Technologies on the Future of Air Cargo Transportation

——SF Express Practice
SF EXPRESS is a Leading CEP company in China

SF Express was established in 1993, now it is based in Shenzhen, China. In 2016 SF Express has been listed on the Chinese stock market with a stock code 002352.

- $10.7 billion revenue, $713 million profit in 2017
- 3.05 billion parcels in 2017
- 400k employees
- 30,000 self-owned and outsourced vehicles for main/secondary lines
- 13,000 self-owned business points
- International express service cover 53 countries, SF E-Parcel service cover 225 countries
Business Scope: One Stop Logistics Solution Supplier

Logistics Services
- Express Service
- Heavy Freight Service
- Warehousing Service
- Cold Chain Service
- International Service
- SF Industrial Park

Financial Services
- SF Financial

Commercial Services
- SF Best
SF Express has already established a nationwide ground network based on a large number of business points, distribution centers, ground vehicles, couriers, etc., and we actively extend to other countries.

We applied AI, IoT, intelligent equipments and machines learning in our business to free hands and assisting in decision making. Technologies are leading the logistics industry into a digital, visualized lean and intelligent era.

Our Aviation Network consists of Airliners, large UAVs, and small UAVs. SF Airlines is the largest cargo airlines in China. We are working with the Hubei Province Government to build Ezhou SuperHub to enhance our aviation network.
Data Network: Technologies Involved

- UAV
- Intelligent Equipment
- AI Call Center
- Big Data
- Smart Map
- Green Package
- Image Recognition
- Car Networking
- Smart Warehouse
- Automatic Sorting
Data Network: How We Apply Big Data in Our Business

Demand Forecast
We’ve built a dynamic demand forecast model based on large history data, real-time data from the e-commerce platform, customer insight, etc.

Network Design
Our logistics network design, including our coverage plan, air routes plan, resource deployment, etc., is based on our demand forecasting data.

Routes Plan
Our self-developed route plan system supports both dynamic and static air-ground connection routes planning and optimizing.

Resource Plan
Our system dynamically matches our resources with real-time demand forecasting data to optimize resource allocation and scheduling in advance.
SF Airlines has opened a number of air freight routes connecting major cities in China, and its transportation network will be further expanded along with the continued business development of SF Express.
Aviation Network: Ezhou SuperHub

- SF Express cargo SuperHub (Ezhou SuperHub) EIS in 2021
- It will be Asia’s first and world’s 4th 4E air freight hub
- It covers 90% of China’s GDP within 2hr flight
- We will enlarge our large freighter fleet (B767 or similar) to more than 100 by 2022
A 3-Tier Aviation Network to Achieve 36hr Nationwide Delivery in 2022
Why We Need UAV in Logistics?

Cheaper Aircraft

- No life support system, e.g. windows, AC, pressurized cabin, rest facilities, etc.
- Low requirements on structure and performance, e.g. speed, comfortability, etc.
- No human-machine interface, e.g. dashboard, cockpit, etc.
- Efficient emergency procedures and equipment (no one on board)

Cargo Friendly

- Lower operating cost
- Larger space for cargo
- Flexible airframe design to match with containers (like a shoes box)
- Less restrictions on cargo type (liquid, flammable, explosive, odorous, etc.)
## Technologies Are Ready——Just Accommodate to Logistics

| Manned A/C is Highly Intelligent | • Autopilots are already widely in use by military and civil aircraft  
• Advanced passenger aircraft are already equipped with fully autonomous flight control, flight task management, failure monitoring and isolation, detect and sense capability, etc. Very little human intervention is needed |
| --- | --- |
| Military UAVs are Widely Used | • Many Military UAVs, e.g. Global Hawk(US), Predator(US), Cai Hong(CN), Yi Long (CN) are used in large-scale  
• Some UAVs have granted permission to fly in shared airspace |
| Core Flight Systems Are Well-developed | • **Flight Control Systems:** fly-by-wire flight control system with multiple redundancies, 4D navigation, flight task management, failure monitoring and isolation  
• **Communication System:** Broadband data link/satellites high-speed real-time communication and remote telemetry  
• **Navigation Systems:** DGPS with high precision navigation capability  
• **Surveillance Systems:** ADS-B、TCAS etc.  
• **ATC Systems:** Digitalized ATC systems and flight service station, remote control tower |
| Technologies In Other Areas Can Be Applied | • **AI:** can be applied in aviation to a high level of autonomy  
• **Big Data:** can be applied in aviation to improve airplane performance, optimize operation network, data mining of airplane full life cycles |
Opportunities Are All Over the World
Logistics Will Be the Breakthrough of UAV Commercialization and Regulations

- Simple task with compromised requirements towards speed, endurance, maneuverability, design, etc.
- Point to point flight along fixed route in isolated airspace with preprogramed emergency procedures, avoiding the crowd
- High utilization (e.g. 2 flights per day, 6 days per week) to accumulate data and experience for regulations
Thank You