737MAX 叶片重排

737MAX 维护经验不足，可以联系发动机工程师帮忙重排叶片
发动机网站下载 BLAMAP 软件，当前最新版本为 4.3.2 软件、安装说明和使用材料已放在服务器，如下图

1.将叶片数据编辑成.txt 文档

1	HB521276	207821	-2009	-22129
2	HB521694	209212	-1914	-22281
3	HB521041	209034	-1989	-22289
4	HC817892	210462	-1935	-22394
5	HC577140	208558	-1997	-22158
6	HC817900	209086	-1937	-22231
7	HC817913	209942	-1984	-22392
8	HC817678	208666	-1980	-22055
9	HC817931	209634	-1891	-22325
10	HB521721	208045	-1987	-22185
11	HB521693	209594	-2008	-22194
12	HC577525	209601	-2008	-22233
13	HC817715	210066	-2002	-22361
14	HC872693	208497	-1911	-22134
15	HC577720	208582	-1938	-22163
16	HC817973	209993	-2073	-22295
17	HC817437	209003	-2005	-22242
18	HC817808	210086	-2062	-22314

2.安装软件

3. 打开 blamap 软件，点 NEW 新建
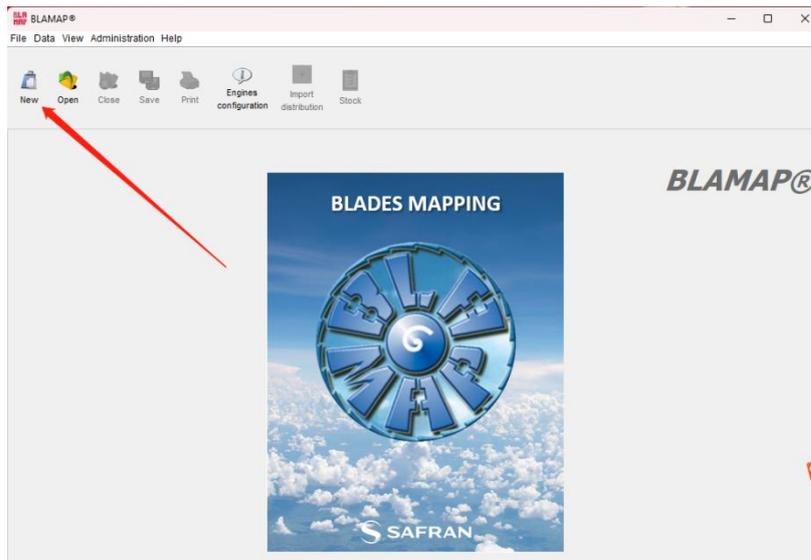
4. 选择发动机，导入叶片数据如下
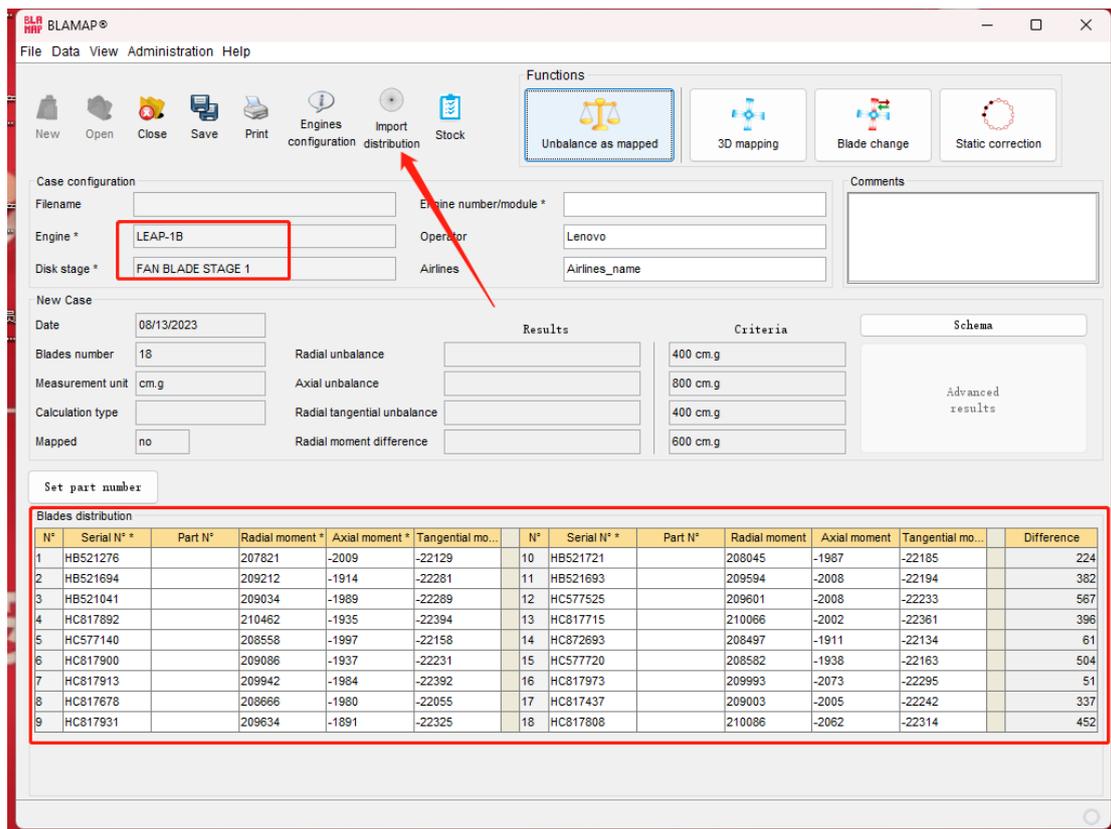
5. 点 3D mapping,如下图，最终显示径向动量矩 546cm.g,叶片安装方案如下

6. 当叶片的径向动量矩差值大于 600cm.g,如下修改 1 号叶片动量矩，1 和 10 号差值 1520。
点击 3D mapping,结果如下图，此时软件考虑的是最小的影响，而不是径向动量矩差值最小。
（可能造成振动值上升）

Screenshot 1

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File Data View Administration Help

Functions

New Open Close Save Print Engines configuration Import distribution Stock | Unbalance as mapped 3D mapping Blade change Static correction

Case configuration

Filename		Engine number/module *	
Engine *	LEAP-1B	Operator	Lenovo
Disk stage *	FAN BLADE STAGE 1	Airlines	Airlines_name

Comments

New Case

			Results	Criteria	Schema
Date	08/13/2023				
Blades number	18	Radial unbalance		400 cm.g	
Measurement unit	cm.g	Axial unbalance		800 cm.g	Advanced results
Calculation type		Radial tangential unbalance		400 cm.g	
Mapped		Radial moment difference		600 cm.g	

Set part number

Blades distribution

N°	Serial N° *	Part N°	Radial moment *	Axial moment *	Tangential mo...	N°	Serial N° *	Part N°	Radial moment	Axial moment	Tangential mo...		Difference
1	HC817892		211462	-1935	-22394	10	HC817913		209942	-1984	-22392		1,520
2	HB521276		207821	-2009	-22129	11	HB521721		208045	-1987	-22185		224
3	HC577720		208582	-1938	-22163	12	HC817900		209086	-1937	-22231		504
4	HC872693		208497	-1911	-22134	13	HC577140		208558	-1997	-22158		61
5	HB521041		209034	-1989	-22289	14	HC817437		209003	-2005	-22242		31
6	HC817973		209993	-2073	-22295	15	HC817715		210066	-2002	-22361		73
7	HC817808		210086	-2062	-22314	16	HB521693		209594	-2008	-22194		492
8	HC577525		209601	-2008	-22233	17	HC817931		209634	-1891	-22325		33
9	HC817678		208666	-1980	-22055	18	HB521694		209212	-1914	-22281		546

Screenshot 2

BLAMAP®

File Data View Administration Help

Functions

New Open Close Save Print Engines configuration Import distribution Stock | Unbalance as mapped 3D mapping Blade change Static correction

Case configuration

Filename		Engine number/module *	
Engine *	LEAP-1B	Operator	Lenovo
Disk stage *	FAN BLADE STAGE 1	Airlines	Airlines_name

Comments

New Case

Date	08/13/2023
Blades number	18
Measurement unit	cm.g
Calculation type	Mapping 3D
Mapped	yes

> **3D mapping succeeded with warning** ✕
>
> The radial moment pair difference criterion is not completed but the minimum possible is achieved.
> The observed minimum value is 1868 cm.g while the criterion is ≤ 600 cm.g.
> Position and serial pairs disregarding the difference in standard of radial moment:
> - 1 [HC817892] & 15 [HC817913] Difference: 1520 cm.g
>
> OK

Set part number

Blades distribution

N°	Serial N° *	Part N°	Radial moment *	Axial moment *	Tangential mo...	N°	Serial N° *	Part N°	Radial moment	Axial moment	Tangential mo...		Difference
1	HC817892		211462	-1935	-22394	10	HC817913		209942	-1984	-22392		1,520
2	HB521276		207821	-2009	-22129	11	HB521721		208045	-1987	-22185		224
3	HC577720		208582	-1938	-22163	12	HC817900		209086	-1937	-22231		504
4	HC872693		208497	-1911	-22134	13	HC577140		208558	-1997	-22158		61
5	HB521041		209034	-1989	-22289	14	HC817437		209003	-2005	-22242		31
6	HC817973		209993	-2073	-22295	15	HC817715		210066	-2002	-22361		73
7	HC817808		210086	-2062	-22314	16	HB521693		209594	-2008	-22194		492
8	HC577525		209601	-2008	-22233	17	HC817931		209634	-1891	-22325		33
9	HC817678		208666	-1980	-22055	18	HB521694		209212	-1914	-22281		546

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File Data View Administration Help

Functions: New | Open | Close | Save | Print | Engines configuration | Import distribution | Stock | Unbalance as mapped | 3D mapping | Blade change | Static correction

Case configuration

Field	Value	Field	Value
Filename		Engine number/module *	
Engine *	LEAP-1B	Operator	Lenovo
Disk stage *	FAN BLADE STAGE 1	Airlines	Airlines_name

Comments

New Case

Field	Value		Results	Criteria
Date	08/13/2023			
Blades number	18	Radial unbalance	316.4 cm.g	400 cm.g
Measurement unit	cm.g	Axial unbalance	285.06 cm.g	800 cm.g
Calculation type	Mapping 3D	Radial tangential unbalance	272.51 cm.g	400 cm.g
Mapped	yes	Radial moment difference	1868 cm.g	600 cm.g

Schema — Advanced results

Set part number

Blades distribution

N°	Serial N° *	Part N°	Radial moment *	Axial moment *	Tangential mo...	N°	Serial N° *	Part N°	Radial moment	Axial moment	Tangential mo...	Difference
1	HC817892		211462	-1935	-22394	10	HB521693		209594	-2008	-22194	1,868
2	HB521694		209212	-1914	-22281	11	HC577525		209601	-2008	-22233	389
3	HC577140		208558	-1997	-22158	12	HC817678		208666	-1980	-22055	108
4	HC577720		208582	-1938	-22163	13	HC817437		209003	-2005	-22242	421
5	HB521276		207821	-2009	-22129	14	HB521721		208045	-1987	-22185	224
6	HC817808		210086	-2062	-22314	15	HC817913		209942	-1984	-22392	144
7	HC817931		209634	-1891	-22325	16	HC817900		209086	-1937	-22231	548
8	HC817715		210066	-2002	-22361	17	HC817973		209993	-2073	-22295	73
9	HB521041		209034	-1989	-22289	18	HC872693		208497	-1911	-22134	537

7. 同一组数据可以通过多次 3D mapping 获取合适的方案

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File Data View Administration Help

Functions: New | Open | Close | Save | Print | Engines configuration | Import distribution | Stock | Unbalance as mapped | 3D mapping | Blade change | Static correction

Case configuration

Field	Value	Field	Value
Filename		Engine number/module *	
Engine *	LEAP-1B	Operator	Lenovo
Disk stage *	FAN BLADE STAGE 1	Airlines	Airlines_name

Comments

New Case

Field	Value		Results	Criteria
Date	08/13/2023			
Blades number	18	Radial unbalance	262.39 cm.g	400 cm.g
Measurement unit	cm.g	Axial unbalance	250.8 cm.g	800 cm.g
Calculation type	Mapping 3D	Radial tangential unbalance	143.2 cm.g	400 cm.g
Mapped	yes	Radial moment difference	537 cm.g	600 cm.g

Schema — Advanced results

Set part number

Blades distribution

N°	Serial N° *	Part N°	Radial moment *	Axial moment *	Tangential mo...	N°	Serial N° *	Part N°	Radial moment	Axial moment	Tangential mo...	Difference
1	HC817892		210462	-1935	-22394	10	HC817808		210086	-2062	-22314	376
2	HC817913		209942	-1984	-22392	11	HC817715		210066	-2002	-22361	124
3	HC817973		209993	-2073	-22295	12	HC817931		209634	-1891	-22325	359
4	HC872693		208497	-1911	-22134	13	HB521041		209034	-1989	-22289	537
5	HB521721		208045	-1987	-22185	14	HB521276		207821	-2009	-22129	224
6	HC577140		208558	-1997	-22158	15	HC817678		208666	-1980	-22055	108
7	HC577720		208582	-1938	-22163	16	HC817437		209003	-2005	-22242	421
8	HC577525		209601	-2008	-22233	17	HB521694		209212	-1914	-22281	389
9	HB521693		209594	-2008	-22194	18	HC817900		209086	-1937	-22231	508
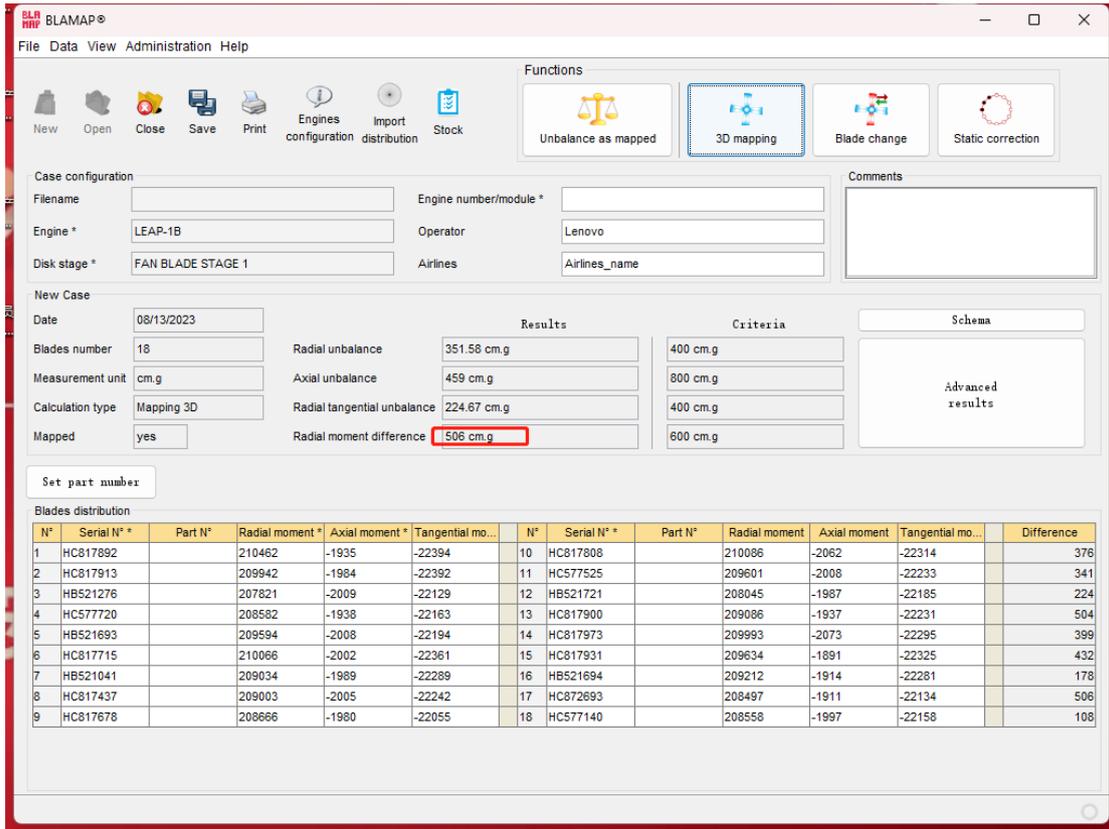
8. 其他功能参考服务器：BLAMAP_v4.3.2_tool-guide_December-2022 文件使用

名称	修改日期	类型	大小
BLAMAP_v4.3.2_tool-guide_December-2022.pdf	2023/8/13 14:06	Foxit Reader PD...	4,531 KB
Blamap-Auto-4.3.2.exe	2022/10/25 17:04	应用程序	123,528 KB
configLEAPLine_956A7671G02.zip	2023/8/13 14:27	压缩(zipped)文件...	711 KB
LEAP-1B叶片动量矩.txt	2023/5/9 15:37	文本文档	1 KB