infiltrator Unmanned Helicopter with a Missile Mounted under the Wing¹¹³

SUBSYSTEMS FOR UNMANNED AERIAL VEHICLES (UAV)

Beijing Hongpeng Future UAV Technology Co., Ltd.

北京红鹏未来无人机科技有限公司

Website: <http://cn.ttfly.com/com/hongpeng123/>

Location: No. 21, No. 6,
North Fourth Ring Road,
Chaoyang District, Beijing
[北京市朝阳区北四环6号21号]



Beijing Hongpeng Future UAV Technology Co., Ltd. has national B-level aerial photogrammetry qualification, specializing in R&D, production, and service of aerial photography technology. It develops, produces, and services of tilt cameras and drones to create professional products with military quality. The company claims it took the lead in the industry in 2013 in developing a miniature tilt photography product based on electric rotor drones, which drove the rapid development of low-altitude tilt aerial photography technology in China. The company holds a military second class confidential unit qualification.¹¹⁴

CCP and/or PLA: 2015 Participated in a National Defense Exhibition which was the only national defense electronics exhibition approved by the General Armament Department of the PLA

Henan Zhengda Aviation Industry Co., Ltd.

河南正大航空工业股份有限公司

Website: <https://www.nongjitong.com/company/henanzhengdahangkong/50486084.html>

Location: Zhengzhou City, Henan Province
[河南省郑州市]



Henan Zhengda Aviation Technology Co., Ltd. is an incorporated joint-stock company that develops, produces, and services industrial UAV flight control systems, power systems, and complete machines. The company's products are mainly used in agriculture, forestry, and plant protection.¹¹⁵ The company participated in AirShow China 2018.

Shenzhen Dajiang Innovation Technology Co., Ltd.

深圳市大疆创新科技有限公司

Website: <https://www.dji.com/company>

Location: 14th Floor, West Tower,
Skyworth Semiconductor Design Building,
No. 18 Gaoxin South 4th Road,
Nanshan District, Shenzhen
[深圳市南山区高新南四路18号创维半导体设计大厦西座14楼]



Dajiang Innovation Technology produces avionics, automatic control equipment, UAVs, radio data transmissions systems, and electronic components.¹¹⁶ The company attended the 10th China Drone Conference and Exhibition 2019.

Shenzhen Qifei Aviation Industry Co., Ltd.

[深圳市奇飞航空实业有限公司]

深圳启飞航空工业有限公司

Website: N/A

Location: 801, Building 3,
Tongjian Building, Futian District,
Shenzhen, Guangdong, 518019

[深圳市福田区同建大厦3号楼801 518019]



Qifei Aviation Industry develops and produces unmanned helicopters with an output of 200 kg or more. The company has core technical drawings, and related R&D and manufacturing technologies can be optimized for military and police use. Military, police forces, and naval, airborne patrols employ these unmanned helicopters. Additionally, Qifei Aviation Industry develops small aviation piston engines and small turboshaft engines. The company participated in the DefenPol China 2018 military-civil fusion technology event.¹¹⁷

COUNTER-UAV SYSTEMS

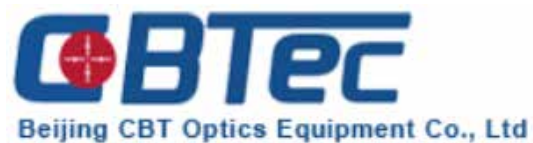
Beijing CBT Optics Equipment Co., Ltd.

北京中商鼎盛机电设备有限公司

Website: www.cobtecinternational.com

Location: Room 1501-03,
Building C Tiantongtai,
Tech-Finance Valley,
No. 29 Kechuang, 13st, BDA,
Beijing 100176

[北京经济技术开发区13号科创29号科技金融谷天通泰C座1501-03室 北京100176]



CBT Optics Equipment's primary business is developing and producing low-level night vision equipment and military thermal image range finders. It also produces two counter-drone systems: (1) the Handheld Anti-Drone Control Equipment device and (2) the Bobcat Day and Night Automatic Anti-Drone Device.¹¹⁸ The company exhibited at Milipol Paris 2019.

Chengdu Zirui Qingyun Aviation Aerospace Technology Co., Ltd.

成都紫瑞青云航空宇航技术有限公司

Website: <https://www.81uav.cn/com/tiantianxiangshang/introduce/>

Location: Chengdu

[成都]

The Chengdu Zirui Qingyun Aviation Aerospace Technology Co., Ltd. is a fully-owned subsidiary of Chengdu Hermes Technology, Ltd. and brings together technical experts (e.g., aviation engineers and simulation technology specialists) to ensure its products meet international aviation industry standards. The team focuses on developing military and civil UAV systems.¹¹⁹ The firm developed the "Tianyan No. 1" anti-UAV low-altitude defense system and integrated avionics and exhibited at AirShow China 2016. "Tianyan No. 1" uses scanning detection, target recognition, automatic tracking, and electromagnetic interference technologies.

Shandong Lujiao Intelligent Equipment Co., Ltd.

[山东鲁教智能装备有限公司]

Website: N/A

Location: Room 704, 7th Floor, Building 23,
Wanzhou First Street, Xuecheng District,
Zaozhuang, Shandong
[山东省枣庄市学城区万州第一街23号楼7楼704室]

Shandong Lujiao Intelligent Equipment produces a “military series” of the “drone strike interception” system capable of shooting down “military-grade aircraft.” Additionally, the company makes a handheld tactical drone jammer. It also makes rapid landing gear for carrier-based aircraft.



Shanghai Jianzhen Defense Technology Co., Ltd.

鉴真防务技术（上海）有限公司

Website: www.jianzhendefence.net

Location: Room 139 Area B
Changjiang Software Park,
Baoshan District Shanghai
[上海市宝山区长江软件园B区139室]



Jianzhen Defense Technology specializes in research, development, production, and systems integration of domestic military and civilian dual-use low-altitude airspace security products.¹²¹ Jianzhen Defense has long been committed to scientific research and application services in the field of low altitude airspace security. The Ph.D. team from first-class universities such as National Defense University and Zhejiang University has built a strong R&D core. More than 20 core technology national invention patents to form solid foundation support. The self-developed UAV Integrated Control Cloud Platform and multi-scene adaptive diversified anti-drone equipment have formed a strong defense. Systems, professional solutions to drone “black fly” and “flying” problems, innovation to provide “cooperative” drone management and control services. The company independently developed the “smart city” low altitude airspace security system, which integrates radar detection, spectrum detection, signal detection, photoelectric tracking, navigation signal deception, radio suppression, artificial intelligence, blockchain, and other high-tech.

Ties to the CCP and/or PLA: Their anti-drone technology products have been in a number of major military

activities such as the launch of Jiuquan satellites, maritime passages in the SCS. They are a leader in providing integrated military-civilian UAV security management and control solutions in China. The core team consist of members from National University of Technology and Zhejiang University¹²²

Zhejaing Zhongdeng Electronics Technology Co., Ltd.

[浙江中登电子科技有限公司]

Website: www.militarysignaljammer.com

(<http://www.zjzdkj.com.cn>)

Location: No. 1539,
Chengnan Road, Jiaxing, Zhejiang

[浙江省嘉兴市城南路1539号]



Zhongdeng Electronics Technology makes a wide variety of jammers, including a drone signal jammer. The company's philosophy is, "Military technology forges high-quality military equipment."¹²³ The company also exhibited a small UAV at the First Qingdao Military-civil fusion Technology Innovation Achievement Exhibition (2018).

AIRCRAFT ENGINES

AnHui Haery Aviation Power Co., Ltd.

安徽航瑞航空动力装备有限公司

Website: <http://haerypower.com>

Location: Technical Innovation Center 7F,
WanDong Road, Xinwu

[新武市万东路7F技术创新中心]



Develops, produces, sells, and provides after-sale service for rotary-wing, fixed-wing, and UAV aviation engines. The "Lark" heavy oil engine is suitable for large load long flight UAVs, light helicopter, fixed-wing, and light-sport aircraft. The "Bailing" gasoline engine is suitable for forestry and plant protection UAVs, power line UAVs, forest fire protection UAVs, border patrol inspection UAVs, and aerial photography UAVs.¹²⁴ The company exhibited at AirShow China 2018.

Chongqing Zongshen Aero Engine Manufacturing Co

宗申产业集团有限公司

Website: en.zongshen.cn/industry/hf/

Location: Zongshen Industrial Park,
No.128 Yu'nan Avenue,
Ba'nan District, Chongqing
[重庆市巴南区豫南大道128号宗申工业园]



Chongqing Zongshen Aero Engine Manufacturing Co., Ltd. designs, develops, and provides after-market service for aero engines. The company mainly provides power equipment for rotor aircraft, fixed-wing aircraft, unmanned aerial vehicles, and other aviation aircraft.¹²⁵ The home page of Zhongshen Industrial Group displays an armed UAV.¹²⁶

Deyang Yuxin Machinery Manufacturing Co.

德阳钰鑫机械制造有限公司

Website: www.ysjs.com.cn

Location: 26 Donghai Rd West Section,
Jingyang Qu, Deyang Shi, Sichuan Sheng
[四川省德阳市涪阳区东海西路6号]

Deyang Yuxin Machinery Manufacturing Company is a large-scale private enterprise integrating the manufacturing and testing of various machinery parts. It specializes in developing and producing key components in aerospace engines and gas turbines. The company has passed the certifications of quality management systems of GJB900C, Confidentiality Qualifications, and Weapons Equipment.¹²⁷

Ties to the CCP and/or PLA: Company participates with PLA to discuss strengthening of aero-engine industry and military-civil cooperation¹²⁸

Liaoning Hrwon Technology Co., Ltd.

辽宁华万科技有限公司

Website: www.hrwon.com

Location: Manrong Industrial Park,
West Street, Luohe Station,
Heping District, Shenyang 100
[沈阳市和平区漯河站西街万荣工业园100号]



HRWON

Liaoning Hrwon Technology produces heavy oil rotary engines for military, general aviation, and other markets.¹²⁹ The company participated in AirShow China 2018.

Ties to the CCP and/or PLA: Partner with China Unicom, Baidu, State Administration of Science Technology and Industry for National Defense, AVIC, Chinese Academy of Sciences

Laizhou Zhongwei Machinery Co., Ltd.

莱州中玮机械有限公司

Website: <http://www.zwjx.net>

Location: Chunyu Village, Pinglidian Town,

Laizhou, Shandong

[山东省莱州市平里店镇春雨村]



Laizhou Zhongwei Machinery Co., Ltd. specializes in developing and producing spinning thin wall revolving parts used in military aviation. Many military scientific research institutes, military enterprises, and listed companies have given the “excellent supplier” award to the firm.¹³⁰ Laizhou Zhongwei Machinery together with the Institute of Engineering Thermophysics of the Chinese Academy of Sciences, School of Aerospace of Tsinghua University, the Nanjing General Staff, and Qingdao Zhongke Hangxing Technology Company developed an aircraft engine combustion chamber, nickel-based high-temperature alloy material for various types of nozzles, fuel oil duct and other parts.

Ties to the CCP and/or PLA: It mainly cooperates with several units of AVIC to produce components of turbojet engines such as combustion chambers, tail nozzles, fuel manifolds, outer casings and other components



J-15 Carrier-Based Fighter on Laizhou Zhongwei Machinery Company Home Page¹³¹

Langhua Electric Co., Ltd.

朗华电气

Website: www.longwaelectric.com

Location: Building 32, Digital Silicon Valley International Development Park,

No.999 Yinhuang East Road,

Maanshan Economic Development Zone, Anhui Province

[安徽省马鞍山经济开发区银黄东路999号数字硅谷国际开发园32栋]



Langhua Electric specializes in aerodynamics and flight controls for UAVs. It mainly develops and produces aeronautical electric propulsion systems, UAV electric power propulsion systems, heavy oil engines, flight control

systems, aviation power supplies, and drones. The company has developed electric propulsion systems and ancillary systems for military-industrial enterprises. Its products fill the space between Chinese navigation aircraft and large drones with electric propulsion systems.¹³²

Ties to the CCP and/or PLA: Develops electric propulsion systems for “certain type” of military aircraft, generators, drive motors, integrated controllers, battery systems and environmental control systems.

MISSILES AND PROPELLANTS

Guangdong Hongda Blasting Co. Ltd.

广东宏大爆破股份有限公司(宏大爆破)

Website: www.hdbp.com/index.php

Location: 21st Floor, North Tower,
Jinbin Tengyue Building,
No. 49 Huaxia Road,
Zhujiang New Town,
Guangzhou, China 510623

[广州珠江新城华夏路49号津滨腾悦大厦北座21楼510623]



Guangdong Hongda sells civil explosives and civil blasting equipment for mines. It created the Guangdong Minghua Machinery Co., Ltd. is a wholly-owned subsidiary in 2011 to produce short-range, made-for-export HD-1 supersonic cruise missiles and other munitions for drones. The company announced in 2018 that the National Defense Science and Technology Administration had approved the project.¹³³ According to the Guangdong Hongda Blasting Company web site: “With the deepening of China’s national defense military reform, the company will introduce talents and projects, upgrade technology on the basis of existing military products, expand the scale and efficiency of military business, and form the integration capability of independent research and development of military products.” The subsidiary designed the missiles and propulsion systems, and state-owned companies provided the control systems. Guangdong Hongda introduced the HD-1 at AirShow China 2018.

Ties to the CCP and/or PLA: Discussion on public offering of the company disclosed that they were previously State-owned factory 806 and have business ties with PLA¹³⁴



HD-1 Missile Displayed at AirShow China 2018¹³⁵

SPACE AND SATELLITE SYSTEMS

Beijing Aerospace Hongtu Information Technology Co., Ltd.

航天宏图信息技术股份有限公司

Website: www.piesat.com.cn

Location: Room 301, 3rd Floor,
Building 5, 4th District,
Xishan Creative Park,
Haidian District,
Beijing 100085

[北京市海淀区西山创意园区四区5栋3楼30室]



Beijing Aerospace Hongtu Information Technology Co., Ltd. (also known as “Aerospace Macro”) is a high-tech enterprise specializing in the research and application of satellite (remote sensing satellite, navigation satellite) technology. Aerospace has the qualifications of ISO9001 quality system certification and CMMI L3 certification. It has more than 100 software copyrights and a number of invention patents, including remote sensing image processing software, geographic information system software, and spatial information three-dimensional visualization platform. The combination of remote sensing technology and cloud computing technology has pioneered the Chinese remote sensing cloud platform. Taking the remote sensing, geographic information system, and Beidou navigation technology as the core, Aerospace Hongtu undertakes and participates in a series of national key projects in the fields of atmospheric ocean, water conservancy, and environmental protection, disaster reduction emergency, land surveying, and mapping.¹³⁶ The company received funding from CASIC Aerospace Science & Technology Investment Fund Management as a military-civil fusion initiative. The company attended the Military-civil fusion Expo 2019 as a military-civil fusion initiative.

Ties to the CCP and/or PLA: stock prospectus showing extensive ties w/ PLA units¹³⁷

Beijing Deep Blue Aerospace Technology Co., Ltd.

北京深蓝航天科技有限公司

Website: www.dbaspace.com

Location: Room 501, 5th Floor, Building 4,
No. 15, Ronghua South Road,
Beijing

[北京市荣华南路15号4号楼5楼501室]



Deep Blue Aerospace Technology is a start-up enterprise that performs research and development on reusable space launch rockets. Company products include the “Thunder” liquid oxygen kerosene rocket engine and “Xingyun-1” small liquid launch vehicle.¹³⁸ A deputy designer won a second prize from the National Defense Science and Technology Bureau.

Beijing GalaxySpace Technology Co., Ltd.

[银河航天]

Website: www.yinhe.ht

Location: Floor 6, Block B,

Baosheng Plaza,

No.8, Heiquan Road,

Haidian District, Beijing

[北京市海淀区黑泉路8号宝胜广场B座6楼]



Beijing Galaxy Space Technology Co., Ltd. is a private developer committed to mass production of the low-cost, high-performance small satellites through agile and fast-iterative development mode, and builds the world's leading LEO broadband satellite constellation and global coverage with a 5G communication network. The core team consists of senior experts from the Internet, aerospace industry, and research institutes.¹³⁹ The company attended the Military-civil fusion Expo 2019.

Ties to the CCP and/or PLA: article discussing Beijing Galaxy participation in Military-Civilian Fusion.¹⁴⁰



“银河 Galaxy” Satellite Constellation¹⁴¹

Beijing Interstellar Glory Space Technology Co., Ltd. / iSpace

北京星际荣耀空间科技有限公司(星际荣耀)

Website: www.i-space.com.cn

Location: No. 1 Building No. 9,

Disheng South St.,

Economic-Technology Development Area, Beijing

[北京市迪城南经济技术开发区9号楼1号]



Beijing Interstellar Glory Space Technology (also known as iSpace and Beijing Star Glory Space Technology Co., Ltd.) is a newly founded private company devoted to building a low-cost commercial satellite launching system. Systems include sub-orbital rockets: Hyperbola-1S and Hyberbola-1Z. The company is also developing a sub-orbital concept aircraft.¹⁴²

Ties to the CCP and/or PLA: “top 10 military Aerospace enterprises of the year 2018” by China Military Industry List-awards¹⁴³

**Beijing Jiutian [Commsat] MSI Technology
Development Co., Ltd.**

[北京九天微星科技发展有限公司]

Website: www.commsat.cn

Location: 11C, Jingyuan Road,
No. 3 Guangqu Road,
Chaoyang District, Beijing
[北京市朝阳区广渠路3号靖远路11C]



Jiutian MSI Technology Development is a startup company focusing on the design and innovation of microsattellites plus constellation networking. The company's main business areas are: (1) satellite star development and on-orbit delivery services, (2) one-stop solution for satellite applications, and (3) aerospace STEAM education.¹⁴⁴ The company, together with the Hunan Changsha Research Institute, developed 10 small remote sensing satellites for Saudi Arabia. Each satellite carried a full-color/multi-spectral high-resolution camera for ground imaging. The core personnel are from China Aerospace Science and Technology Corporation, Chinese Academy of Sciences, China Mobile, Huawei, and other companies covering satellite, communication systems, and operations.

Ties to the CCP and/or PLA: Long March 2 rockets used to launch Beijing Jiutian developed Saudi satellites¹⁴⁵

Beijing Minospace Technology Co., Ltd.

北京微纳星空科技有限公司

Website: <http://www.minospace.cn/>

Location: No. 9 Yongxiang North Road, Haidian District, Beijing
[北京市海淀区永祥北路9号]



The Beijing Minospace Technology Company (also known as Weiner Star Technology Co. Ltd. (微纳星空)) is a private commercial satellite company that integrates satellite development and satellite applications. The firm concentrates on R&D and manufacturing services of micro-nano satellite systems, including independently R&D of micro-nano satellite platforms and core components. Additionally, the company develops satellite systems such as electronic communication and optical payloads as well as satellite-terrestrial communication terminals and has experience in satellite communication systems integration. It can provide satellite resources-based integrated information system solutions for defense, industry, and regional users.¹⁴⁶

Beijing Zhixing Space Technology Co., Ltd.

北京智星空间科技有限公司

Website: www.smartsatellite.com

Location: 2F-ABC,
Sanyi Heavy Industry Sun Valley Incubator,
Beijing Road,
Changping District, Beijing
[北京市昌平区北青路三义重工太阳谷孵化器2F-ABC]



Zhixing Space Technology Co., Ltd. relies on microsattellite technology to launch satellite remote sensing Spatio-temporal Big Data applications iteratively. The company has a professional team with the main members coming from five aerospace institutes of the Chinese Academy of Sciences and other aerospace units. The company

plans to launch a 6U cubic star in 2019 to carry out multi-spectral high-definition imaging to verify low-cost COTS devices and satellite operating systems. In 2020, it will launch China's first commercial synthetic aperture radar satellite and build a 12-SAR satellite constellation. This microwave remote sensing constellation realizes on-demand observation revisiting and millimeter-scale deformation monitoring at any level in the world.¹⁴⁷

Chang Guang Satellite Technology Co. Ltd.

长光卫星技术有限公司

Website: www.charminglobe.com

Location: No. 1299, Mingxi Road,
BeiHu Science and Technology Development District,
Changchun, Jilin

[吉林省长春市北湖科技开发区明溪路1299号]



Chang Guang Satellite Technology Co. Ltd. (also known as CGSTL) was China's first commercial remote sensing satellite company. The company is composed of 5 share-holding units and 32 individuals. The shareholders include CIOMP of the Chinese Academy of Sciences, small and medium-sized enterprises of Jilin Provincial Government, and 3 private companies. Chang Guang Satellite Technology is in the commercial business developing and operating satellite and unmanned aircraft as well as remote sensing information processing. Core business areas are satellite development, UAV development, UAV component development, mapping services, ground application systems, and large data application services.¹⁴⁸ The company attended the Military-civil fusion Expo 2019.

Ties to the CCP and/or PLA: successful launch marks the realization of the industrialization/ commercialization of China's Aerospace sensing objectives.¹⁴⁹

Chengdu GuoXing Aerospace Technology Co. Ltd. / Ada Space

成都国星宇航科技有限公司

Website: www.national-space.com / www.adaspace.com

Location: 4th Floor, Building 3,
Jingronghui, Tianfu 5th Street,
High-Tech Zone, Chengdu

[成都市高新区天府五街景荣汇3号楼4楼]



GuoXing Aerospace Technology is a military-civil fusion enterprise for commercial satellite operations and remote sensing data services. The founders were leading experts in universities, research institutes, and military units of the original satellite and application fields. It has already launched two artificial intelligence-enabled satellites with a third soon to be launched. These satellites form the world's first commercial artificial intelligence constellation.¹⁵⁰

Ties to the CCP and/or PLA: top 10 commercial Aerospace companies 2018 Military Industry List¹⁵¹

Hangzhou LaserFleet Space Technology Co., Ltd.

深圳航星光网空间技术有限公司 (航星光网)

Website: N/A

Location: 15C, North Leap
Huayuan, Dongguimiao Road,
Nanshan Road,
Nanshan District, Shenzhen¹⁵²

[深圳市南山区南山路东归庙路华北北跳15C]



LaserFleet is a startup in the commercial aerospace industry. It generates hundreds of low-Earth orbit satellites to form an Internet constellation providing high-speed Internet access for stratospheric aircraft, tethered balloons, suborbital spacecraft, space stations, and microsattellites.¹⁵³ Satellite laser communication and space optical network technology are areas of corporate emphasis. The company has established a partnership with professional institutes under the Chinese Academy of Sciences for the joint development of a satellite communication system. The LaserFleet team consists of experienced scientists and engineers in aviation, aerospace engineering, communications, fine mechanics, and other industry.

**LandSpace Technology Corporation /
Beijing Blue Arrow Space Technology Co., Ltd.**

蓝箭航天空间科技股份有限公司

Website: www.landspace.com/

Location: H1, Zhonghang International Plaza,
No. 13 Ronghua South Road,
Yizhuang Economic and Technology Development Zone, Beijing

[北京亦庄经济技术开发区荣华南路13号中航国际广场H1]



Founded by Tsinghua University in 2015, the company focuses on the design, manufacturing, and operations of small and medium commercial space launch vehicles. LandSpace is devoted to the development of Liquid-fuel (LOX+LCH₄) Rocket Engines (LREs) and low-cost commercial launch vehicles with independent intellectual property rights. LandSpace could complete the system and unit design, manufacture, test, and delivery with highly integrated design and innovation capability by a first-class technical team to provide economical and reliable high-quality launch services for commercial satellites and special-purpose spacecraft, as well as the development of new technologies and systems for space applications. The Long March 11 rocket is the basis of the company's family of Zhuque family of rockets.¹⁵⁴

Ningbo Space Engine Technology Co., Ltd

宁波天擎航天科技有限公司

Website: www.space-engine.cn

Location: Room 4-123,
Innovation Building 2,
66 Yuanshi Road,
High-Tech Zone, Ningbo
[宁波市高新区源石路66号创新大厦4-123室]

Ningbo Space Engine Technology is a commercial space company that designs and develops commercial aerospace propulsion products, including rocket motors, liquid rocket engines, and liquid high-altitude and orbit control propulsion systems.¹⁵⁵ The company exhibited at AirShow China 2018.

OneSpace Technology Co., Ltd.

零壹空间科技集团有限公司

Website: www.onespacechina.com

Location: H1 Zhonghang International Plaza,
13 Ronghua South Road
Beijing, 100176
[北京市荣华南路13号H1中航国际广场, 邮编: 100176]



OneSpace has developed six major technical fields of rockets and overall design, wireless communication, intelligent control, data acquisition and test systems, support equipment, solid power, and 20 core products. At the same time, it explores the application of new technologies and mechanisms in the aerospace and defense military industries, and seeks to become a world-class commercial aerospace group. OneSpace has 3 business subsidiaries and 1 research institute.¹⁵⁶

21st Century Space Technology Application Co., Ltd.

二十一世纪空间技术应用股份有限公司

Website: www.21at.com.cn/gywm/gsjj/

Location: No. 26,
Building Materials East Road, Xisanqi, Haidian District, Beijing, 100096
[北京市海淀区西三旗建材东路26号100096]



21st Century Space Technology Application is primarily an independent remote sensing satellite control and geospatial information Big Data service provider. The company's self-developed remote sensing satellite intelligent observation and acquisition technology can capture high-quality images of the earth and form standardized products. The proprietary algorithms, models, and software systems developed by the company can realize large-scale automatic processing of remote sensing images and intelligence of spatial information. The company also provides interpretation analysis, flexible production of business application products. Its work supports government scientific governance, resource and environmental monitoring, national security, and national digital constructions. The company also builds the "Beijing Series" remote sensing satellites.¹⁵⁷

Ties to the CCP and/or PLA: "The Provincial Bureau of National Defense Technology and Industry also signed strategic cooperation agreements with the 21st Century Space Technology Application Joint Stock Company and the China Association for the Peaceful Use of Military Technology"¹⁵⁸

Zhejiang Shikong Daoyu Technology Co., Ltd. (Geely Satellite or Geely Space)

浙江时空道宇科技有限公司

Website: N/A

Location: 10th Floor, Building 1,
Xinglian Science and Technology Park,
No. 1535 Hongmei Road,
Xuhui District, Zhejiang
[浙江省徐汇区红梅路1535号兴联科技园1号楼10楼]

The company, a strategic subsidiary of Geely Technology Group, has stated the goal of becoming the world's leading low-cost, high-reliability commercial satellite manufacturer, the world's leading provider of satellite-based high-precision positioning services, and the world's leading provider of user-oriented satellite application solutions. The company is also responsible for establishing, operating, and maintaining global communications and navigation constellation systems. The R&D team has more than 10 years of satellite development experience and participates in many national key large-scale projects.¹⁵⁹

Ties to the CCP and/or PLA: In-depth cooperation with Huawei, China Mobile

Zhuhai Orbita Aerospace Science & Technology Co., Ltd

珠海欧比特宇航科技股份有限公司

Website: www.myorbita.net

Location: Orbita Technology Park
1 Baisha Road
Tangjia Dong'an Zhuhai, 519080
[Orbita科技园1号唐家东路珠海白沙路519080]



Zhuhai Orbita Aerospace Science & Technology is a practitioner of the national strategy of “military-civil fusion,” mainly engaged in the research and production of aerospace electronics, micro-satellite constellation and satellite Big Data, artificial intelligence technology and products. The company provides services to the aerospace, defense industry, geographic information, land and resources, agriculture, forestry, animal husbandry and fishery, environmental protection, transportation, smart city, modern finance, personal consumption and many other fields.¹⁶⁰

Ties to the CCP and/or PLA: “Under the guidance of the state’s strategy of promoting “private enterprises to participate in the construction of national space infrastructure”, the company actively participates in the construction of national space infrastructure and implements industrial innovation and upgrading.”(https://www.myorbita.net/gsjj/index_3.aspx)

MATERIALS

Advanced Corporation for Materials and Equipment (ACME) Co., Ltd.

湖南顶立科技有限公司

Website: m.acmefurnace.net

Location: Muyun industrial park,
Changsha, Tianxin, Hunan Province
[湖南省天心市长沙市慕云工业园区]



ACME is a National High-Tech Enterprise specializing in R&D and production of new materials and high-end special thermal equipment. The thermal equipment developed is widely used in carbon-based/ceramic-based composite materials, carbon fiber/silicon carbide fiber, high-performance ceramics, graphite, vacuum heat treatment, powder metallurgy, environmental protection, and many other fields. The company also offers 3D printing equipment. The company is an important research and development unit for special large-scale thermal equipment in aviation and aerospace.¹⁶¹ The company attended the International Military-Technical Forum Army-2019 and Army-2020 in Moscow.

Ties to the CCP and/or PLA: Partners with AVIC, AECC, China National Nuclear Corp, China Academy of Sciences

Anhui Jiahang Carbon Fiber Co. Ltd.]

安徽佳力奇碳纤维科技股份有限公司

Website: en.ahsxtxw.com

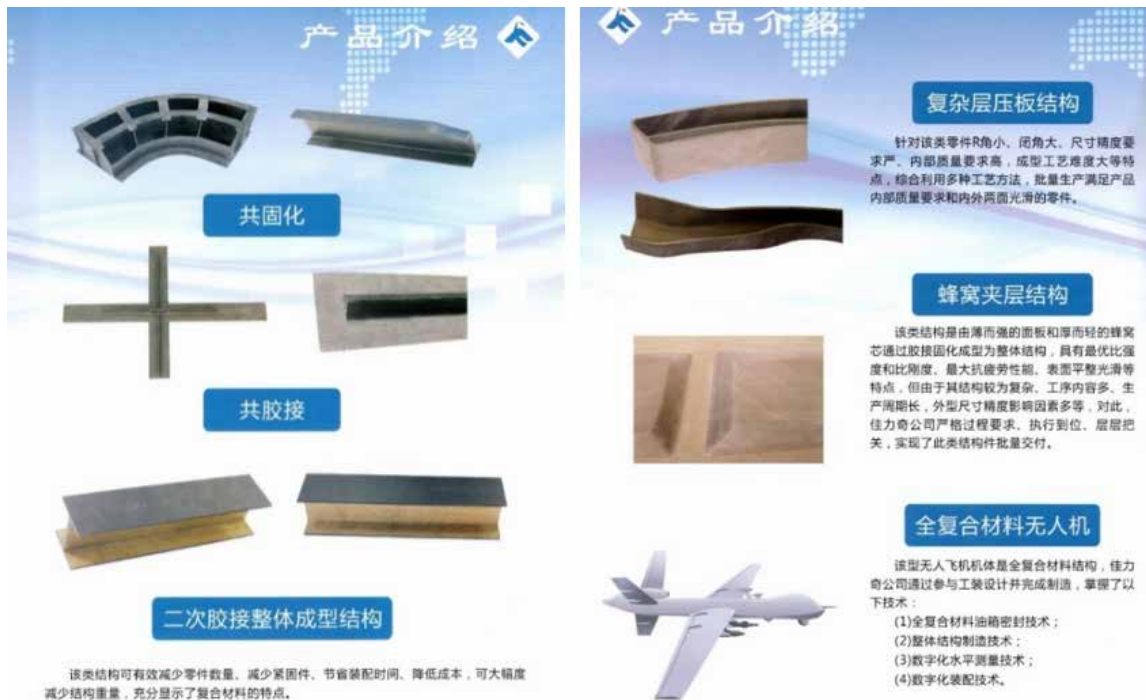
Location: 169 Chaoyang Road,
High-Tech Zone, Suxian County,
Anhui 234103

[安徽省宿县高新区朝阳路169号234103]



Anhui Jiahang Carbon Fiber Company is a subsidiary of Anhui Jia Liqi Carbon Fiber Co., Ltd., a national high-tech enterprise. This private high-tech enterprise specializes in R&D, production, sales, and service of resin-based composite components. Its products are widely used in national defense, military, aviation, aerospace, and electronics. The company is responsible for drafting and formulating three national carbon fiber standards, effectively promoting the standardization construction of China's carbon fiber industry. The company has passed the national military standard quality system certification, three confidentiality certifications, weapons and equipment research and production license certification, equipment for the unit qualification, military qualification four certificates complete.¹⁶² The company participated in AirShow China 2018.

Ties to the CCP and/or PLA: “In order to achieve the supporting application of the company’s products in the field of weapons and equipment, the company strives to build a military-civilian integrated development industrial structure, and cooperates with AVIC Chengfei, the Chinese People’s Liberation Army Defense Chemical Research Institute and other military industrial enterprises and scientific research institutions to build a cooperative platform to coordinate development of high-tech Performance weapon equipment supporting products.”¹⁶³



Brochure Distributed at AirShow China 2018

Baoji Titanium Industry Co., Ltd.
 宝鸡钛业股份有限公司
Website: www.baoti.com
Location: No.88, High-Tech Road,
 721014 Baoji
 [宝鸡市高新路88号721014]



Baoji Titanium Industry processes titanium and titanium alloy materials. The firm is a creator of China’s titanium, zirconium, and other rare metal national standards, national military standards, and other standards. Bao Ti, relying on technological innovation and industrial upgrading, led the development of China’s titanium industry and established a complete quality assurance system. Company supplied products to China’s Shenzhou series spacecraft and the lunar exploration satellite programs.¹⁶⁴ The company exhibited at the Paris Air Show 2019.

Ties to the CCP and/or PLA: Provide components for the Chinese Space Program¹⁶⁵

Baotou North Jiarui Defense Technology Co., Ltd.

包头北方嘉瑞防务科技有限公司

Website: N/A

Location: Intersection of B1 and B6 highway in the northern new area of Qingshan Equipment manufacturing industrial park, Baotou, Qingshan, Inner Mongolia

[内蒙古青山包头青山装备制造产业园北区新区B1, B6高速公路交叉口]



Baotou North Jiarui Defense Technology is a specialist in the ballistic protection area conducting the upstream raw material research and development on Ultra-high Molecular Weight Polyethylene by integrating starting raw material, product design, production and service in this field. Baotou North Jiarui successfully developed ballistic protection products in body armor, vehicles, warships, and aircraft.¹⁶⁶ The company exhibited at the International Military-Technical Forums Army-2019 and Army-2020 in Moscow.

Ties to the CCP and/or PLA: Baotou North Jiarui Defense Technology Co., Ltd. is a high-tech enterprise specializing in the research and development, production and service of protective products. Zhuo Technology Co., Ltd. is a joint venture funded by the State-owned Assets Supervision and Administration Commission and the Weapons Industry Group.¹⁶⁷

Chengdu Luchen New Material Technology Co., Ltd.

鲁晨新材料科技有限公司

Website: www.lu-chen-composite.cn

Location: Industrial Park,
Xinjin, Chengdu 611436

[成都新津工业园区611436]



Lu Chen New Materials focuses on the manufacture of high-performance composites for use in a variety of sectors, including aerospace and defense security, and ballistic protection.¹⁶⁸

Ties to the CCP and/or PLA: March 2017, Xie Ruiwu, a member of the Standing Committee of the Chengdu Municipal Party Committee, organized a conference to promote the development of new material industry clusters in Jintang County. Lu Chen New Material participated in this meeting as a representative of new material enterprises in Chengdu.¹⁶⁹

Guangdong Yinna Technology Co., Ltd.

广东银纳科技有限公司

Website: www.yinna-tech.com

Location: Block D,
New Material Industrial Base,
No. 2, Zhongjin Road,
Lishui Town, Nanhai District,
Foshan City, Guangdong Province

[广东省佛山市南海区丽山镇中金路2号新材料产业基地D座]



Yinna Technology is a high-tech production enterprise of nanotechnology (nano-powder powder, nano-tungsten powder) and micro-metal powder. The company provides professional services for medical, military,

and conformal cooling molds. All these materials are widely used in aerospace and other civil-military high-tech equipment.¹⁷⁰

Guangzhou JR-Tech. Co., Ltd.

[捷荣航材 (广州) 有限公司]

Website: www.jr-tech.com.cn

Location: #7, Huahui Road,
HuaShan, Huadu, Guangzhou, 510880
[广州市花都花山区花会路7号510880]



JR-Tech is a high-tech conglomerate with diverse capabilities, including aviation materials trading, component maintenance, and ground support equipment for commercial and military aircraft.¹⁷¹ The company participated in Third Expo for High-tech Equipment Achievements of Military and Civilian Integration Development 2017 and Aviation Expo China 2017.

Ties to the CCP and/or PLA: Partner with AVIC¹⁷²

Kangde New Composite Material Group Co. Ltd.

康得新复合材料集团股份有限公司

Website: www.kangdexin.com/

Location: No. 85, Chengang Road,
Environmental Protection,
New Material Industrial Park,
Zhangjiagang, Jiangsu Province
[江苏省张家港市环保新材料产业园城岗路85号]



Kangde New Composite Material Group Co. Ltd. is a materials technology firm mainly engaged in developing, producing, and selling high polymer materials with special emphasis on prefilming material, photoelectric material, and carbon material.¹⁷³ This firm and Sichuan Tengdun Technology Co. Ltd. announced the signing of an agreement in January 2018 at the first THX Unmanned Aerial Vehicle System Application Development Conference in Chengdu to launch a UAV development project.¹⁷⁴

Kuang-Chi Technologies Co., Ltd.

光启科技有限公司

Website: www.kuang-chi.com

Location: Software Building,
No. 9 Gaoxin Zhong 1st Road,
Nanshan District,
Shenzhen, Guangdong 518057
[深圳市南山区高新中一路9号软件大厦518057]



Kuang-Chi Technologies specialized in applying machine learning and artificial intelligence to a number of areas, including military metamaterials, intelligent photon technology, novel space technology, and wireless communications. The company displayed a wide variety of aircraft components made of meta-materials at AirShow

China 2016 for a fighter, possibly the J-20. These products included SATCOM antennas, radome, air duct for a fighter, anti-icing board, and aircraft structure.¹⁷⁵ Kuang-Chi Technologies also displayed a frequency band pass radar nose cone and other fighter aircraft structures made of meta-materials at AirShow China 2018.



Aircraft Structures Made of Meta-Materials Displayed at AirShow China 2016¹⁷⁶



Frequency Band Pass Radar Nose Cone and Other Aircraft Structures Made of Meta-Materials Displayed at AirShow China 2018¹⁷⁷

Qingdao Hong Biachuan Metal Precision Products Co., Ltd.

青岛宏百川金属精密制品有限公司

Website: N/A

Location: Shandong 266215

[青岛, 山东]



Qingdao Hong Baichuan Metal Precision Products Co., Ltd. is a subsidiary of the Hengchangsheng Group. The company produces parts and accessories of precision equipment, instruments, and meters for space flight, aviation, shipping, high-speed train, medical, and environmental protection industries.¹⁷⁸ The company signed a joint venture agreement in 2013 with Tianjin Aurora UAV Technology Co., Ltd. to develop unmanned aircraft and promote the industrialization of UAVs. The company signed a “Memorandum on Promoting Strategic Cooperation Projects on Drones” with Zongshen Power in 2015.¹⁷⁹ The company displayed a rotary UAV at Military-civil fusion Expo 2019.

Shandong Dawn Polymer Materials Co., Ltd.

山东道恩高分子材料股份有限公司(道恩股份)

Website: www.dawnprene.com**Location:** Enyuan Economic Park Industrial Park,
North Road,
Zhenxing Road,
Longkou City,
Shandong Province

[山东省龙口市振兴路北路恩源经济园区工业园区]



Shandong Dawn Polymer Materials Co., Ltd. specializes in the research, development, production, and service of hydrogenated nitrile rubber, thermoplastic elastomers, modified plastics, color masterbatches, etc. It is the only manufacturer of high-performance thermoplastic elastomer materials in China and has nearly 100 authorized invention patents. Its products are widely used in many fields such as national defense, aerospace, rail transportation, medical and health, petrochemical, communication fiber, etc., and many products compete in the international market.¹⁸⁰ The company participated in the 4th Military and Civilian Integration Development High-Tech Equipment Achievements Exhibition 2018.

Ties to the CCP and/or PLA: Collaborates with Chinese Academy of Sciences, Oil Research Institute of General Logistics Department of the PLA¹⁸¹

Shaanxi Tian Cheng Aerospace Co. Ltd.

陕西天成航空材料股份有限公司

Website: www.tcae.com**Location:** No 3, Gaoke 3rd road,
Qindu District, Xianyang 712000

[咸阳市金都区高科三路3号, 712000]



The company develops and produces titanium alloys and is one of the leading titanium alloy manufacturing company in the field of aerospace rod and coil, as well as plate and sheet. The company qualified for the Chinese national military standard quality system certification as well as weapons and equipment manufacturing “three-level confidential certification,” OHSAS18001, ISO14001, and other related system certifications.¹⁸² The company exhibited at Paris Air Show 2019.

Shandong Nanshan Aluminum Co. Ltd.

山东南山铝业股份有限公司

Website: www.nanshanalu.com**Location:** Nanshan industrial park,
Longkou, Yantai 265706

[烟台龙山南山工业园区265706]



Shandong Nanshan Aluminum is a large enterprise (8,835 employees) affiliated with the Nanshan Group (a top 500 Chinese enterprise). Develops, produces and processes aluminum solutions and alloys as well as graphite and carbon products.¹⁸³ The company exhibited at Paris Air Show 2019.

Shanxi Gangke Carbon Material Co., Ltd.

[山西港科碳素材料有限公司]

Website: www.jnjgb.com

Location: Taiyuan

[太原]

Shanxi Gangke Carbon Material is a subsidiary of the Taiyuan Iron and Steel Group. It conducts research and development on high-end carbon fiber, an extremely strong, lightweight, and corrosion-resistant material.¹⁸⁴ Its product line includes polyacrylonitrile grade T800 carbon fiber used for aerospace and aviation applications.

Shanxi Taigang Stainless Steel Precision Strip Co Ltd.

太原钢铁(集团)有限公司

Website: www.tisco.com.cn

Location: No.2, Jiancaoping Street, Jiancaoping District

Taiyuan, Shanxi, 030003

[街2号山西太原030003]



Taigang Stainless Steel Precision Strip is a subsidiary of the Taiyuan Iron and Steel Group. The company is now capable of making thin steel sheets 0.02mm thick - equivalent to one-fourth of a piece of standard A4 paper and 600 mm wide. Such “hand tear steel” is used in a wide range of areas including aviation.¹⁸⁵

Sichuan Xinwanxing Carbon Fiber Composite Materials Co., Ltd.

四川省新万兴碳纤维复合材料有限公司

Website: www.xwxfhcl.com

<http://www.xwxfhcl.com/about.asp?bid=197&cid=237>

Location: Xinchang Town,

Jiajiang County, Sichuan Province 614000

[四川省夹江县新昌镇614000]

Sichuan Xinwanxing Carbon Fiber Composite Materials Co., Ltd. is a high-tech private sector company that has four certificates from the military industry. It develops and produces high-performance resin matrix composite materials. Xinwanxing Carbon Fiber Composite Materials worked with the Chengdu Aircraft Design Institute in developing the UAV's body structure of the Pterosaur- 1D UAV that is a member of the Wing Loong family of military UAVs.¹⁸⁶

Ties to the CCP and/or PLA: Sichuan Xinwanxing Carbon Fiber Composite Materials Co., Ltd. under the careful guidance of experts from the Chengdu Aircraft Design and Research Institute, after nearly three years of unremitting efforts, the development and production of the pterosaur-1D UAV body structure have been fully completed. In June 2017, the company signed a military-civilian integration agreement with the Chengdu Aircraft Design and Research Institute, which opened a new chapter of military-civilian integration¹⁸⁷

Taizhou Huacheng Tungsten & Molybdenum Products Co., Ltd.

泰州市华诚钨钼制品有限公司

Website: www.hcwm.cn

Location: Jiangyan District, Taizhou City,
Jiangsu Province
[江苏省泰州市姜堰区]



Taizhou Huacheng Tungsten & Molybdenum Products specializes in the production of tungsten, molybdenum, high specific gravity tungsten alloys, tungsten, and copper alloys, and the development of new tungsten and molybdenum materials. The main products are tungsten, molybdenum strip, plate, electrode bar, tungsten molybdenum tantalum, molybdenum head, TZM rare-earth molybdenum, sodium tungstate, sodium molybdate, and other products.¹⁸⁸

Xi'an HuaShan Tungsten Products Co., Ltd.

西安华山钨制品有限公司

Website: www.xahs-tungsten.com

Location: No.123
Xingfu Zhong Road,
Xi'an
[No.123 兴福中路 西安]



Xi'an HuaShan Tungsten Products is a joint venture company owned by Northwest Industries Group Co., Ltd., ChongYi ZhangYuan Tungsten Co., Ltd. and Xi'an HuaShan Precision Machinery Co., Ltd. The company also advertises that it is a military-civil fusion company. Xi'an Huashan Tungsten Products Co., Ltd. mainly produces high-density tungsten-based products, tungsten nickel-iron alloy, tungsten nickel-copper alloy, tungsten nickel iron-molybdenum alloy, tungsten nickel iron-cobalt alloy, tungsten-copper alloy, pure tungsten products. The products are widely used in the military industry, nuclear industry, machinery manufacturing, aerospace, medical shielding, industry shielding, oil counterweight and sporting goods, and other areas.¹⁸⁹

Ties to the CCP and/or PLA: The only private listed company in the tungsten industry that supplies tungsten processing products to the military. Xi'an Huashan Tungsten Products Co., Ltd., a military-civilian joint company, was jointly established with Northwest Industrial Group Corporation, a large enterprise affiliated to China Weapons Industry Corporation.¹⁹⁰

COMMAND, CONTROL, COMMUNICATIONS, COMPUTERS, INTELLIGENCE, SURVEILLANCE AND RECONNAISSANCE (C4ISR)

Baoan Enterprise Huaxun Ark Co., Ltd.

[宝安企业华讯方舟有限公司]

Website: www.huaxunchina.cn/

Location: Huaxun Ark Optoelectronic

Information Industrial Park,

Building 37, Baotian 1st Road,

Chentian Industrial Zone,

Xixiang, Bao'an District, Shenzhen

[深圳市宝安区西乡晨田工业区宝田一路37号华讯方舟光电信息产业园]



Baoan Enterprise Huaxun Ark Co., Ltd brought more than 20 products in the field of civil and military integration to AirShow China 2018. Company product lines include design, development, testing, and installation of satellite communications products, systems, and networks. Wireless communication products included drone data link and miniaturized multi-mode measurement and control transponder. Among them, the miniaturized multi-mode measurement and control transponder series products for both aircraft and satellites. The company describes Huaxun Ark as an “integrated national defense and military information” provider.¹⁹¹ Core military product lines include military communications, special aircraft, guided weapons, radar, and intelligence reconnaissance. The company has also exhibited the latest intelligent management platforms for air and space combat command systems, aircraft maintenance systems, and optical waveguide head-mounted display devices.¹⁹² In addition, Huaxun Ark displayed an air and space combat command simulation platform in which the flow of information and the derivation of combat operations can provide display and support decision support in strategy, campaign, tactics, and at all levels at AirShow China 2018.



Baoan Enterprise Huaxun Ark Display at AirShow China 2018¹⁹³

Beijing Deep Blue Space Remote Sensing Technology Co., Ltd.

[北京深蓝空间遥感技术有限公司]

Website: www.dbluespace.com

Location: 2nd Floor, Building 8,
No. 2 Building, Shenguzhong Road,
Chaoyang District, Beijing
[北京市朝阳区深谷中路2号楼8号楼2层]



Deep Blue Space Remote Sensing Technology provides remote satellite monitoring for urban transportation, major infrastructure, power grid, petroleum, and other industries through large-scale data collection, data mining, intelligent analysis, and three-dimensional visualization systems. The core R&D team comes from aerospace institutes and well-known domestic universities. It has a unique and full understanding of aerospace technology and remote sensing application and has rich experience in Big Data, deep learning, and industry.¹⁹⁴

Beijing Lingyun Intelligent Technology Co., Ltd.

[北京凌云智能科技有限公司]

Website: www.twowheelscar.com

Location: Building A1, West Area of Olympic Village,
No. 1 Lincui East Road,
Chaoyang District, Beijing
[北京市朝阳区林翠东路1号奥运村西区A1栋]



Beijing Lingyun Intelligent Technology produces the Nebula Man-Unmanned Cooperative Special Operation Weapon System that is an intelligence network and ground-air integrated support system for division level Army units. The nebula consists of the Star sub-system and Cloud sub-system that interact with multi-rotor unmanned aircraft, unmanned ground combat vehicles, and intelligent armed soldiers.¹⁹⁵ The company exhibited at AirShow China 2018.

Beijing Ruixinfeng Technology Co., Ltd. (RINFON)

北京睿信丰科技有限公司

Website: www.rinfon.com

Location: Room 502, Building 41,
Digital Valley, Zhongguancun Software Park,
No. 8 Dongbeiwang Road,
Haidian District, Beijing
[北京市海淀区东北旺路8号中关村软件园数码谷41栋502室]



Beijing Ruixinfeng Technology (RINFON) covers aerospace, aviation, and defense electronics-related fields. Its main products are satellite test systems, satellite ground stations/terminals, communications test, and measurement instruments and UAV data links.¹⁹⁶ The company exhibited at AirShow China 2018.

Ties to the CCP and/or PLA: Provide key support to national projects. Cooperates with Chuangfang Investment who specifically focus on technological innovation projects, and has long-term layout of military-civilian integration and intelligent manufacturing industries.¹⁹⁷

Beijing Zhengtang Technology Co., Ltd.

北京正唐科技有限责任公司

Website: <http://sagetown.com.cn>

Location: 2 Building 17-4,
Beijing City Tang, Venice Garden,
Tiantongyuan North,
Litang Road, Beijing 102209

[北京市李塘路天通苑北威尼斯花园2区17-04]



Zhengtang Technology produces wireless mobile data transmission equipment, electronic warfare equipment, and avionics wireless data transmission equipment that have been successfully applied to drone measurement and control, space return cabin detection, and air-to-air missile systems. Other items in the product line include the Shenzhou-6 manned return capsule image and high-speed data transmission system, a certain type of airborne missile-loaded image and two-way data transmission system are all successful cases for military service. The company exhibited at Fifth China UAV Conference 2014.¹⁹⁸

Ties to the CCP and/or PLA: Zhengtang Technology Co., Ltd. has become a partner or qualified supplier of many large state-owned enterprises.¹⁹⁹

Beijing Zhongjing View Technology Co., Ltd.

北京中景视图科技有限公司

Website: www.zj-view.com/gywm

Location: Beijing

[北京]



The business scope of Beijing Zhongjing View Technology includes multi-source satellite image distribution, remote sensing data processing, industry mapping, and system development, and integrated construction.²⁰⁰

Ties to the CCP and/or PLA: “Zhongjing View is a high-growth innovative enterprise supported by the state”²⁰¹

Beijing Zhuoyun Remote Sensing Technology Co., Ltd.

[北京卓云遥感技术有限公司]

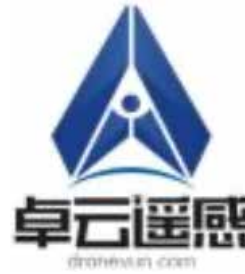
Website: www.droneyun.com

Location: Sea Eagle Industrial Building,

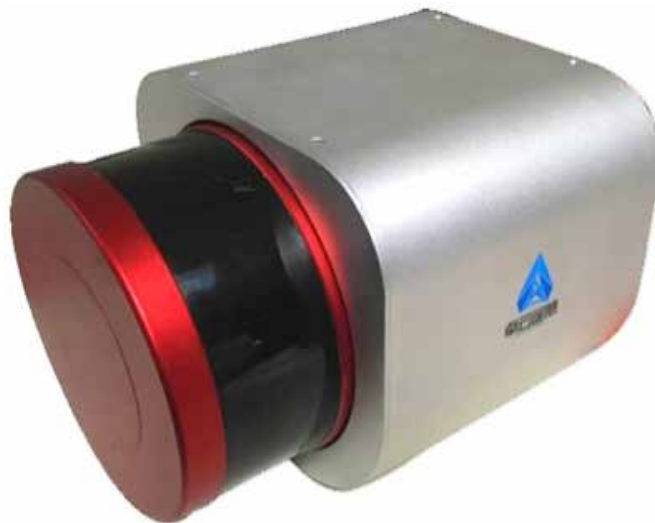
No. 1 Haiying Road,

Beijing

[北京市海鹰路1号海鹰工业大厦]



Zhuoyun Remote Sensing Technology is a high-tech R&D and manufacturing enterprise specializing in UAV remote sensing, laser 3D measurement, tilt photogrammetry, and photoelectric imaging technology. The company's self-developed laser radar system, tilting photography pod, ultra-wide field of view small multi-spin/tilt camera, and other products have been successfully applied to land surveying and mapping, power line inspection, forestry management, soil and water conservation, engineering construction, and disaster emergencies.²⁰²



Zhuoyun Remote Sensing Technology's Multi-Rotor UAV Lidar System DL-100²⁰³

Guangzhou Jiantong Surveying and Mapping Geographic Information Technology Co., Ltd.

广州建通测绘地理信息技术股份有限公司

Website: www.gzjtch.com

Location: 6/F, Building D,

No. 1027 Gaopu Road,

Tianhe District, Guangzhou

[广州市天河区高浦路1027号D栋6楼]



Guangzhou Jiantong Surveying and Mapping Geographic Information Technology Co., Ltd. is a high-tech surveying and mapping enterprise specializing in high-precision spatial geographic information data collection, processing, and application system development. It is a leader in airborne laser radar (LiDAR) surveying and mapping service.²⁰⁴



Guangzhou Jiantong Surveying and Mapping Geographic Information Technology²⁰⁵

GeoSys Hong Kong Ltd.

[GeoSys香港有限公司]

Website: geosys.org

Location: 913A, 9/F,

Hang Ngai Jewelry Centre 4 Hok Yuen Street East,

Hung Hom,

Kowloon, Hong Kong

[香港九龙红Ho鹤园东街4号恒艺珠宝中心9楼913A]



GeoSys Hong Kong is a geospatial technology company providing geographic information systems, BIM, indoor and outdoor scanning systems, satellite and UAV remote sensing/aerial photography technology research, development, applications, and services in Hong Kong.²⁰⁶

Shanghai Smartstone Sensing and Control Technology Co., Ltd.

慧石(上海)测控高科技有限公司

Website: www.smartstone-tech.com

Location: F3, Block 6, Huafang Road

Qingpu, Shanghai

[上海市青浦区华芳路6栋F3]



Smartstone Sensing and Control Technology develop and produce high-end sensors, mainly for aerospace, automotive, and high-speed rail sectors. Product lines include PE/IEPE accelerometers, MEMS pressure sensors, speed sensors, position sensors, and temperature sensors.²⁰⁷ Smartstone exhibited at AirShow China 2018 and the International Exhibition on Sensing and Measuring Technology 2014.

Ties to the CCP and/or PLA: Founded and established on the philosophy of building and improving domestic military technology.²⁰⁸

Xi'anTian He Defense Technology Co., Ltd.

西安天和防务技术股份有限公司

Website: www.thtw.com.cn

Location: Xian High-tech Industrial Development
Zone Technology, Road 9th,

Xi'an Shannxi, 710065

[西安市高新技术产业开发区科技路9号西安陕西710065]



Xi'anTian He Defense Technology Co., Ltd. is a private high-tech military enterprise mainly engaged in R&D, production, sales, and technology trade of reconnaissance, command and control systems with continuous-wave radar technology and photoelectric detection technology. The company's main products include terminal air defense command and control system products. The firm claims to be the "first private military enterprise listed in China." The company has more than 300 national defense invention patents and practical patents and undertakes 3 national 863 programs, 1 national science and technology support plan for a major project, more than 10 "13th Five-Year" military pre-research projects and a number of confidential projects. The company attended the Military-civil fusion Expo 2019.²⁰⁹

Ties to the CCP and/or PLA: Highly integrated in PLA technology sharing/development²¹⁰

OPTOELECTRONICS

Pieport Industries Ltd.

[皮波特工业有限公司]

(彼岸集团)

Website: www.peiport.com/en

Location: Room 1302 Westlands Center,
20 Westlands Road,

Taikoo Place, Hong Kong

[香港太古坊华兰道20号华兰中心1302室]



Hong Kong-headquartered Pieport Industries is the first civil-level gimbal solution provider in China. Peiport has more than 20 years of experience in optoelectronics gimbals, infrared cameras, and ultraviolet cameras. Peiport gimbals are widely used in areas such as power line inspection, police surveillance, fire detection, border securities, marines, TV broadcasting, etc. Peiport is also the official distributor for ROTAX Engine, which provides IC engines for ultralight aircraft and UAVs.²¹¹



ROTAX 915 IS/ISC Engine²¹²

Xi'an Tianyuan Optoelectronics Technology Co., Ltd.

西安天圆光电科技有限公司

Website: www.tygd-tech.com

Location: 11th Floor, Building A,
Innovation and Technology Building,
Northwestern Polytechnical University,
Beilin District, Xi'an, Shaanxi

[陕西省西安市碑林区西北工业大学创新技术大楼A楼11楼]



Tianyuan Optoelectronics Technology carries out collaborative innovation, independent research, and development system integration products in three major areas: aviation aircraft payload, space satellite payload, and simulation system. The company's product line includes two synthetic aperture radars used for aviation measurement, aerial remote sensing, satellite ocean observation, and other fields. It also manufactures the TYCA large field of view, high-resolution area aerial camera that relies on aerospace satellite camera design technology combined with integrated with a large field of view, a high-resolution special optical lens to produce a large-area imaging device. The firm is a member of the Shaanxi Guosheng Military-Civilian Integration Enterprise Chamber of Commerce.²¹³

Ties to the CCP and/or PLA: Partners with CAST, NSSC

Xinguang Optoelectronics Technology Co., Ltd.

哈尔滨新光光电科技股份有限公司

Website: www.xggdkj.com

Location: Daoli District,
Harbin City, Heilongjiang

[道里区, 黑龙江省哈尔滨市]



The main business of Xinguang Optoelectronics Co. Ltd. is military products and advanced military technology. The company has obtained all the military product qualification certificates. Its customers include China Aerospace Science and Industry Corporation, China Aviation Industry Corporation, China Weapons Industry Corporation, and “many other military enterprises.” The company designs, develops, produces, and installs optical-mechanical-integrated products in four main areas: (1) optical target and scene simulation, (2) optical imaging guidance, (3) optical testing, and (4) optoelectronic integration.²¹⁴

Ties to the CCP and/or PLA: “company is committed to serving the development of advanced weapon systems for the defense technology industry, focusing on providing high-precision components, devices, and systems in the fields of optical target and scene simulation, optical guidance, photoelectric testing and laser countermeasures. Its products are mainly used in precision guided weapons, missiles, and major national projects such as the Long March VII launch vehicle.”²¹⁵

COMPUTERS AND SOFTWARE

Beijing Tianzhou Shangyuan Information Technology Co., Ltd.

北京天舟上元信息技术有限公司

Website: www.skyship.com

Location: Beijing

[北京]



Tianzhou Shangyuan Information Technology develops software products (e.g., 3D CAD/CAE/CAM integrated solutions) that support high-end equipment platforms. Related products have obtained a series of typical applications in aerospace, aviation, weapons, shipbuilding, electronics, and other industries and have long provided consulting and technical support services for related product R&D units.²¹⁶



Home Page of Tianzhou Shangyuan Information Technology²¹⁷

Hang Li Data System Engineering Ltd.

[恒利数据系统工程有限公司]

Website: www.hanlidata.com

Location: Room 901,
Keen Hung Commercial Building,
80 Queen's Road East,
Wanchai, Hong Kong
[香港湾仔皇后大道东80号基恩商业大厦901室]



Hengli Data Systems Engineering Co., Ltd. is mainly engaged in system integration, software development, hardware product development and integration, production, and international trade. Systems integration focuses mainly on airborne and telemetry ground projects. Products include ones aimed at: (1) aircraft ground-test data analysis, (2) aircraft flight test system, (3) large aircraft flight-test data, and (4) structural modal analysis software.²¹⁸

Nanjing Langkun Software Co., Ltd.

朗坤智慧科技股份有限公司

Website: www.luculent.net

Location: No.12, Dinghuaimen,
Gulou District Nanjing 210013
[南京市鼓楼区定化门12号210013]



Nanjing Langkun Software Co., Ltd. designs, develops, and produces prepackaged computer software. The company received financing from the China Aerospace Science and Industry Corporation Aerospace Science & Technology Investment Fund Management.²¹⁹

**Shanxi Kotel Aerospace Defense
Technology Co., Ltd**

山西科泰航天防务技术股份有限公司

Website: www.kotelmems.com

Location: No. 3 Digit Road.

Hi-Tech Development Zone, Taiyuan, Shanxi

[山西省太原市高新技术开发区数字路3号]



Shanxi Kotel Aerospace Defense Technology is a “national-level hi-tech enterprise” and “national-level micromechanical inertial navigation system economic mobilization center.” Kotel’s products have been widely used in defense industries for measurement and control systems, ammunition guide and control systems, weapon systems, military informatization, and so on. At the same time, taking advantage of military technology, Kotel provides key products and testing services in areas like moon exploration project and Long March carrier rocket. KOTEL regards “integration of informatization and intellectualization, military-civil fusion” as strategic guidelines for developing solutions for both military and civil customers. Kotel has several branches. The Measurement and Control Branch is responsible for sales, R&D, and manufacturing of sensors, recorders, testing devices, and testing systems and software, as well as supplying various testing solutions and services. The Military Informatization Branch plans, designs, executes, and maintains military informatization solutions as well as designs, develops, and maintains information system application software, as well as design, execution, and maintenance of information system integration. The firm is striving to become a “Leading private military enterprise” according to the company’s website.²²⁰

Ties to the CCP and/or PLA: “Ketai Aerospace involve data acquisition and services of weaponry and equipment, comprehensive support for equipment, and services related to electronic information systems, which are bound to play an important role in the construction of a new joint logistics support system for our army.” -director of the Ministry of Defense Information Bureau for China²²¹

Xi’an Frontier Power Software Development Co., Ltd.

西安前沿动力软件开发有限责任公司

(前沿动力集团)

Website: www.adicn.com

Location: No. 1101, Rongcheng Donghai A,

South Section of Zhangba Liu Road,

High-tech Zone,

Shaanxi Province Xi’an

[1101号荣成东海A张坝刘路南段高科技区陕西省西安市]



The Xi’an Frontier Power Software Development Co., Ltd. has a comprehensive technical service system and related software tool product lines for military and civil aviation, military equipment, nuclear industry, automobile, and other military and civil fields. The company’s main qualifications include: ISO9001 quality system certification, weapons and equipment quality management system certification (referred to as the national military standard GJB 9001C-2017), software enterprise certification, three-level confidential qualification unit certificate, Shaanxi Province post-doctoral innovation base, etc. Property rights include more than 30 software copyrights and more than 10 invention patents.²²² The firm’s President and Chief Scientist have won first and second prizes for scientific and technological progress from the [Chinese] National Defense Science and Technology Commission. He has more than 30 years of experience researching computational fluid dynamics, computational structural mechanic), aeroelasticity, aeroservoelasticity, and engine numerical simulation analysis.²²³

Ties to the CCP and/or PLA: “comprehensive technical service systems and related software tool product lines for the aerospace, weaponry, and nuclear industries, as well as automotive and other military & civil fields. Services China Aviation Industry Group, China Aerospace Science and Technology, Science and Industry Group, China Ordnance Industry Group, China Dongfang Electric Group, General Assembly 29 Base and other large group companies have established business and technical cooperation.”

REMOTE SENSING AND PHOTOGRAPHY

AIRTOP

[空顶]

Website: N/A

Location: N/A



AIRTOP is an industrial enterprise specializes in oblique photography using unmanned aerial vehicle as the core production, provide professional aviation image industry solutions for global customers, such as professional aerial cameras, oblique photography gimbal unmanned aerial vehicle control system, aerial mapping work operation systems, the application of 3D data and composite material molding and other professional technology. More than 100 government departments and enterprises used AIRTOP's services. The company attended China Surveying Mapping and Geoinformation Technology Equipment Expo 2018.²²⁴

GeospatialSmart Technology Co., Ltd.

北京中遥智图科技有限公司

Website: www.geospatialsmart.com

Location: Office 306, Tower C,
CRCC Plaza, No. 19 Beiyuan East Road,
Chaoyang District, Beijing, 100012

[北京市朝阳区北苑东路19号中铁广场C座306室, 邮编, 100012]



GeospatialSmart Co., Ltd. focuses on photogrammetry and remote sensing and develops web-based platform and application software.²²⁵ The company attended China Surveying Mapping and Geoinformation Technology Equipment Expo 2017.

Beijing GEOWAY Software Co., Ltd.

北京吉威时代软件股份有限公司

Website: english.geoway.com.cn

Location: 16 Floor WanShang Plaza,
22 Shijingshan Road, Beijing
[北京市石景山路22号万尚广场16楼]



GEOWAY claims it is the leading provider of geomatic solutions in China. It has a long-term commitment to research and development in the fields of geographical information systems, remote sensing, and digital photogrammetry. It possesses the capabilities of integrated business application in terms of software development, system integration, data processing, and information services. GEOWAY acquired independent intellectual property rights, including geospatial data management, geographical information system, remote sensing application, and digital photogrammetry, which shows international competitiveness in terms of image analysis and map representation. The company exhibited at China Surveying Mapping and Geoinformation Technology Equipment Expo 2018.²²⁶

Guangzhou Hopong Helicopter Remote Sensing Technology Co., Ltd.

广州市红鹏直升机遥感科技有限公司

Website: www.hopong.com.cn

Location: B7-6F, No.11Kaiyuan Road,
Hi-tech Industry Development District,
Guangzhou, China

[开元路11号B7-6F高新技术产业开发区中国广州]



Guangzhou Hopong Helicopter Remote Sensing Technology Co., Ltd. was found in 2002 by technical experts from the General Surveying and Mapping Bureau, Guangzhou Military Region No. 5 Office Remote Sensing Center, and demobilized members of the PLA Air Force. Hopong is the technical support unit of the Digital China Research Institute of Peking University. The firm was a pioneer in military airborne remote sensing and drone technology. Key technologies include aeronautical survey photography, aerial image direct modeling, true 3D simulation platform development, and 3D image reconstruction technology based on a UAV platform. In 2018, Hopong released the state-of-the-art camera: Hopong Taurus Camera, which can reach the millimeter level image resolution. The company attended the China Surveying Mapping and Geoinformation Technology Equipment Expo 2018.²²⁷

Shanghai Soarscape Technology Group

瞰景科技发展(上海)有限公司

Website: https://www.soarscape.com/

Location: Shanghai

[上海]



The Soarscape Technology Group is a high-tech enterprise focused on providing total solutions for reality modeling technology. The company includes Soarscape Technology Development (Shanghai) Co., Ltd. and Shanghai IFA Digital Technology Co., Ltd., and has branches in Hubei, Sichuan, Heilongjiang, Guizhou, Zhejiang, and other regions. As one of the earliest pioneers in the industry to introduce the automatic modeling

technology of oblique photogrammetry, the company's research and development in UAV and aerial camera, high-performance computer cluster deployment, large-scale 3D reality data acquisition, data-producing, and application, also software development, etc. and has the core competency of a full process solution. Soarscape is the CPA Platinum Channel Partner of China in Reality Modeling Series products of Bentley Software Company that is the world leader in the engineering software industry. In the future, the company will further integrate cloud computing, reality 3D maps, VR virtual reality, and other technologies to provide better technology and services for urban planning management, public security, water conservancy, and hydropower, ancient construction, and cultural tourism. The company attended China Surveying Mapping and Geoinformation Technology Equipment Expo 2017 and 2018.²²⁸

NAVIGATION AND GUIDANCE

**Beijing Naiwei Technology Co., Ltd. /
NavTech Inc.**

北京耐威科技股份有限公司

Website: www.navgnss.com

Location: Room 2607 Block A,

Beihuan Center,

18 Yumin Road,

Xicheng District, Beijing 100029

[北京市西城区鱼民路18号北环中心A座2607室100029]



Naiwei Technology's main products and services are MEMS chip process development and wafer fabrication, navigation systems and devices, and avionics systems. Applications include communications, biomedical, industrial science, consumer electronics, aerospace, and intelligent transportation.²²⁹ At the Beijing International Military and Civilian Integration Equipment Exhibition 2017, the company exhibited the following products: high accuracy laser inertial navigation system, high accuracy fiber-optic gyro, quartz accelerometer, a miniature fiber-optic integrated navigation system, and aviation backup computer.

Chengdu JOUAV Automation Co., Ltd.

成都纵横自动化技术有限公司

Website: www.en.jouav.com

Location: 6A-7F, Jingrong International Plaza,

5th street of Tianfu, Hi-Tech District,

Chengdu, Sichuan Province 610041

[四川省成都市高新区天府五街景荣国际广场6A-7F 610041]



The research team at Chengdu JOUAV Automation Co., Ltd. has expertise in (1) flight mechanics modeling and simulation, (2) aerodynamic wind tunnel testing and parameter identification, (3) flight control and navigation, (4) embedded software and hardware development, (5) unmanned aerial vehicle system integration and application, (6) and software development.²³⁰ The company won first, second, and third prizes in AVIC CUP UAVGP Innovation Grand Prix and was the first company to demonstrate successfully fixed-wing UAV fully autonomous take-off/landing on the removable platform and fixed-wing UAV skyhook precise recovery.²³¹ The company attended AirShow China 2018.

ComNav Technology Ltd.

上海司南卫星导航技术股份有限公司

Website: www.comnavtech.com**Location:** Building 2,
No.618 Chengliu Middle Rd.
201801 Shanghai
[成六中路618号2号楼 201801上海]

ComNav Technology Ltd. develops and manufactures multi-constellation, multi-frequency GNSS measurement engine boards and receivers for ultimate high precision positioning applications. ComNav was the first Chinese company to develop, design, and produce combined GNSS (GPS and GLONASS) plus BeiDou OEM board. Its technology has already been used in applications such as surveying, construction, machine control, agriculture, intelligent transportation, precise timing, deformation monitoring, and unmanned system. The company attended China Surveying Mapping and Geoinformation Technology Equipment Expo 2018.²³²

Guangzhou Asensing Technology Co. Ltd.

广州导远电子科技有限公司

Website: www.asensing.com**Location:** B101,
Qirui Science and Technology Park,
No. 1 Nanxiang 2nd Road,
Huangpu District
[黄浦区南翔二路1号奇瑞科技园B101]

Guangzhou Asensing Technology Co. Ltd. specializes in the development of high-speed inertial navigation technology and product manufacturing. It provides customers with a variety of integrated navigation systems and unmanned platform solutions. The company has offices in Shenzhen and Beijing.²³³ The company exhibited at AirShow China 2018.

Recco Defense / Jiangsu Leike Defense Technology Co., Ltd.

[雷科防务 / 江苏雷科防务科技股份有限公司]

Website: www.racodf.com**Location:** 6th Floor, Building 5,
No. 2, West Third Ring Road, Haidian District, Beijing
[北京市海淀区西三环二路2号5楼6楼]

Recco Defense builds a variety of satellite navigation products, including Beidou chips, Beidou satellite navigation modules, special satellite navigation terminals, civil satellite navigation terminals, and a satellite navigation simulator. The company also produces a variety of radars, including remote sensing observation radars, regional surveillance radars, and a radar simulation test/verification system. The company asserts it has “long been committed to serving the national defense and people’s livelihood areas such as air, space, land, and sea.” The website advertises that the B01YA12 and B01YA12 airborne unmanned synthetic aperture radars (SAR) can be used for a wide variety of missions, including military reconnaissance.²³⁴

Ties to the CCP and/or PLA: Heavily invested/owned by state-owned enterprises²³⁵



B01YA12 Unmanned Airborne SAR System²³⁶

Shanghai Huace Navigation Technology Ltd.

上海华测导航技术股份有限公司

Website: www.huace.cn

Location: 509 Gaojing Rd,
Qingpu Qu, Shanghai Shi
[上海市青浦区高井路509号]



Shanghai Huace Navigation Technology Ltd. (known as CHC) designs, manufactures, and markets a wide range of professional GPS/GNSS solutions. As China's first independent intellectual property right measuring GNSS receiver developer, CHC participated in major projects which undertaken by the Ministry of National Science and Technology of China (863 Program), the National Development and Reform Commission (NDRC) and the General Armaments Department, etc. CHC currently obtained more than 160 patents and 60 software copyrights. Besides, CHC received the award of Shanghai Science and technology progress three times. CHC is currently mastering core technologies, including GNSS Algorithm Technology, Baseband and RF Board Technology, GNSS Beidou Receiver Development Technology, Industrial Software Applications, System Solutions, Machine Control and Navigation Technology. Aiming to improve the efficiency of high precision data acquisition and utilization and maximize customer values, CHC is dedicated to offering professional solutions to high-precision data collections and applications, covering numerous fields like Geodetic survey, mobile mapping, 3D laser scanning, UAV, GIS, deformation monitoring, precision agriculture, digital project construction, intelligent transportation, marine survey, etc. The company attended China Surveying Mapping and Geoinformation Technology Equipment Expo 2017.²³⁷

Ties to the CCP and/or PLA: Develop technology for the dual use civilian-military Beidou navigation system²³⁸

ELECTRICAL EQUIPMENT AND POWER SUPPLIES

**Dr.Power Technologies / Shanghai Juntao
Power Equipment Co. Ltd.**

上海军陶电源设备有限公司

Website: <http://www.drpower.com.cn/index.aspx>

Location: Sanbang Road,
Building A01, No.469,

Shanghai, Songjiang District, 201600

[上海市松江区469号A01号三邦路, 201600]



Dr.Power Technologies / Shanghai Juntao Power Equipment designs and manufactures AC-DC and DC-DC converters as well as power supply solutions to the military and rugged industrial market. Till now, the company has provided thousands of power supply solutions for end customers on avionics, military aircraft, commercial aircraft, radar arrays, electronic warfare, missiles, UAVs, emergency systems, surface ships, submarines. Products include DC-DC standard converters, CPCI/VPX/VNX power supplies to custom system level AC-DC and DC-DC power supplies.²³⁹ The company exhibited at the International Military-Technical Forum Army-2019 and Army-2020 in Moscow.

Dynamic Electronics Co. Ltd.

定穎電子股份有限公司

Website: www.dynamicpcb.com

Location: Daqi Avenue, No.88,
Huangshi City, Wangren Town,
Hubei Province, 435000

[湖北省望仁镇黄石市88号大崎大道435000]



The company is a professional PCB manufacturer and ranked the 43rd of the world in the PCB field. There are three production bases located in Taiwan Taoyuan, China Huangshi, and Kunshan. Dynamic authorized capital is US\$92.5 million, annual sales turnover over US\$400 million with over 7,500 employees. Dynamic's long-term strategy is to develop technical capabilities for High Layer Count, High-Density Interconnect, High Frequency and Heavy Copper applications and Rigid-Flex PCB for aerospace, military defense, and medical industry as well as the Internet of Things (IoT) and cloud computing.²⁴⁰ The company exhibited at the International Military-Technical Forum Army-2019 in Moscow.

ELECTRO-OPTICAL EQUIPMENT



Jiangsu A-Star Aviation Industries Company

[江苏一星航空实业公司]

Website: www.bja-star.com

Location: Jiangsu

[江苏]

A-Star is a private company whose founders came from China Electronic Technology Corporation (CETC). The company specializes in military electro-optical targeting systems and electronic warfare systems for a wide variety of fighters, including the FC-31/J-31.²⁴¹



天巡-S56 联合光电探测制导吊舱

- 精巧独特的外形设计
- 自成体系,集成有火控计算机激光陀螺INS、大气数据计算机、无线电高度表、数据链等
- 适用于多种机型,改装简便快捷
- 可为多类型制导武器提供制导
- 实时全向数据通信链路
- 多波段、多功能联合探测模式
- 功能完整,性能强劲



EORD-31 前视红外搜索跟踪系统

系统概述

EORD-31 前视红外搜索跟踪系统专门为四代机设计, 适用于歼-20、歼-31、T-50、SU-35等多种机型。系统采用高灵敏度线阵红外传感器与面阵红外传感器作为目标探测器, 并配合高动态伺服系统, 主要用于对飞机前方及侧上方目标进行扫描探测、搜索与定位。

EORD-31 前视红外搜索系统主要由光机扫描装置(红外光学系统、长波线阵红外探测器、中波面阵红外探测器、短波线阵红外探测器、伺服稳定平台)、图像处理计算机、二次电源及其配套附件组成。

EORD-31 前视红外搜索系统可探测载机正前方 $\pm 60^\circ$ 区域内的目标, 通过对成像数据的实时处理, 进而检测并定位目标; 同时亦可根据目标成像特性与典型目标成像数据的智能比对结果, 达到自动识别目标的目的。

功能及用途

- 全天时、反隐身探测及目标跟踪定位
- 武器制导
- 与机载雷达同步工作, 提高抗干扰能力
- 远距离目标识别
- 夜间/雾霾等低能见度条件下辅助进场导航
- 对空、对地、对海侦察搜索

为多类型武器提供制导

为光电/雷达跟踪制导系统提供目标指示

Advertising Brochures for Infrared Search and Tracking Pods²⁴²

Microthermo (Hangzhou) Technology Co. Ltd.

微热光电 (杭州) 有限公司

Website: www.microthermo.net

Location: No. 158 Zixuan Road,
15F/Building 3,
Hangzhou, Xihu, 310030
[西藏杭州西湖大厦15楼紫轩路158号310030]



Microthermo (Hangzhou) Technology produces uncooled shutterless thermal imaging modules 384x288/640x480 17um for surveillance, weapon sights, firefighting, hunting, UAV, etc. more than 10 years. Featured specifications are as follows: resolution: 384x288/640x480 17um, Ulis as sensor; PCB size: 20x20mm/24x24mm; output: analog video and BT.656/Cameralink/LVDS/USB/HDMI/DVR; frame rate: 50Hz Pal/ 60Hz NTSC; lens which are optional and customized. Applications include: UAVs, weapon sights, surveillance, telescopes for the army, or civil use.²⁴³ The company exhibited at the International Military-Technical Forum Army-2019 and Army-2020 in Moscow.

Jiangyin Xiangjiang Opto-Electronic Instruments Co., Ltd.

江阴香江光电仪器有限公司

Website: www.jyxjgd.cn

Location: No. 16, Xinyuan Road, Xinhua Industrial Park,
Chengjiang Street,
Jiangyin City, Jiangsu Province
[江苏省江阴市澄江街道新华工业园新源路16号]



Jiangyin Xiangjiang Opto-Electronic Instruments is a high-tech private enterprise that develops and produces electro-optical devices. The company has received 18 National Patents and 8 Provincial Hi-tech Products. Several of its products have gone into national major research and development projects as well as the national defense sector.²⁴⁴

Ties to the CCP and/or PLA: Partner with CASC²⁴⁵

Zhejiang ULIRVISION Technology Co., Ltd.

浙江红相科技股份有限公司

Website: www.ulirvision.com/

Location: No.581 Huoju Avenue,
17F,Block C Sunwave, Zhejiang,
Bingjiang, Hangzhou
[杭州市滨江镇江太阳C座17楼霍州大道581号]



ULIRVISION is one of the largest-scale professional manufacturers and suppliers of thermal imaging systems that include infrared cameras, gas infrared cameras, corona cameras. The firm specializes in infrared imaging and UV imaging research, development, production, and marketing. The ULIRVISION supplies infrared cameras, night visions, gas infrared cameras, thermal imaging cores, and corona cameras.²⁴⁶ The company exhibited at the International Military-Technical Forum Army-2019 in Moscow.

Wuhan Global Sensor Technology Co., Ltd. (GST)

武汉高芯科技有限公司

Website: www.gst-ir.com/

Location: Huanglongshan South RD, 6#, Wuhan

[龙山南路6武汉]



Wuhan Global Sensor Technology Co., Ltd. (GST) is a subsidiary of Guide Infrared. GST specializes in the design, manufacture, sales, and marketing of infrared thermal imaging detectors and coolers. The company runs 3 internally-developed production lines: (1) 8-inch 0.25 μm MEMS production line for uncooled VO_x detectors, (2) 8-inch 0.5 μm production line for cooled MCT detectors, and (3) 8-inch 0.5 μm MBE production line for cooled T2SL detectors. Its products are widely used in thermography, security and surveillance, personal vision, automotive, consumer infrared, and military applications (including for UAVs).²⁴⁷

Ties to the CCP and/or PLA: 2015) “Recently, the company has just obtained the “Registration Certificate of Weapon and Equipment Manufacturing Unit” issued by the General Equipment Department of the Chinese People’s Liberation Army and approved for additional items. Becoming the first private enterprise to enter the field of complete weapon system development indicates that the company’s government-equipped weapon system products have made considerable progress in scientific research capabilities, technical levels, and production capabilities and have been recognized by the military.”²⁴⁸

MISCELLANEOUS MECHANICAL COMPONENTS

Anhui Yingliu Electromechanical Co. Ltd.

安徽应流机电股份有限公司(应流集团)

Website: <http://www.yingliugroup.com>

Location: East Side of North Rui An Road,

Jin An District, Anhui

[安徽省金安区北瑞安路东侧]



Anhui Yingliu Electro-Mechanical Co., Ltd. principally engages in the research and development, manufacture, and distribution of professional equipment parts and components for helicopters, UAVs, and small turbine power plants. Yingliu Electro-Mechanical’s products include a pump and valve parts, and machinery and equipment components for use in aviation, nuclear power, oil and gas, resources, defense industry, and other high-end equipment fields. The company markets products within China and overseas.²⁴⁹ The company exhibited at AirShow China 2018.

Beijing Emerging Eastern Aviation Equipment Co., Ltd.

北京新兴东方航空装备股份有限公司

Website: N/A

Location: No. 65 Yingshikou Road, Beijing, BEJ 100195

[北京市星石口路65号, BEJ 100195]



Beijing Emerging Eastern Aviation Equipment Company develops, manufactures, and sells aviation equipment based on servo control technology, as well as provides related technical services. Its principal products are airborne suspension/launching devices, such as rack-mounted random systems and turret random systems. Additionally, the company offers aviation equipment, such as aircraft information management and recording systems, integrated testing and support systems, as well as military autonomous controllable computers. The company's products go into aerospace equipment, such as helicopters, fixed-wing aircraft, and drones.²⁵⁰ The company exhibited at AirShow China 2018.

Ties to the CCP and/or PLA: In 2005, the company's "All-electric Cannon Control System" project won the "First Prize of Scientific and Technological Progress in the Army" of the former General Armament Department of the Chinese People's Liberation Army²⁵¹

Beijing Science and Technology Servo Technology Co., Ltd. /

Beijing Institute of Servo Technology Co., Ltd.

[北京科技伺服技术公司]

Website: www.bitservo.com.cn

Location: Zhongguancun South Street,
Second District 5 683 No. F, 9th Floor,
Haidian District, Beijing 91823

[中关村南街, 第二区 5 683 号 F 楼, 9 楼, 北京市海淀区 91823]

Beijing Science and Technology Servo Technology Co., Ltd. is a high-tech company specializing in the research of aircraft actuators. The company has independent intellectual property rights in jet actuators and supersonic cruise targets and automatic bomb delivery devices for drones, transport aircraft, and other types of aircraft. Additionally, the company develops jet actuators and aerodynamic steering gear. It has also performed testing on steering gear systems and the missile control systems.²⁵²

Chengdu ALD Aviation Manufacturing Corporation

成都爱乐达航空制造股份有限公司

Website: <http://en.cdald.com>

Location: Antai 2nd Road,
West Hi-Tech Zone,
Chengdu, Sichuan

[四川省成都市西部高新区安泰二路]



Chengdu ALD Aviation Manufacturing Corporation develops and produces precision components for military and civil aircraft, including: (1) engine parts, (2) system and hydraulic parts, and (3) assembly parts.²⁵³ Over the decade, ALD has participated in R&D on over 3,000 parts for 20 types of airplanes. The company attended AirShow China 2018.

Ties to the CCP and/or PLA: Listed in the “Military-Civilian Integration Stock List” - “Elorda: Chengdu Elorda Aviation Manufacturing Co., Ltd. The main business is engaged in precision machining of military aircraft and civil passenger aircraft parts. The main products are ribs, beams, joints, bearings, frames, emergency doors. , Spoiler, aileron, wheel cabin, floor beam. The company has won the honor of “Excellent Supplier” of the aircraft manufacturing unit of AVIC.”²⁵⁴

Liaoning Hangcheng Technology Co., Ltd.

辽宁航成科技有限公司

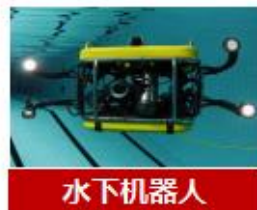
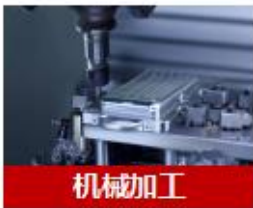
Website: www.lnhckj.com.cn

Location: Yingsong Songsan Road,
Sujiatun District, Shenyang
[沈阳市苏家屯区英松松三路]



Liaoning Hangcheng Technology is a private firm that does research and production of military development tasks supporting China’s aviation, aerospace, and weapons sectors. Among its clients is the PLA Rocket Force. The company holds third-class confidential qualification plus quality management system certification for weapons and equipment research and production units.²⁵⁵ The company exhibited at AirShow China 2018.

业务领域



战略合作伙伴



中国科学院



辽宁工程技术大学



哈尔滨工业大学



锦达精密



利源轨道

Liaoning Hangcheng Technology’s Major Clients²⁵⁶

Ningbo Xingjian Aerotech Co., Ltd.

宁波星箭航空机械制造有限公司

Website: www.xjaero.com/en/about.aspx

Location: Xiyang Village,
Shiqi Street, Haishu District,
Ningbo 31153

[浙江省海曙区石岐街西阳村31153]

Ningbo Xingjian Aerotech Co., Ltd

Ningbo Xingjian Aerotech Co., Ltd. manufactures space and aviation parts and components, including special materials for precision parts and custom designs based on client requests. The company specializes in the production of titanium alloy, high-temperature alloy aviation, and space components. Product lines include bolts, studs, nuts, threaded rod, screws, washer, bent bolts, pins, studmaster, etc. These components are extremely precise, highly durable, and can tolerate extreme heat. Holds NBXJ is AS9100C – Aviation, Space, and Defense manufacturing quality management systems standard certified.²⁵⁷ Identified as a military-civil fusion enterprise at the Fourth Military-Industrial Integration Development Conference of Zhejiang Province (2017).

Shenzhen Lianjiaxiang Science and Technology Co., Ltd.

[深圳市联嘉祥科技有限公司]

Website: www.lianjiaxiang.com/

Location: 1006 Shennan Road,
Futian District, Shenzhen

[深圳市福田区深南路1006号]

联嘉祥
LIAN JIA XIANG

Shenzhen Lianjiaxiang Science and Technology Co., Ltd. specializes in research and development, manufacture, sale, and services of wires and cables. Its products are widely used in an intelligent-building system, computer network system, intelligent rail traffic, mechanical and electrical equipment control system, and military aircraft.²⁵⁸ The company participated in the Beijing International Military-Military Equipment Exhibition 2017.

Ties to the CCP and/or PLA: Partners with China Mobile, Huawei²⁵⁹



Lianjiaxiang Science and Technology Booth at
Beijing International Military-Military Equipment Exhibition 2017²⁶⁰

Tianjin Istar-Space Technology Co., Ltd. / Astar Aerospace Technology Co., Ltd.

爱思达航天科技, 天津爱思达航天科技有限公司/北京爱思达航天科技有限公司

Website: www.istar-space.com

Location: Tianjin Research Center &

Tianjin manufacture base No.1,

No.18 Yingchun Rd,

Huaming High-Tech Zone,

Dongli District, Tianjin

[天津研究中心和天津制造基地1号: 天津市东丽区华明高新区迎春路18号]



Istar-Space Technology Co., Ltd. is a high-tech startup enterprise established in response to the call for national military-civil fusion. The company focuses on the R&D, design, and manufacturing of lightweight structural parts, functional parts, and new materials for aerospace, aviation, rail transit, shipbuilding, and car industries.²⁶¹ Istar-Space Technology attended AirShow China 2018.

Ties to the CCP and/or PLA: Provides technical support and structural products for well-known rocket companies, satellite companies and military equipment departments.²⁶²

Wuhan Ruijing Sharp Laser Chip Technology Co., Ltd.

武汉锐晶激光芯片技术有限公司

Website: <http://www.bdlrj.com/gywm/gywm99.html>

Location: 902, Future Technology City,

Donghu New Technology Development Zone,

Wuhan, Hubei Province 430075

[湖北省武汉市东湖新技术开发区未来科城902号邮编 430075]

武汉锐晶

The company's scope of business includes solid laser chip research, development, production, sales, maintenance services, technical advice, import and export of goods, technology import and export, agent import and export.²⁶³ The company received funds from CASIC Aerospace Science & Technology Investment Fund Management as part of a military-civil fusion initiative.

Xi'an Chenxi Aviation Technology Co., Ltd.

西安晨曦航空科技股份有限公司

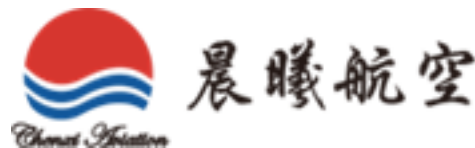
Website: www.cxaviatech.com

Location: No. 11, Area C,

No. 69, Jinye Road,

High-tech Zone, Xi'an

[西安市高新区金叶路69号C区11号]



Xi'an Chenxi Aviation Technology Co., Ltd. is a private military listed company specializing in the development of aviation equipment. Based in the aviation field, Chenxi is mainly engaged in R&D, production and sales of aviation electromechanical products and related professional technical services. It has more than ten technical specialties such as inertial navigation, engine control, flight control computer, drone, and avionics.²⁶⁴

Ties to the CCP and/or PLA: Listed in the "Military-Civilian Integration Stock List"²⁶⁵

Xi'an Xinghang Aviation Manufacturing Co. Ltd. /

Xi'an Xinghang Aviation Technology Co. Ltd.

[西安天元光电科技有限公司]

Website: N/A

Location: No. 55 Hangkong First Road,

Aviation Base, Xian, Shaanxi 710089

[陕西省西安市航空基地航空一路55号710089]

Xinghang Aviation Manufacturing makes aviation equipment. The product line includes aeronautical structures, aviation simulation equipment, aviation simulators, and components for aircraft, rockets, and missile engines.²⁶⁶

Zhejiang Xizi Aviation Industry Co., Ltd.

(西子联合) 西子联合控股有限公司

Website: www.xizigroup.com

Location: No. 277 Xinken Road,

Dajiangdong Industry Cluster,

Hangzhou 31222

[杭州大江东产业集群新垦路277号]



Zhejiang Xizi Aviation Industry Co., Ltd. is part of Xizi United Holding Corporation. Xizi Aviation Industry focuses on the fabrication of aerospace parts and components, including airframe structure, composite parts, sheet metal parts, aerospace fastener, etc. XIZI Aviation is capable of CNC machining, composite structures forming, sheet metal forming, heat and surface treatment, component assembly, digital measurement, NDT, etc. XIZI Aviation is a tier 1 supplier of C919 aircraft airframe structure and provides high-quality products and services for Airbus, Boeing, COMAC, AVIC, Cessna, Bombardier, etc. Identified as a military-civil fusion enterprise at 4th Military-Industrial Integration Development Conference of Zhejiang Province in 2017.²⁶⁷

Ties to the CCP and/or PLA: Supplies airframe components for COMAC²⁶⁸

Zhejiang Zhonghang Electronics Co., Ltd.

[浙江中航电子有限公司]

Website: www.zjzhdz.com

Location: No. 1418-41 Moganshan Road, Hangzhou

[杭州莫干山路1418-41号]



Zhejiang Zhonghang Electronics Co., Ltd. develops and produces professional military electrical connector research and production units. Its products are used in the aviation, nuclear industry, weapons, ships, military electronics, railways, national grid recharge stations, new energy vehicles, coal mine safety and other military and civilian areas.²⁶⁹ Identified as a military and civilian integration demonstration enterprise at the 4th Military-Industrial Integration Development Conference of Zhejiang Province 2017.

Ties to the CCP and/or PLA: Zhejiang Zhonghang Electronics Co., Ltd. was named the 2017 Zhejiang Military-civil fusion Demonstration Enterprise.²⁷⁰

SMART MANUFACTURING

**Shandong Shanda Huatian Software Co., Ltd. /
Huatian Software [Hoteam Software]**

山东山大华天科技集团股份有限公司

Website: huatian.com.cn

Location: Shangda Technology Park,
Yingxiu Rd.,

Hi-tech. Zone, Jinan,

Shandong, China 250101

[高新区映秀路上大科技园山东省济南市开发区250101]



Shandong Shanda Huatian Software, also known as Huatian Software or as Hoteam Software, is a manufacturing software supplier with 3D as its core technology. The firm has undertaken approximately 20 national scientific research projects and claims to be “at the forefront of the industry in the theoretical research of 3D CAD and product life cycle costs.”²⁷¹ It participated in the China Xi’an Military-civil fusion and Defense Aerospace Science and Technology Exhibition 2019.

Xi’an Liren Technology Co., Ltd.

西安立人科技股份有限公司

Website: www.lirenkj.com/yewu/junmin

Location: 4th Floor, Block A,
Liren Science and Technology Park,
No. 52 Gaoxin 6th Road, Xi’an

[西安市高新六路52号立人科技园A座4楼]



Xi’an Liren Technology Co., Ltd. has four core business areas: (1) systems integration, (2) Big Data, (3) operational service, and (4) military-civil fusion. Liren Technology provides intelligent manufacturing technology to military enterprises. Activities focused on military-civil fusion, including intelligent and efficient processing, intelligent process system business, basic database system business for manufacturing, digital workshop business, intelligent workshop intelligent production line business, data center construction, industrial control network, and security solutions. Direct support to the military includes network and information security, information storage, big data, and cloud computing, weapon information, information display terminals, conference systems, public broadcasting systems, military communications, command and control, military security, Internet of things, military and civilian fusion equipment, military supporting products, new materials, special vehicles and other information construction areas.²⁷²

Xi'an Supersonic Aviation Technology Co., Ltd

西安超音航空科技有限公司

Website: www.xa-sat.com

Location: Room 501, Building C,
Hangchuang International Plaza,
Shenzhou 4th Road,
National Civil Aerospace Industry Base,
Xi'an City, Shaanxi Province

[陕西省西安市国家民航产业基地神舟四路航创国际广场C座501室]



Xi'an Supersonic Aviation (SAT) is a high-tech company mainly engaged in industrial 3D printing technologies and defense components R&D and production. The company has 20 years of experience at all kinds of aero, automobile engine parts, and aviation maintenance equipment. The firm has 18 years of experience in PREP atomizing technology for spherical powder and 13 years of experience at 3D printing, such as Laser deposition, SLM, EBM, SLA process. The company also has 20 years of experience at all kinds of aero, automobile engine parts, and aviation maintenance equipment. SAT provides the following products and technical services (1) 3D printing materials of biodegradable materials and spherical metal powder such as titanium alloy, super-alloy, aluminum, and copper alloy; rare refractory metals, (2) Customized PREP atomized equipment, (3) 3D printer for desktop and DP, SLA, SLM; Customized 3D printing parts, and (4) Surface finishing services with a precision bellow Ra 60 nanometer for 3D printing parts and other parts to arbitrary materials and complex structures. Additionally, SAT produces UAVs and robots.²⁷³



QL Long Range UAV for Border Surveillance²⁷⁴

BATTERIES AND POWER SUPPLIES

Shenyang Junwei Xinneng Technology Co., Ltd.

[沈阳君威新能科技有限公司]

Website: www.jwxnkj.com

Location: No. 1 Yangshan Road,
Huanggu District, Shenyang City
[沈阳市皇姑区阳山路1号]



Shenyang Junwei Xinneng Technology is a private enterprise that describes itself as the “only professional heating of weapons and equipment in China.” The company specializes in batteries and smart lithium power supplies for weapons, aviation, aerospace, and marine weapons. PLA naval, land, air forces as well as the PLA Rocket Force, the PLA Strategic Support Force and “other military services” use the firm’s products. Shenyang

Junwei Xinneng Technology also offers a complete set of testing equipment for military product development and production testing. The company claims to be “the only private military-industrial enterprise that develops and manufactures smart weapon bomb-borne thermal batteries and military-civilian general-purpose intelligent lithium power sources.”²⁷⁵ The company participated in AirShow China 2018.

Ties to the CCP and/or PLA: “Is the only company in the country specializing in thermal batteries for weapons and equipment”, It was included in the first batch of civilian military enterprises in the country and the only private military enterprise with a full set of military characteristics and added to the general assembly procurement list.”²⁷⁶

Shenzhen Power-Time Technology Co., Ltd. /

Gpcomm Technology Co., Ltd.

深圳动力时代科技有限公司

Website: www.power-time.com

Location: 1 Bldg, No. 3 West District,

Shangxue Industrial Park,

Jihua Road, Bantian, Shenzhen

[深圳市坂田季华路上雪工业园西区3号楼1栋]

The logo for Power-Time features the company name in a bold, italicized, blue sans-serif font. The word 'Power' is in a darker blue, and 'Time' is in a lighter blue. A red horizontal line is positioned above the 'i' in 'Time'. Below the text, there is a faint, light blue reflection of the logo.

Shenzhen Power-Time Technology Co., Ltd. makes a wide range of products, including military batteries and headsets for ground forces and aviation. The product range includes ANR headsets, monitoring headsets, bone conduction headsets, aviation headsets, smart batteries, smart chargers, and connectors. The company has passed the national military standard GJB-9001 certification.²⁷⁷ The company exhibited at AirShow China 2018 and Defense & Security Exhibition International (DSEi) 2019.

Ties to the CCP and/or PLA: Provide equipment to PLA. Exhibitor at the 9th China Defense Information Equipment & Technology Exhibition 2020²⁷⁸

MISCELLANEOUS SYSTEMS

Chengdu Hermes Technology Co., Ltd

成都赫尔墨斯科技股份有限公司

Website: www.hermes-sys.com

Location: 5F, Building B5, Zone D,

Tianfu Jingrong Center,

No.99 West Section of Hupan Road,

Chengdu Science City, Tianfu New Area, Chengdu

[成都市天府新区成都市科学城沪盘路西段99号天府经融中心D区B5栋5楼]



Hermes Technology was one of the leading military-civil fusion enterprises created in the Tianfu New Area of Chengdu. The firm has three subsidiaries: (1) Chengdu ZR Aerospace Technology Co., Ltd. (the “ZR”), (2) Chengdu 3D Visual Cloud Information Technology Co., Ltd. and (3) Chengdu Zirui Qingyun Aviation Aerospace Technology Co. Ltd. which focuses on developing, producing and servicing aviation defense systems.²⁷⁹ Hermes Technology is one of the very few private enterprises in China that can provide integrated solutions to advanced integrated avionics. Its avionic products are used primarily in assembling and upgrading of trainer aircraft, light combat aircraft, small- and medium-sized transporting aircraft, and helicopters as well as providing control systems for industrial UAVs. Additionally, the company self-developed a “high-precision mathematical

aircraft simulating platform” and provides UAV ground station simulators.²⁸⁰ Its customer base includes military-industrial institutes, the military, and aviation academies. The company attended the Chengdu Military-civil fusion and Aerospace Industry Exhibition and the 6th China National Defense Information Technology and Technology Exhibition 2017.

Ties to the CCP and/or PLA: Successively introduced strategic emerging industry funds managed by Chengyi Investment, a subsidiary of the State-owned Enterprise Shenneng Group²⁸¹



Integrated Avionics System Shown at 6th National Defense Information Technology Expo²⁸²

Chengdu Huatai Aviation Technology Co. Ltd.

成都华太航空科技股份有限公司

Website: www.huataihangkong.com

Location: No.1186, BaiCao Road,
High-Tech West Zone, Chengdu, Sichuan
[四川省成都市高新西区白草路1186号]



成都华太航空科技股份有限公司
Chengdu Huatai Aviation Technology Co., Ltd.

Chengdu Huatai Aviation Technology Co. Ltd. serves the aviation industry as a maintenance service provider, a developer and manufacturer of airborne equipment and parts as well as avionics test sets, and a supplier of aviation parts and materials.²⁸³ This company is described in Chinese media as “one of the first military-civil fusion enterprises” in Chengdu.

CITIC Haizhi Aviation Technology Co., Ltd

[中信海智航空科技有限公司]

Website: N/A

Location: N/A

CITIC Haizhi General Aviation Maintenance Engineering Co., Ltd. (a Sino-foreign joint venture) created CITIC Haizhi Aviation Technology to qualify to do work for the Chinese military. CITIC Haizhi Aviation Technology carries out military maintenance on helicopters.²⁸⁴

Hunan Huanuo Star Electronic Technology Co., Ltd.]

湖南华诺星空电子技术有限公司

Website: www.xfsb119.com/com/huanuoxingkong

Location: Changsha City, Hunan

[湖南省长沙市]

Hunan Huanuo Star Electronic Technology Co., Ltd. is a high-tech enterprise engaged in the integration of radar, intelligent equipment, and electronic systems. The company has been committed to the development of high-end equipment manufacturing industry, focusing on research and development, production and sales of high-quality radar products, determined to become the forerunner and leader in the domestic civilian market of radar, and actively promote the development of China's military electronics. The company also produces a counter-UAV system. The company has subsidiaries such as Huanuo Intelligent and Nalei Technology, which are mainly engaged in the fields of intelligent robots and micropower radars.²⁸⁵

Ties to the CCP and/or PLA: Business based on national defense and military industry, leading military-civilian integration²⁸⁶

Shijiazhuang METDA Electronic Technology Corporation (METDA)

[石家庄麦达电子科技有限公司]

Website: www.metdac.com

<http://www.metdac.ygean.com/introduce/>

Location: 113# Hezuo Road,

Shijiazhuang, Xinhua, Hebei

[河北省新华社石家庄合作路113号]

Shijiazhuang METDA Electronic Technology Corporation (METDA) is the sub-company of HSRI (Hebei Semiconductor Research Institute), which is China's most comprehensive semiconductor suppliers founded in 1956 with large production capacity, strong technical strength, and highly integrated specialization. The company concentrates on five main areas: (1) microelectronics, (2) optoelectronics, (3) MEMS, and (4) high-end semiconductor sensors and (5) optical-mechanical integrated micro-systems.²⁸⁷

Ties to the CCP and/or PLA: Wholly owned subsidiary of CETC 13th institute²⁸⁸

Sichuan Zhongzi Technology Co., Ltd.

四川中自科技有限公司

Website: www.sczzkj.com.cn

Location: Building 7-A,
Area E, 51 Tengfei Avenue,
Qingyang District, Chengdu
[成都市青羊区腾飞大道51号E区7-A]



Sichuan Zhongzi Technology Co., Ltd. is a national high-tech enterprise dedicated to military and civilian integration. It makes aviation, aerospace, and airborne products as well as ground testing equipment, special process equipment, intelligent system integration, integrated circuit systems, and optical and electrical integration. The company has three national-level defense invention patents for: (1) aircraft fuel system multi-function integrated cleaning (2) vehicle, ducted flexible joint forming machine, and (3) non-flare duct joint forming machines.²⁸⁹ The company exhibited at AirShow China 2018.

Xi'an Hengyu ICT [Xintong] Aviation Equipment (Beijing) Co., Ltd.

恒宇信通航空装备(北京)股份有限公司

Website: www.bjhyxt.cn

Location: 16th Floor,
Lanhai Building,
Zhangbayi Road,
High-tech Zone, Xi'an
[西安市高新区张坝一路兰海大厦16楼]



Hengyu [Xintong] ICT Aviation Equipment (Beijing) Co., Ltd is a wholly-owned high-tech enterprise. The company's main business covers airborne multi-function display equipment, airborne Beidou navigation equipment, airborne high-reliability display module, and a visual navigation system, etc. It focuses on the military sector helicopters and fighters. The company's website shows a picture of the J-20 fighter and an attack helicopter.²⁹⁰ The company exhibited at AirShow China 2018.

Ties to the CCP and/or PLA: Hengyu ICT attend the third military and civilian integration exhibition of achievements in high-tech equipment.²⁹¹

Xi'an Xianghui Aviation Technology Co., Ltd.

[西安翔辉航空科技有限公司]

Website: N/A

Location: Xi'an
[西安]

Xi'an Xianghui Aviation Technology displayed the SFY fighter flight simulator at the "China Aviation City" exhibition in September 2019 in Xi'an.²⁹²

Ties to the CCP and/or PLA: Xi'an Xianghui Aviation Technology Co., Ltd. invested 1 billion yuan to build a "military and civil aviation simulator R & D and manufacturing project", to build aviation parts, flight simulators, and flight attendant simulation cabins R & D and production centers, which strongly promoted the deep integration of aviation, military and civilians, and aviation cultural tourism.²⁹³

ENDNOTES

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