東京エアロスペースシンポジウム2015
Tokyo Aerospace Symposium 2015

SATF-15-069NC

【国内の航空機産業ビジネスの展望 講演会資料】

Toward a Promising Future

「装備品メーカーにおけるMROの展望 ～MRJ開発をきっかけに～」

住友精密工業株式会社

技師長　高橋　教雄

2015年　10月　16日

SUMITOMO PRECISION

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1. 日本のMRO事業取組上の問題点
2. 住友精密のMRO事業：熱交換器の事例紹介
3. 住友精密のMRO事業戦略: 降着装置
4. MRJ開発をきっかけに
5. 最後に

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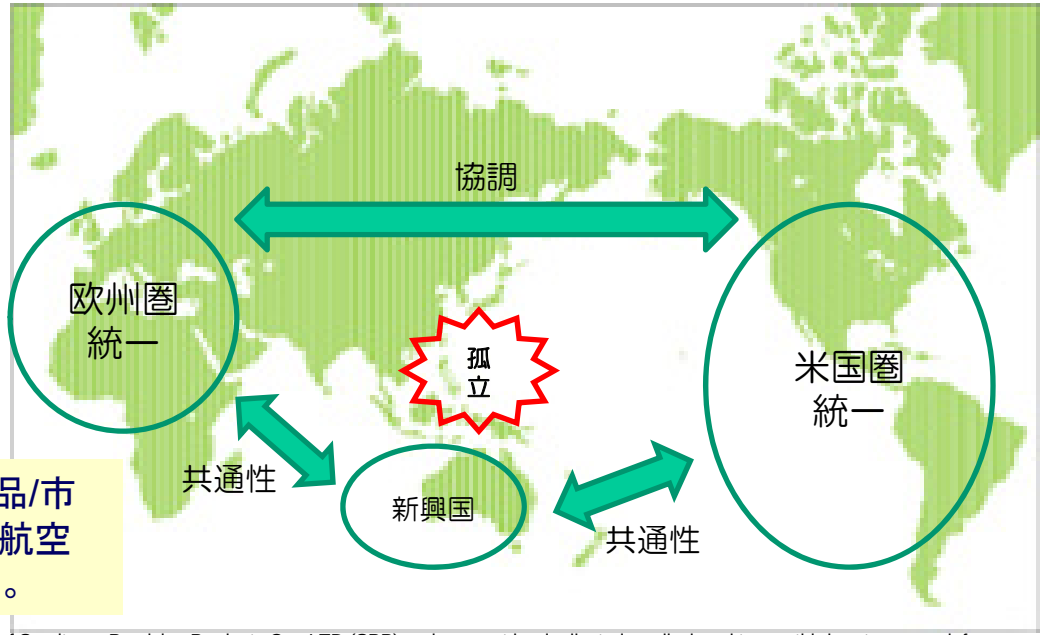
SUMITOMO PRECISION

1.日本のMOR事業取組上の問題点(1/4)

民間航空機の認証に関する国際環境は下記の通り。

1. 米国(FAA)と欧州(EASA)との間で認証・整備・乗員訓練・シミュレーターの基準を共通化するための活動が行われている。
2. MROなどで頭角を現しているシンガポールなどは、国内法を米国連邦航空規則に合わせて制定し、欧米との共通性を確保して優位に立っている。
3. この結果、欧・米・新興国間では多くの基準が共通化されつつある。日本はその流れに乗り遅れている。



ASET2013民間機装備品・部品/市場参入セミナーの(一社)日本航空宇宙工業会講演資料より転用。

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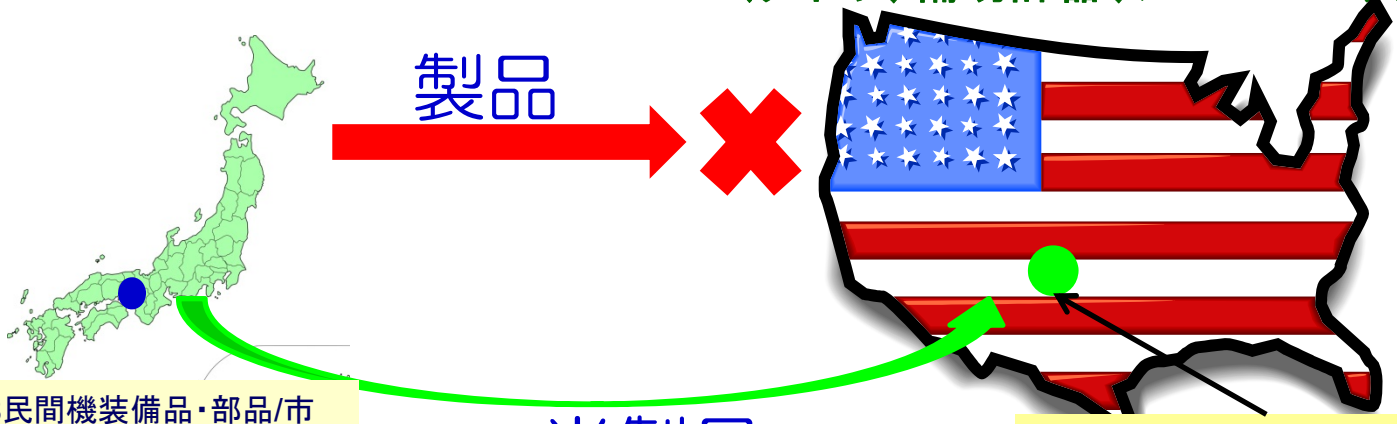
SUMITOMO PRECISION

1.日本のMRO事業取組上の問題点(2/4)

対米国(FAA)の現状:完成品・交換部品

1. 米国連邦航空局(FAA)は米国の機関であるため、米国企業にのみサービスを行う。そのため、海外企業の認証業務は行わないことを原則としている。
2. 日本企業はこの対策として「現地法人」の設立を行い、PMA(Part Manufacturer Approval)ホールダーとなって現地法人がFAAに認証の申請を行っている。
3. BASA(Bilateral Aviation Safety Agreement)IPA(Implementation Procedure of Airworthiness)によって耐空性に関する相互認証制度は導入されたが、日本から米国に新規認められてるのはTSO装備品、標準部品など一部の製品にかぎられている。(現状は実質一方通行) => 本年JCAB PMAが制度化され一歩前進。

・TSO:Technical Standard Oder(タイヤ、補助計器、カーゴパレットなど)



ASET2013民間機装備品・部品/市場参入セミナーの(一社)日本航空宇宙工業会講演資料より転用。

現地法人
(半製品→製品→認証取得)

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SUMITOMO PRECISION

1.日本のMRO事業取組上の問題点(3/4)

対欧州(EASA)の現状:完成品・交換部品

1. 欧州航空局(EASA)はFAAと異なり欧州以外の企業にもサービスを行うことが可能。但し、PMA制度はなく、耐空性証明書(EASA Form 1)発行には組織認証であるPOA(Production Organization Approval)を取得する必要がある。
2. 日本企業として既に複数社POAを取得済みである。
3. DOA(Design Organization Approval)はT/C Holderである例えばAirbusあるいはAirbusが委託(Delegate)した企業が保有。その傘下でPOAを取得することになる。
4. <u>POA取得及びその維持に多額の費用が発生する。</u>

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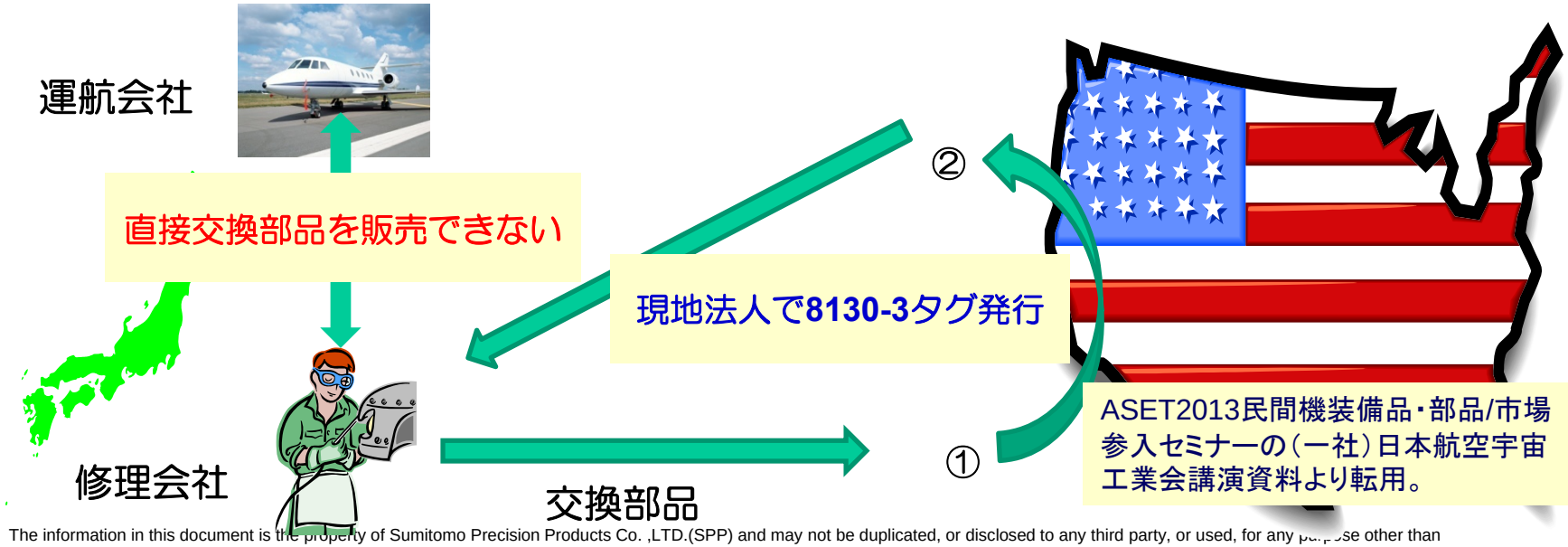
SUMITOMO PRECISION

1.日本のMRO事業取組上の問題点(4/4)

対米国(FAA)・対欧州(EASA)の現状:修理・交換作業

1. 日本企業が自社で設計・製造した製品を修理する場合、日本国内の工場でFAA(あるいはEASA)の修理工場認定(Part 145)を取得した上で海外運航会社から直接修理事業を受注し修理ができる。
2. ただし、交換部品が必要となった場合、FAA/EASAの耐空性証明書が発行できないために、一旦米国現地法人に送付した上で、現地のDMIR等による検査を受け、合格判定を得た上で耐空性証明(8130-3)を発行し逆輸入する処置が必要となる。あるいは、EASA POAを自身で取得する必要がある。



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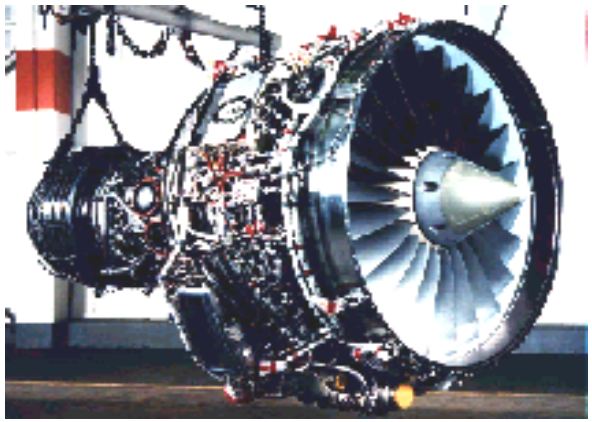
SUMITOMO PRECISION

2.1 IAE V2500 Engine 用熱制御システム

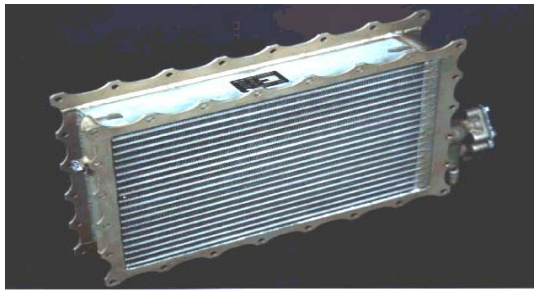
Ⅰ. 開発品目

エンジン内部の潤滑油系統を冷却するもの。



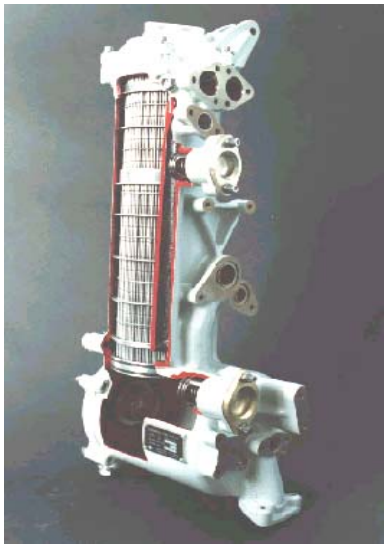
(1) Air Cooled Oil Cooler (ACOC)

ラム･エアーとの熱交換によって
潤滑油の冷却を行う装置。



(2) Fuel Cooled Oil Cooler (FCOC)

燃料(Cold)と潤滑油(Hot)を熱交換させ、
燃料を温める一方で、
潤滑油を冷却させる装置。



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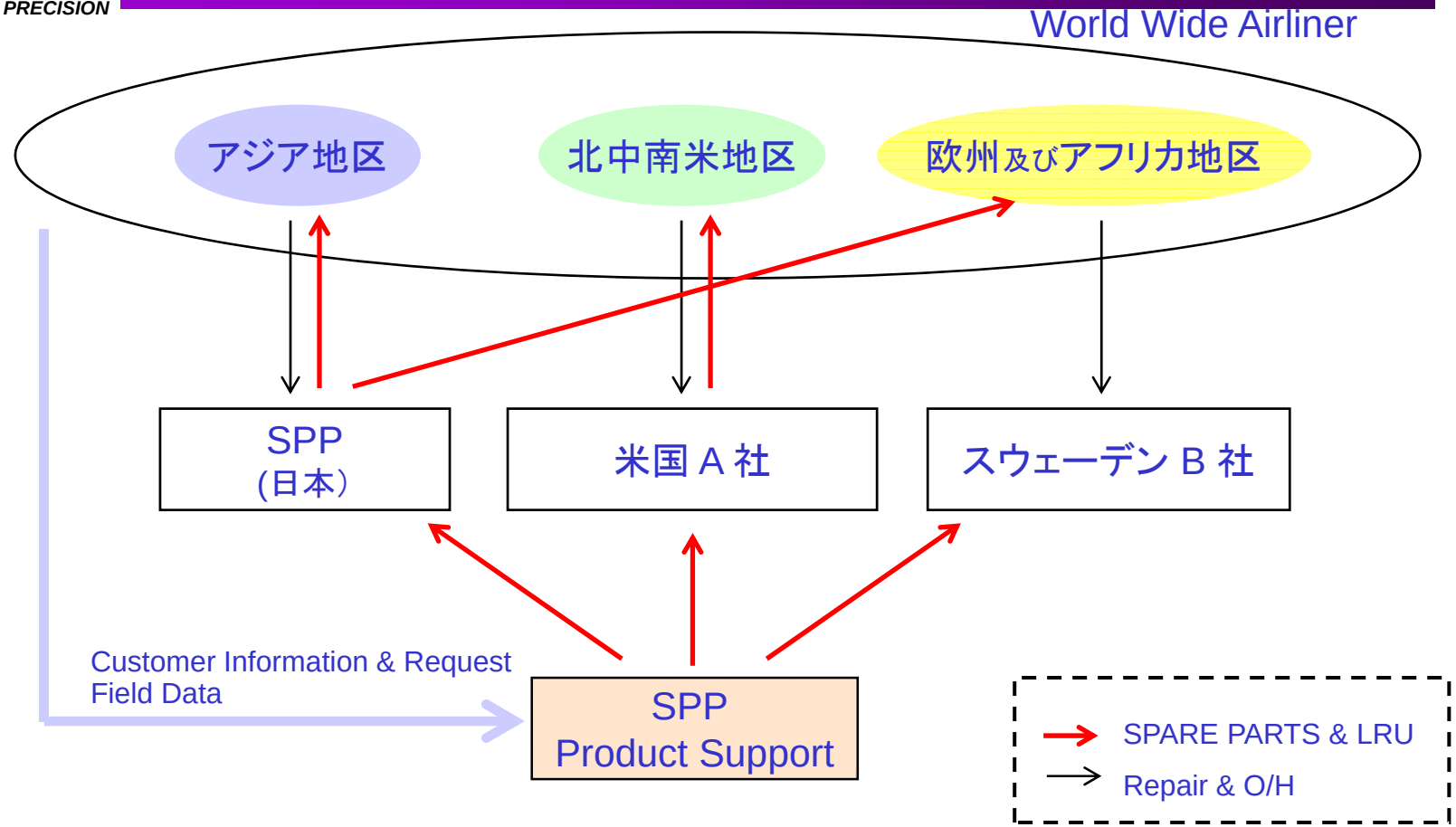
SUMITOMO PRECISION

2.1 IAE V2500 Engine用熱制御システム Product Support組織



1. ODAR (Organized Designated Airworthiness Rep.)設置により FAA Tag 発行。
2. EASA用Form 1タグはAirline 及び RS (Repair Station) が必要に応じて取得。

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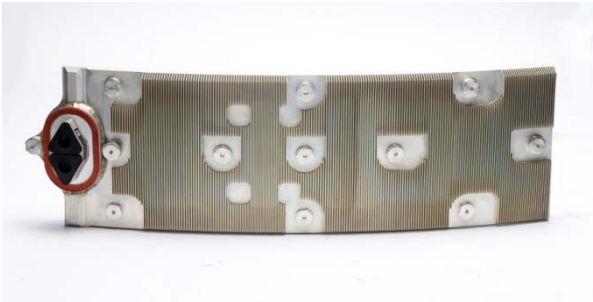
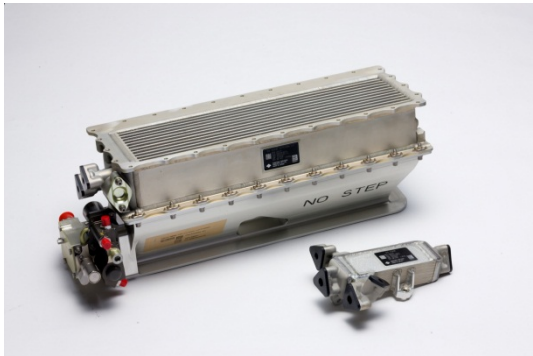
2.2 Rolls-Royce向け製品例 (Trent 1000エンジン熱制御システム)

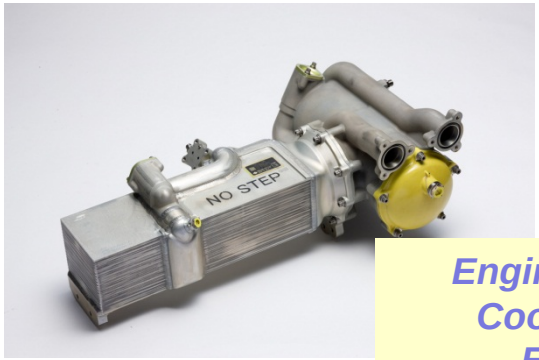
SPP is supplying the Rolls-Royce Trent 1000 heat management system (HMS) for Boeing 787 Dreamliner including innovative Starter/Generator HMS.



Engine SAOHE(Surface Air Cooled Oil Heat Exchanger)



Starter/Generator AOHE(Air Cooled Oil Heat Exchanger) and FOHE(Fuel Cooled Oil Heat Exchanger)



Engine FOHE(Fuel Cooled Oil Heat Exchange)

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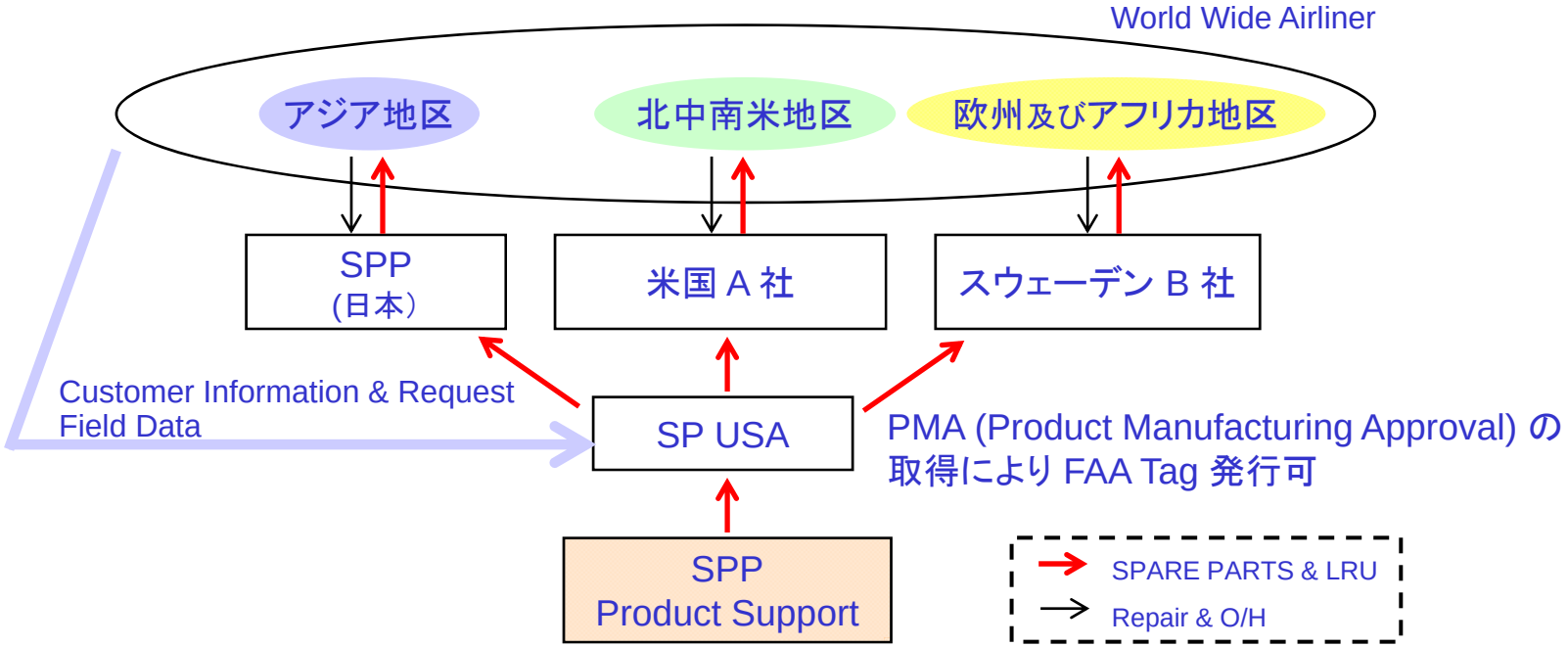
2.2 Rolls Royce Trent Engine 熱制御システム：Product Support 体制

米国テキサス州ダラスにSP USA を設立(2000/11)
米国PMA を取得しFAA 対応している。



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2.3 IAE V2500 Engine用熱制御システム：交換部品の流れ

FAA Form 8130-3 for replacement parts (V2500)

- Q.A. representative in SPP Japan (PC H's approved supplier) is registered as a ODA of IAE (TC/PC Holder of V2500 Engine).

  PCH: Production Certification Holder
  ODA: Organization Designation Authorization
- He issues FAA Form 8130-3 as a ODA of IAE.

SPP OEM
(IAE ODA)

8130-3 tag

SPP Repair Station

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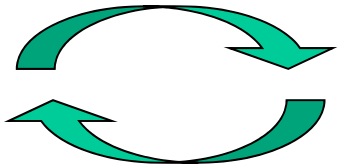
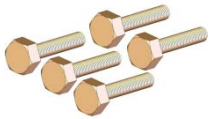
SUMITOMO PRECISION

2.3 Rolls Royce Trent Engine
熱制御システム：交換部品の流れ

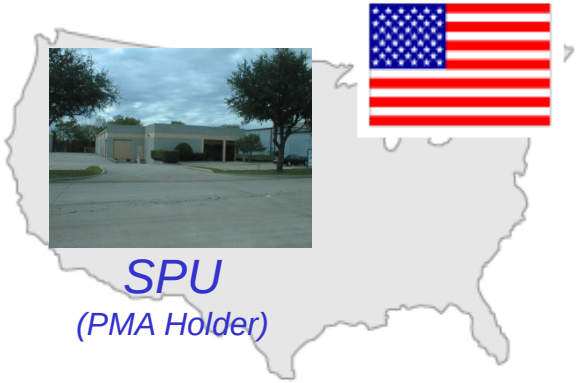
FAA Form 8130-3 for replacement parts (Trent)

SPP OEM



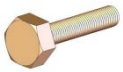


8130-3 tag



SPU
(PMA Holder)

- DMIR issues FAA Form 8130-3.
  DMIR: Designated Manufacturing Inspection Representative



8130-3 tag

SPP Repair Station

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2.4 8130-3 Airworthiness Tag様式

1. Approving Civil Aviation Authority/Country: FAA/United States	2. **AUTHORIZED RELEASE CERTIFICATE** FAA Form 8130–3, AIRWORTHINESS APPROVAL TAG	3. Form Tracking Number:
4. Organization Name and Address:		5. Work Order/Contract/Invoice Number:

6. Item:	7. Description:	8. Part Number:	9. Quantity:	10. Serial Number:	11. Status/Work:

12. Remarks:

13a. Certifies the items identified above were manufactured in conformity to: ☐ Approved design data and are in a condition for safe operation. ☐ Non-approved design data specified in Block 12.		14a. ☐ 14 CFR 43.9 Return to Service ☐ Other regulation specified in Block 12. Certifies that unless otherwise specified in Block 12, the work identified in Block 11 and described in Block 12 was accomplished in accordance with Title 14, Code of Federal Regulations, part 43 and in respect to that work, the items are approved for return to service.	
13b. Authorized Signature:	13c. Approval/Authorization No.:	14b. Authorized Signature:	14c. Approval/Certificate No.:
13d. Name (Typed or Printed):	13e. Date (dd/mmm/yyyy):	14d. Name (Typed or Printed):	14e. Date (dd/mmm/yyyy):

User/Installer Responsibilities

It is important to understand that the existence of this document alone does not automatically constitute authority to install the aircraft engine/propeller/article.

Where the user/installer performs work in accordance with the national regulations of an airworthiness authority different than the airworthiness authority of the country specified in Block 1, it is essential that the user/installer ensures that his/her airworthiness authority accepts aircraft engine(s)/propeller(s)/article(s) from the airworthiness authority of the country specified in Block 1.

Statements in Blocks 13a and 14a do not constitute installation certification. In all cases, aircraft maintenance records must contain an installation certification issued in accordance with the national regulations by the user/installer before the aircraft may be flown.

FAA Form 8130–3 (02–14) NSN: 0052-00-012-9005

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SUMITOMO PRECISION

2.5 EASA Form 1 Airworthiness Tag例

1.Approving Competent Authority / Country EASA	2. **AUTHORIZED RELEASE CERTIFICATE** **EASA FORM 1**	3. Form Tracking Number EASA−2006311
4. Approved Organisation Name and Address: SPP **SUMITOMO PRECISION PRODUCTS CO.,LTD.** 1-10, FUSO-CHO, AMAGASAKI, HYOGO 660-0891 JAPAN		5. Work Order/Contract/Invoice B32490

6. Item	7. Description	8. Part No.	9. Eligibility*	10. Qty.	11. Serial/Batch No.	12. Status/Work
1	Retract Actuator Assy	10-211301-000	A330/340	1	SPP-1029	Repaired

13. Remarks
Repair and Test per CMM 32-31-90 Rev.0

14. Certifies that the items identified above were manufactured in conformity to: ☐ approved design data and are in condition for safe operation ☐ non-approved design data specified in block 13		19. ☒Part-145.A.50 Release to Service ☐Other regulation specified in block 13 Certifies that unless otherwise specified in block 13, the work identified in block 12 and described in block 13, was accomplished in accordance with Part-145 and in respect to that work the items are considered ready for release to service.	
15. Authorised Signature	16. Approval/ Authorisation Number	20. Authorised Signature Toshi Nakamura	21. Certificate/Approval Ref. No. EASA.145.0141
17. Name	18. Date (d/m/y)	22. Name Toshi Nakamura SMI 43	23. Date (d/m/y) 2/NOV/2006

EASA Form 1 - Issue 1 *Installer must cross-check eligibility with applicable technical data

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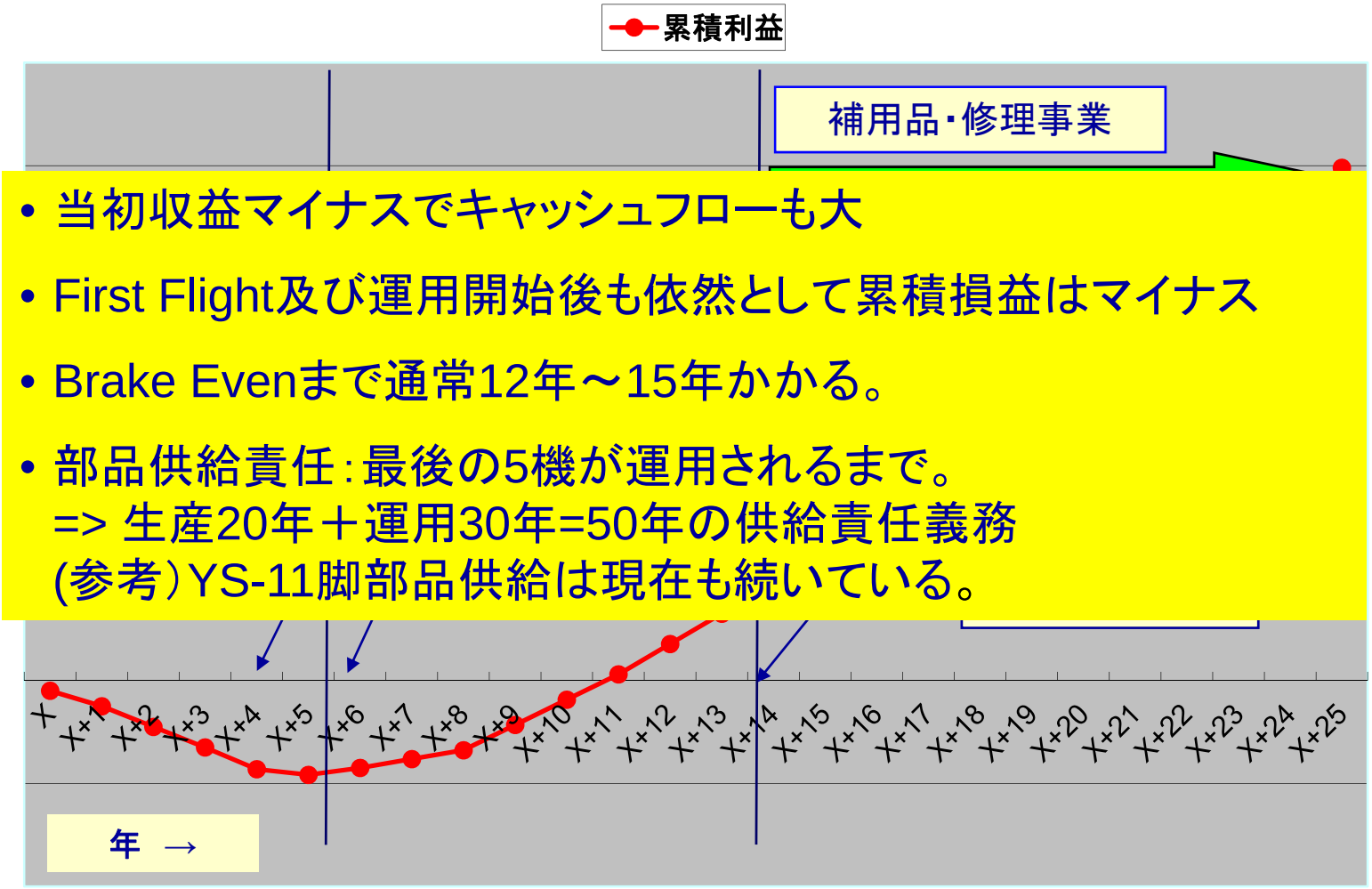
SUMITOMO PRECISION

3.1 Tier 1 Supplierの代表的事業シミュレーション



- 当初収益マイナスでキャッシュフローも大
- First Flight及び運用開始後も依然として累積損益はマイナス
- Brake Evenまで通常12年～15年かかる。
- 部品供給責任：最後の5機が運用されるまで。
  => 生産20年＋運用30年=50年の供給責任義務
  (参考)YS-11脚部品供給は現在も続いている。

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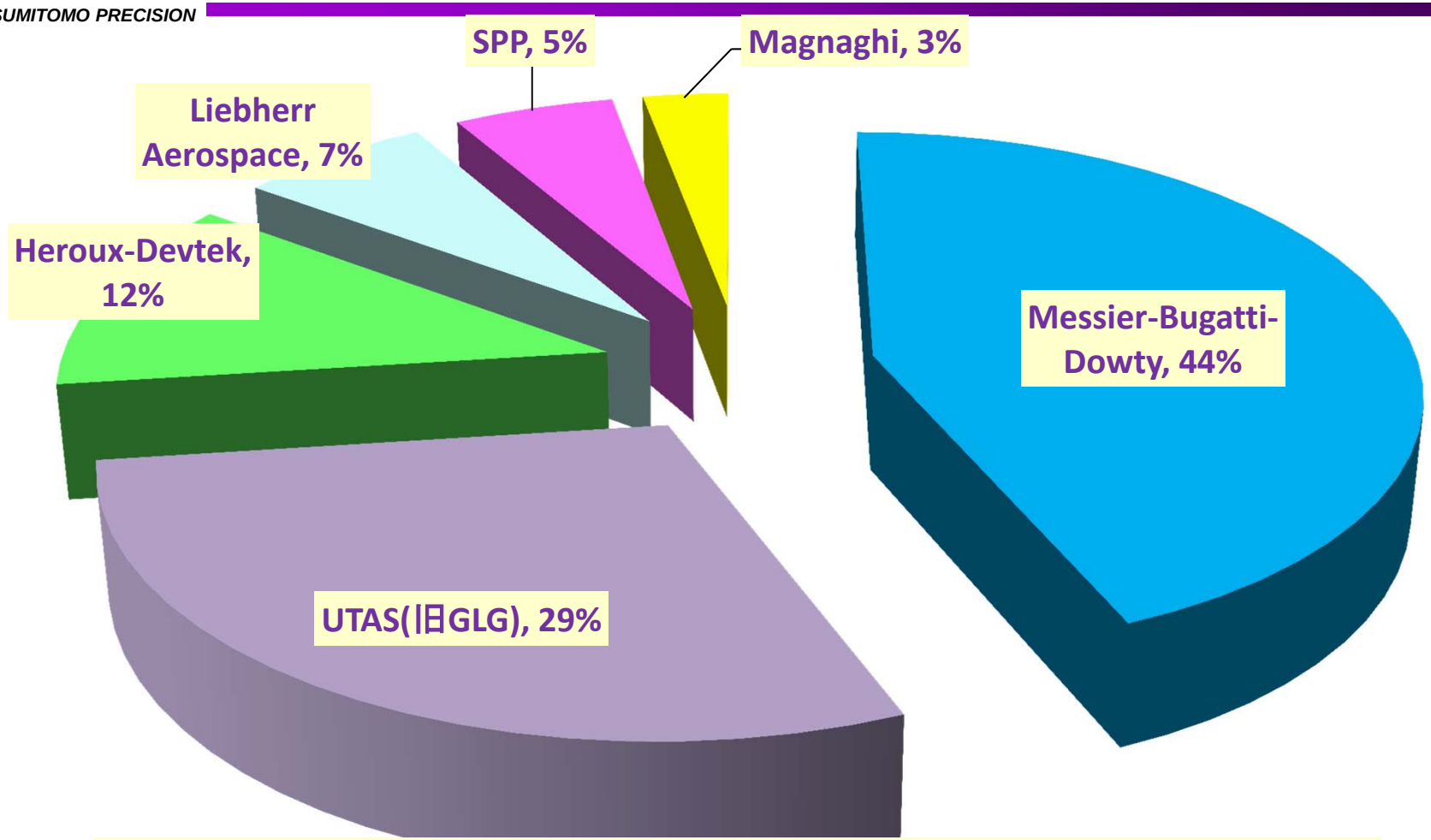
SUMITOMO PRECISION

3.2 降着装置市場の競合状況



世界の降着装置市場ではSPPは5位のPosition

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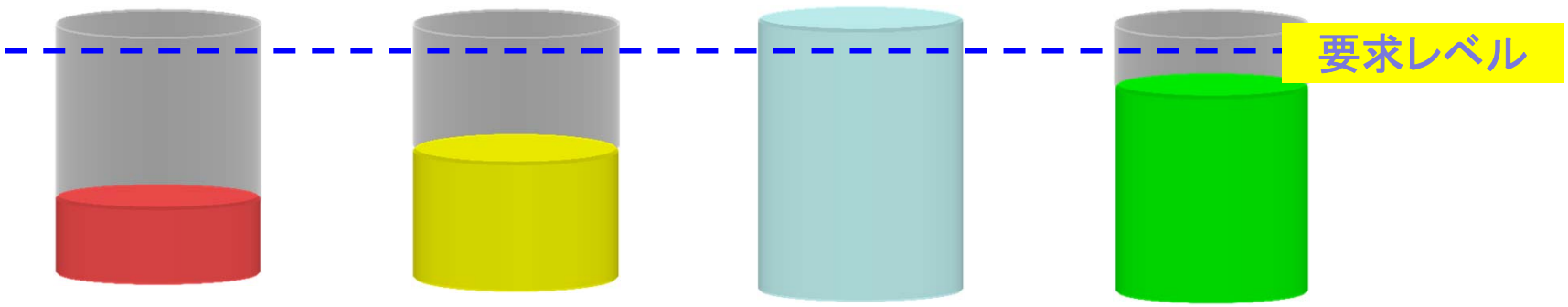
SUMITOMO PRECISION

Tier 1サプライヤを目指して
3.3 顧客による評価

➢ 当社の実力レベルと客先要求レベル



1. 技術と経験

- 認証支援経験
- 開発経験
- 技術開発動向
- 設計ツール
- 設計キャパ柔軟性

2. サービス（近接性）

- 所在地（時差）
- 言語
- 作業支援能力
- MRO能力

3. 品質及び納期

- 良好（日本品質維持）

4. コスト競争力

- 高い生産性で競争力維持（継続不可欠）

能力向上への取組 ➡ 次項以下

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SUMITOMO PRECISION

Tier 1サプライヤを目指して
3.4 SPP NECO設立

SPPNECO
SPP Nagasaki Engineering Co.

所在地: 長崎県諫早市

2014年4月1日、ANAホールディングス社より降着装置MRO事業を譲渡いただき設立しました。

ANA社の降着装置MRO事業を継承しつつ、当社の防衛省向け降着装置MRO事業の一部を委託し、ANA社の持つ整備及び運航に関するノウハウと当社の設計及び製造ノウハウを集約させ、日本で唯一の官民対応降着装置MRO事業者として国際競争力のある事業展開を目指す。

● MRO能力向上（２）

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会社概要

社名	SPP長崎エンジニアリング株式会社
所在地	長崎県諫早市津久葉町６－５７
代表者名	代表取締役社長　岩井　昭二
従業員数	99名（平成26年4月現在）
資本金	3,000万円
出資会社	SPP 100%
事業内容	航空機用装備品（降着装置）の修理及び製造業務

資　格

国土交通省修理改造認定工場　認定番号第200号

沿　革

1987/04/24　ANA長崎エンジニアリング（株）設立

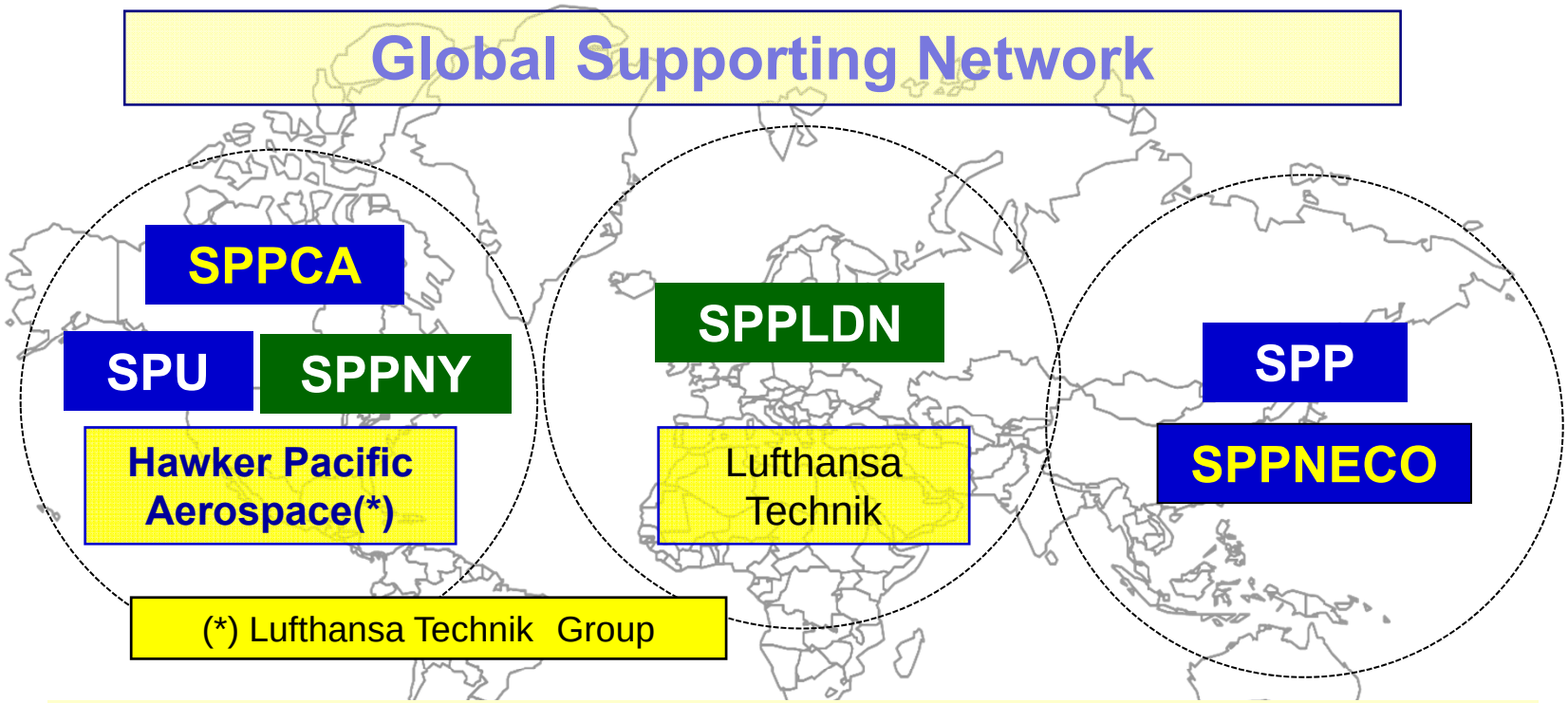
2012/04/01　ANAコンポーネントテクニクス（株）設立

2014/04/01　SPP長崎エンジニアリング（株）設立

SUMITOMO PRECISION

Global Tier 1サプライヤを目指して
3.5 GLOBAL MRO能力の向上

Global Supporting Network



- Global Presence – Europe, Americas, Middle East and Asia.
- 24/7 AOG & Technical Support
- Repair Support
- Spares Support.
- Technical Support
- Quality Approvals – FAR 145 and. EASA145 国土交通省修理改造認定工場

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目　次

1. 日本のMRO事業取組上の問題点
2. 住友精密のMRO事業：熱交換器の事例紹介
3. 住友精密のMRO事業戦略: 降着装置
4. MRJ開発をきっかけに
5. 最後に

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SUMITOMO PRECISION

Global Tier 1サプライヤを目指して
4.1 MRJ Programをきっかけに

Courtesy of Mitsubishi Aircraft Cooperation

Nose Landing Gear

Tail Skid

Main Landing Gear

We are developing the following systems;

1. ATA3210 MLG,
2. ATA3220 NLG,
3. ATA3230 Extension and Retraction,
4. ATA3240 Wheel and Brakes,
5. ATA3250 Steering,
6. ATA3260 Position and Warning.

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Global Tier 1サプライヤを目指して
5.2 MRJ Programをきっかけに

- MRJ Programがきっかけとなってと FAAとJCAB間の***IPA***に関する相互認証（BASA)の実質的な推進を行って頂き、JCABまたはJCABが認可した認定事業者が発行するAuthorized Release Certificate がFAAに認められることが第一目標である。

  IPA: Implementation Procedures for Airworthiness

  =>自国で開発するMRJ用交換部品に対して発行されるJCAB Tagが市場で認められる高い信頼度・ブランド力を構築することが大事である。

- MRJは米国だけでなく欧州や東南アジア地域で運行されることから、FAAだけでなくEASAとの相互認証制度の構築が必要。FAAと同様EASAとの相互認証の推進を期待する。
- 修理手順に関する認証も同様に相互認証できるような法制度の設定と、それに対応したMROサービスの構築が必要。
- 日本の企業自身も自由競争の中でMRJ機開発を通じて円滑なOEM供給、修理、補用品の供給体制を構築することが必要。

=>MRJ Programがなければ、このような機会創生がなかったのも事実。

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5. 最後に

1. 認証取得手順の整備と確立
   =>MRJ機開発を通じて円滑なOEM供給、修理・補用品の提供。
   =>**MRJ用交換部品に対して発行されるJCAB Tagが市場で認められるための高い信頼度とJCABブランドの構築。**

2. グローバルなMRO体制の構築とGlobal Aftermarket Presence.
   =>世界でのサービス拠点づくりとその運営。

   1. Global Presence – Asia. Americas and Europe
   2. 24/7 AOG & Technical Support
   3. Repair Support – 20 Day Turn Around Time
   4. Spares Support – 7 day delivery.
   5. Technical Support – Regular Visits to Operators & Operator Conferences.
   6. Quality Approvals – e.g. FAA145, EASA145

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ご清聴ありがとうございました。

Sumitomo Precision Products Co., Ltd.

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