

Aircraft Record Keeping by  
Blockchain Technology  
AACO October 2019

**stx** Aero Service



# Introduction of STX

## STX Companies

### STX Marine Service

#### Ship MRO



#### Plant MRO



### STX Resort & Entertainment

#### STX Resort



#### STX Lion Heart



### STX Aero Service

#### Aircraft MRO



#### Aviation Engineering



## STX Aero Service

### Engineering Services



- CAMO Services
- Aircraft Acquisition and Transfer
- Manufacturing Certification Services
- New Technology Implementation Services

### Line Maintenance



- One Stop Service for International Airlines
- RTS and Assistance
- Tools and Material Handling Service

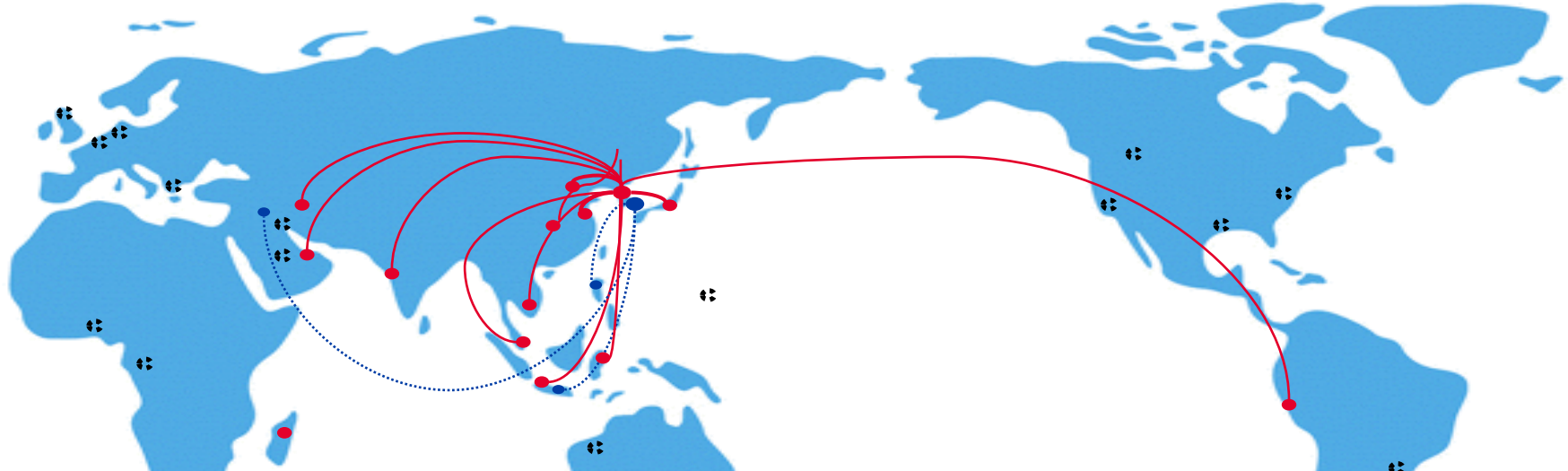
### Component Maintenance



- Landing Gear Overhaul Service
- Component Overhaul Service
- Aircraft Part-Out Service

# STX Global Network

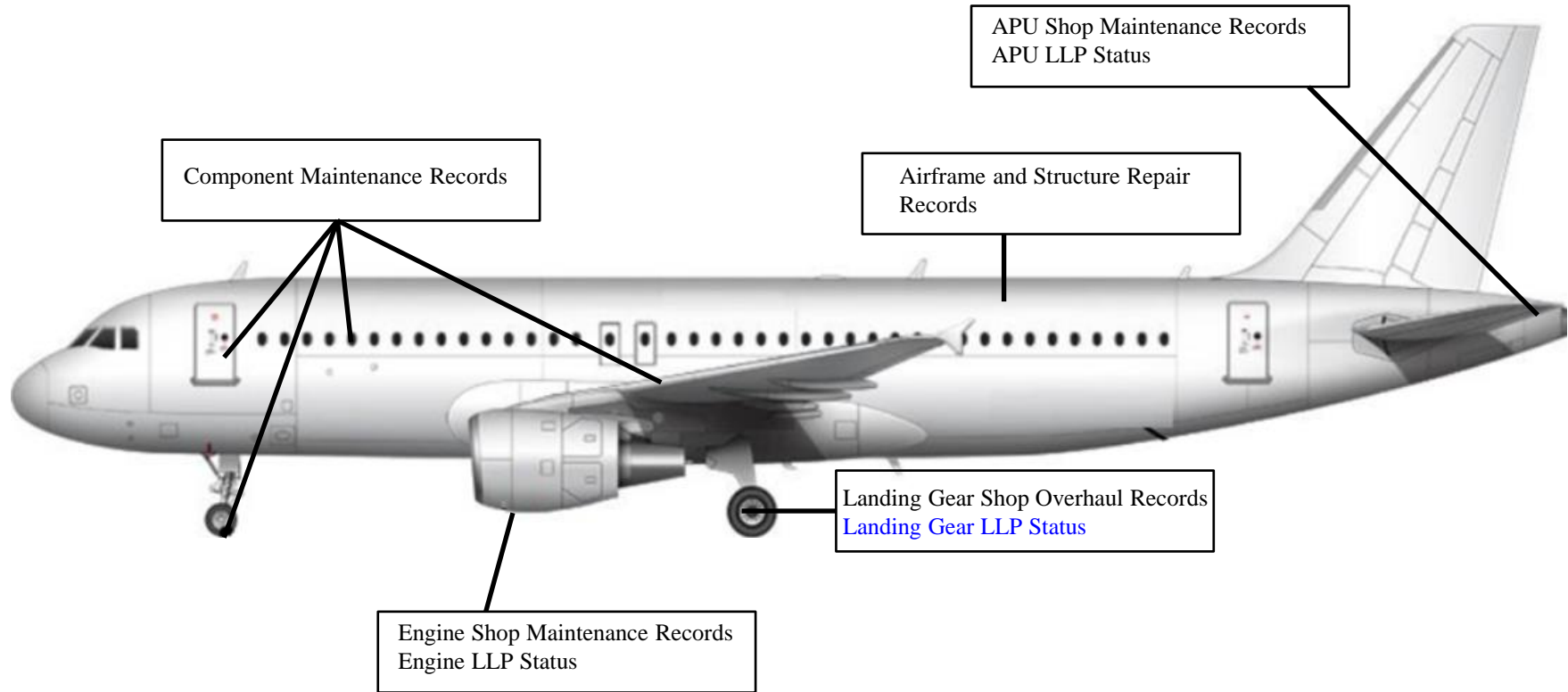
STX has a global network connecting People, Product, Technology and Information.



STX Corporation					
<b>Asia/ Middle East</b>	Japan (Tokyo) China (Shanghai / Beijing) <b>UAE (Dubai)</b> Singapore India (Mumbai)				
	Indonesia (Jakarta) Vietnam (Ho Chi Minh) <b>Iran (Teheran)</b> East Timor (Dili) Hong Kong				
	<table border="1"> <tr> <td style="background-color: #f2f2f2;"><b>America</b></td> <td>Peru (Lima)</td> </tr> <tr> <td style="background-color: #f2f2f2;"><b>Project</b></td> <td>Madagascar</td> </tr> </table>	<b>America</b>	Peru (Lima)	<b>Project</b>	Madagascar
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- STX Corporation's Network
- STX Marine Service's Network
- ⚡ Business Track Records' Area

# Aircraft Record Keeping Issues



# Aircraft Life-Limited Parts (LLP) Issues

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- **Continuous Increase of Leased Aircraft**
- **LLPs are key items in the Maintenance Reserves and Return Conditions**
- **Tracking LLPs are costly and time consuming**
- **Industry requires Back-To-Birth Records for the LLPs.**
- **Each aircraft has about 150 LLPs, mainly in Landing Gear and Engines.**
- **LLPs must be removed and scrapped before reaching the Life Limit.**
- **Status of LLPs must be maintained for Airlines or MRO**
- **Paper records are difficult to manage and often lost**
- **Lack of records result in significant cost**

# Aircraft LLP Issues

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## Sec. 43.10 — Disposition of life-limited aircraft parts.

### *(a) Definitions used in this section.*

*Life-limited part* means any part for which a mandatory replacement limit is specified in the type design, the Instructions for Continued Airworthiness, or the maintenance manual.

*Life status* means the accumulated cycles, hours, or any other mandatory replacement limit of a life-limited part.

### *(c) Disposition of parts removed from type-certificated products.*

- (1) *Record keeping system.* The part may be controlled using a record keeping system that substantiates the part number, serial number, and current life status of the part. **Each time the part is removed from a type certificated product, the record must be updated with the current life status.** This system may include electronic, paper, or other means of record keeping.
- (2) *Tag or record attached to part.* A tag or other record may be attached to the part. The tag or record must include the part number, serial number, and current life status of the part. **Each time the part is removed from a type certificated product, either a new tag or record must be created, or the existing tag or record must be updated with the current life status.**

# Aircraft LLP Issues

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## Sec. 121.380 — Maintenance recording requirements.

- (a) Each certificate holder shall keep (using the system specified in the manual required in §121.369) the following records for the periods specified in paragraph (c) of this section:
- (1) All the records necessary to show that all requirements for the issuance of an airworthiness release under §121.709 have been met.
  - (2) Records containing the following information:
    - (i) The total time in service of the airframe.
    - (ii) Except as provided in paragraph (b) of this section, the total time in service of each engine and propeller.
    - (iii) [The current status of life-limited parts of each airframe, engine, propeller, and appliance.](#)
    - (iv) The time since last overhaul of all items installed on the aircraft which are required to be overhauled on a specified time basis.
    - (v) The identification of the current inspection status of the aircraft, including the times since the last inspections required by the inspection program under which the aircraft and its appliances are maintained.
    - (vi) The current status of applicable airworthiness directives, including the date and methods of compliance, and, if the airworthiness directive involves recurring action, the time and date when the next action is required.
    - (vii) A list of current major alterations to each airframe, engine, propeller, and appliance.

# Aircraft LLP Issues

Before

After

Airline A



Airline B



Airline C



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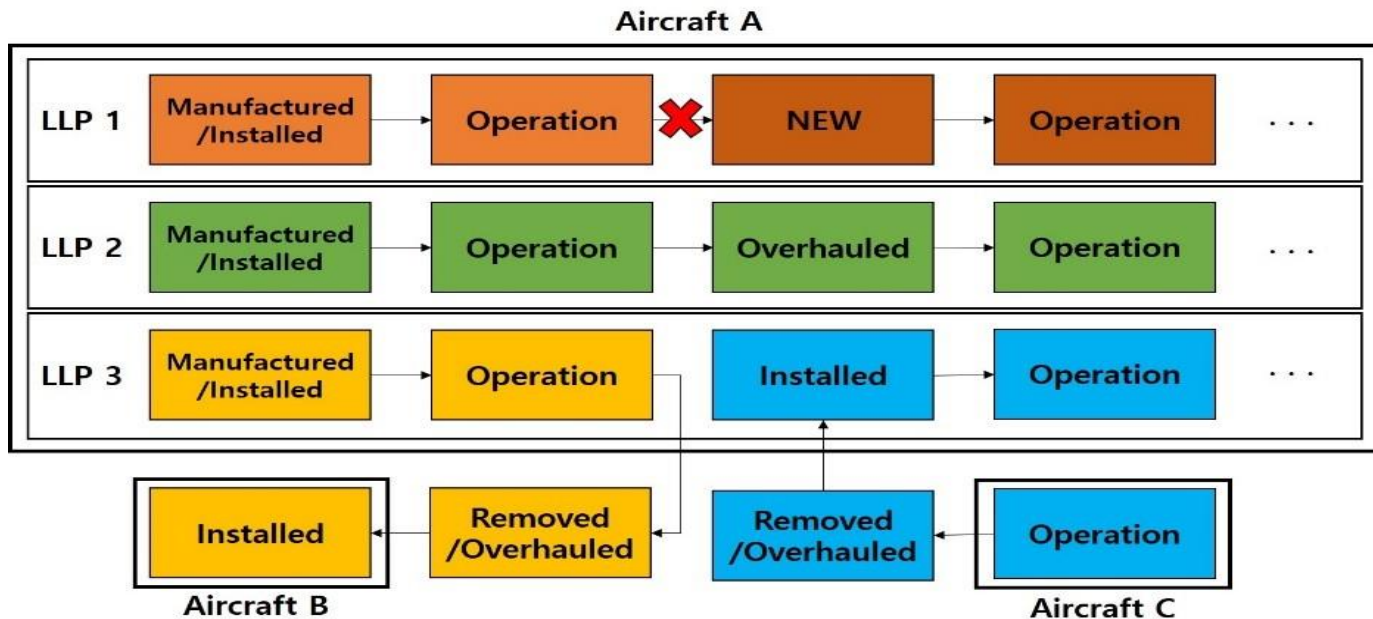
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# Aircraft LLP Issues

## ■ LLP Life Flow



<Life Limited Part Life Flow>

## ■ LLP Record Keeping

### COMPONENT TRACEABILITY RECORD

LH Main Landing Gear Assembly

P/N : 161A1100-35 S/N : MAL0123456789

Seq	Movement History	A/C or NHA	Date	CSN	Source	Reference
1	Manufactured and Installed	MSN XXX	18-May-00	0	Boeing	①
2	Removed for Overhaul	MSN XXX	18-Nov-09	9,955	P-Airline	②
3	Overhauled by T-MRO		29-Dec-09	9,955	T-MRO	③
4	Installed for service	MSN YYY	8-Jan-10	9,955	P-Airline	④
5	Removed	MSN YYY	21-Feb-19	26,517	P-Airline	⑤

## ■ LLP Record Keeping

### COMPONENT TRACEABILITY RECORD

Inner Cylinder Assy

P/N : 161A1126-1 S/N : AD410

Seq	Movement History	A/C or NHA	Date	CSN	Reference	Source
1	Manufactured and Installed	MSN 28619	18-May-00	0	①	Boeing
2	Removed for Overhaul	MSN 28619	18-Nov-09	9,955	②	P Airline
3	Overhauled by Turkish Technic		29-Dec-09	9,955	③	T MRO
4	Installed for service	SMN 28624	8-Jan-10	9,955	②	P Airline
5	Removed for Overhaul	MSN 28624	2-Dec-11	13,345	②	P Airline
6	Overhauled by Turkish Technic		6-Feb-12	13,345	④	T MRO
7	Installed for service	MSN 28624	6-Mar-12	13,345	②	P Airline
8	Removed	MSN 28624	21-Feb-19	26,166	⑤	P Airline

# Aircraft Record Keeping by Blockchain

## Record Keeping for Aircraft and Component

### Blockchain's Advantage

- Prevention of Falsification and Fraudulence
- Safety and Security of Information

### Advantage of New Engine

- Fast Consensus Algorithm
- Multiple Blockchain – Fast Search
- Distributed ID for
  - Off-Chain Private Data
  - Selective Disclosure

### Interface For User

- Considering Scalability for User
- UI/UX considering user's convenience and intuition



# Aircraft Record Keeping by Blockchain

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## ■ Considerations

### ■ Pilot Project

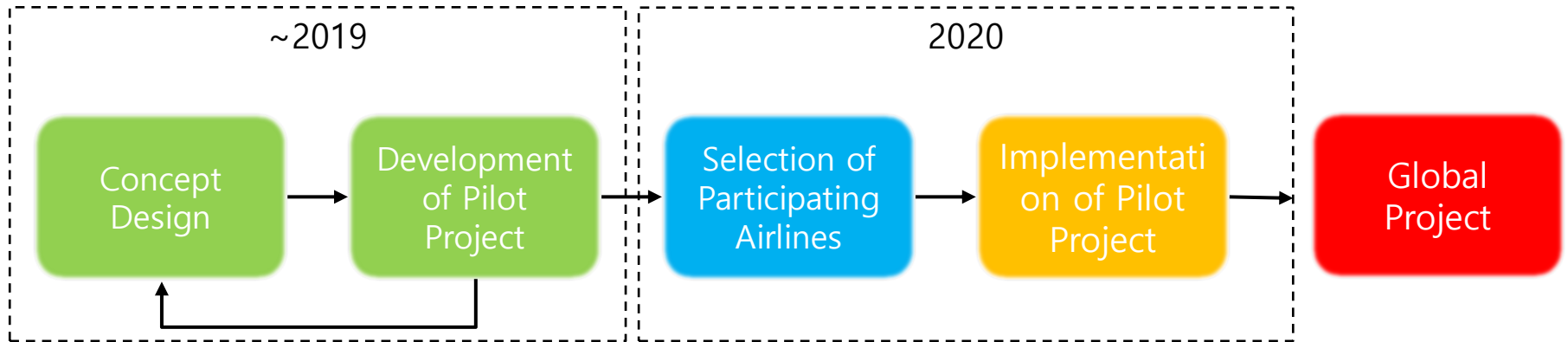
- Developing Demo for AOC Users
- Providing Landing Gear LLP Back-To-Birth Traceability
- Consideration of Scalability, Single-Path Process
- Reward Program for Participants

### ■ Global Project

- After pilot project is evaluated successfully
- Dual-Path Process for the Existing and the New
- Step by step participation by airlines, MROs, OEMs and Logistic Suppliers
- Guidance by IATA
- Reward Program for Participants

# Blockchain Implementation Plan

## ■ Implementation for Pilot Project



# Let's Move Together. Thank you very much

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