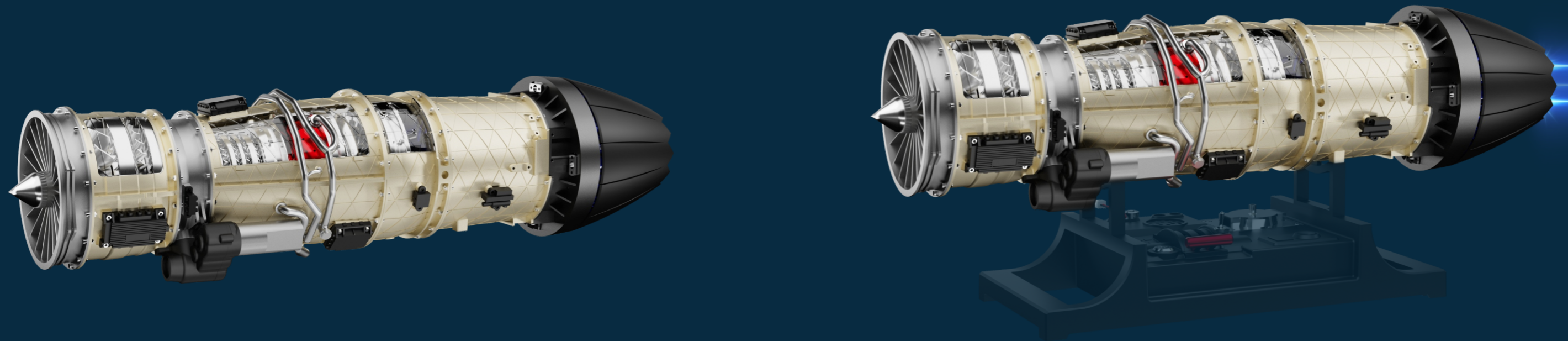


# 小涵道比涡扇发动机

(原理组装模型)



双轴小涵道比涡扇 **发动机**  
TURBOFAN ENGINE



公司:广州市土星文化发展有限公司  
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网址: <http://www.techingedu.com>  
Website: <http://www.techingedu.com>



土星APP  
TECHING

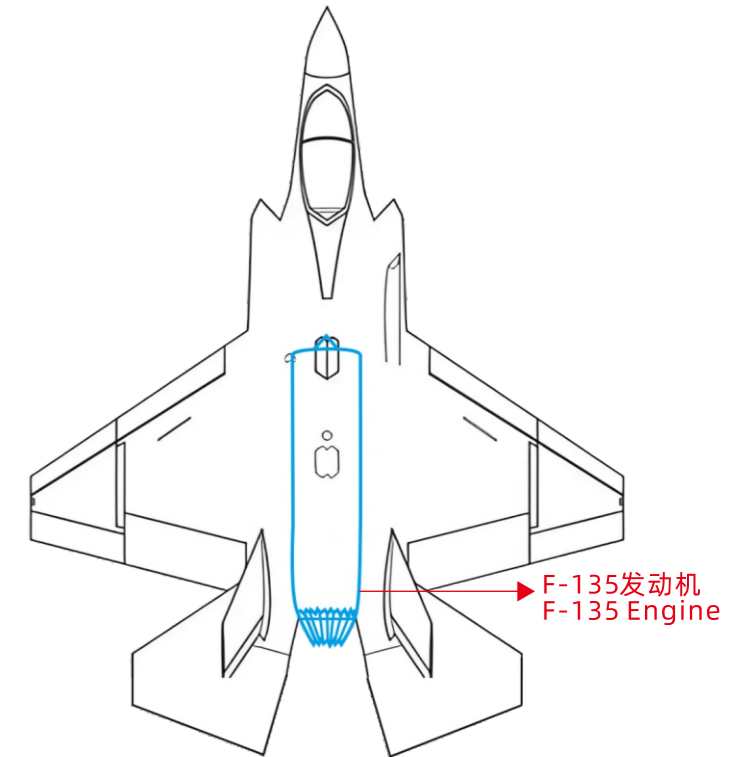
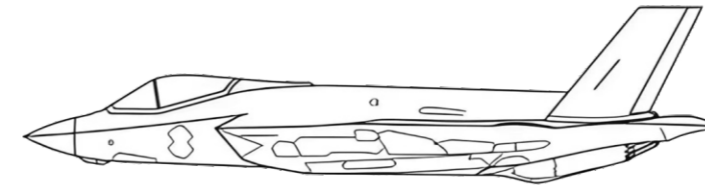


土星官网  
OFFICIAL WEBSITE

版本号: DM135-1

  
**TECHING**  
土星文化

# F-35

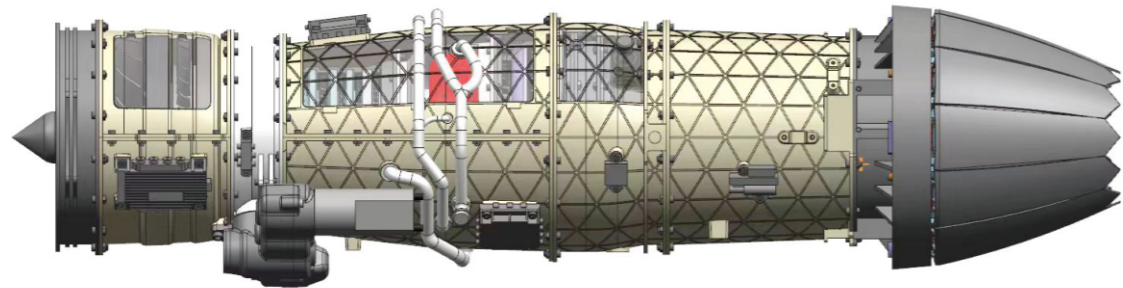


## 基本信息：

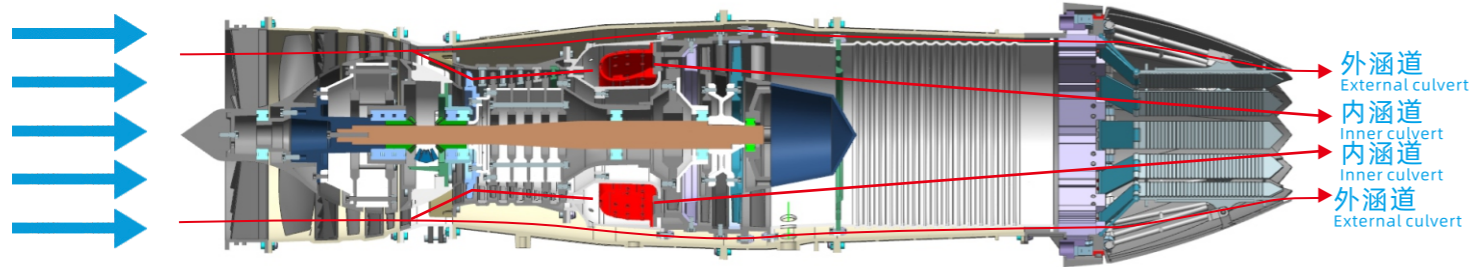
- 小涵道比涡扇发动机
- 双轴核心机
- 风扇直径1.17m
- 推重比1:11
- 最大推力190KN
- 重量：1670KG
- 转速：15000r/min
- 功率：48000KW

## Essential information:

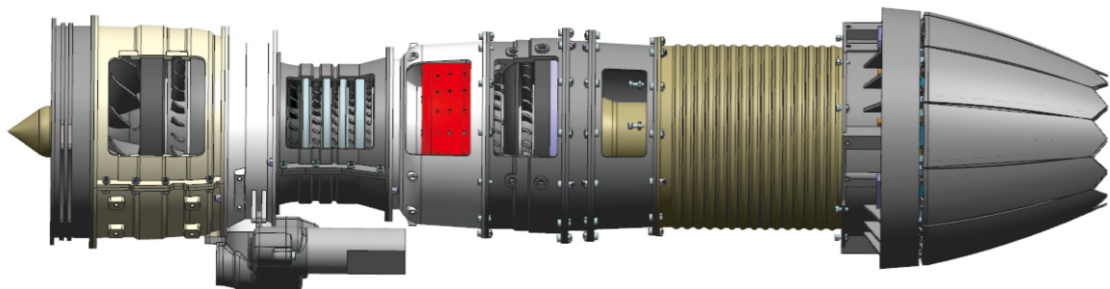
- Small bypass turbofan engine
- Dual axis core machine
- Fan diameter 1.17m
- Push to weight ratio 1:11
- Maximum thrust 190KN
- Weight: 1670KG
- Speed: 15000r/min
- Power: 48000KW



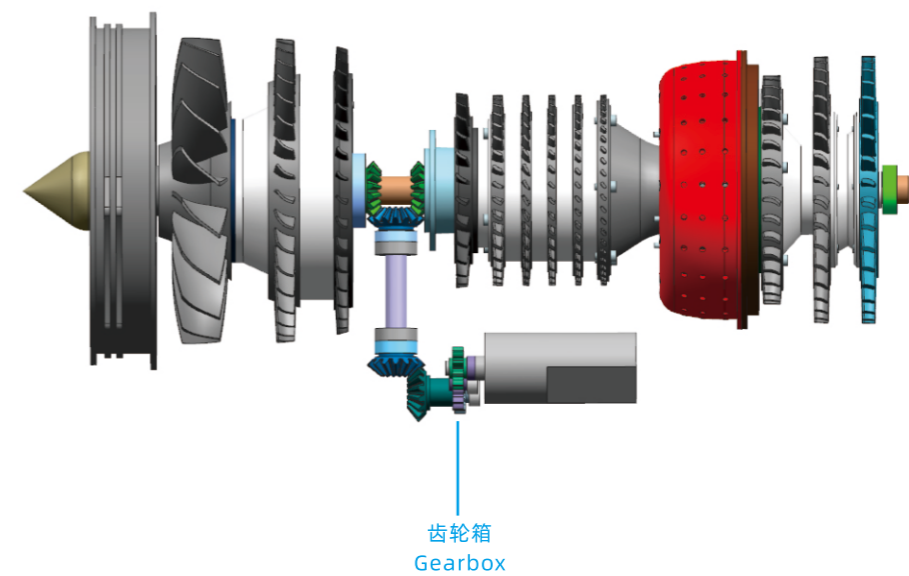
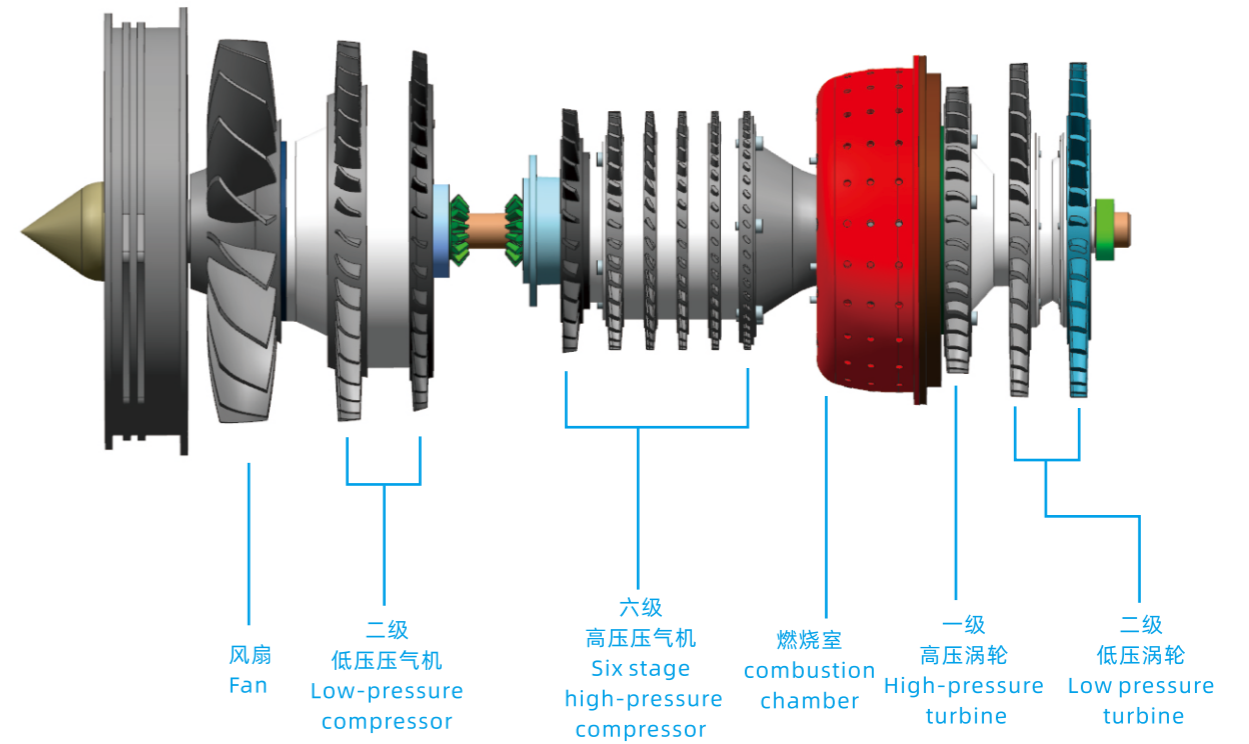
原理结构图  
Principle structure diagram



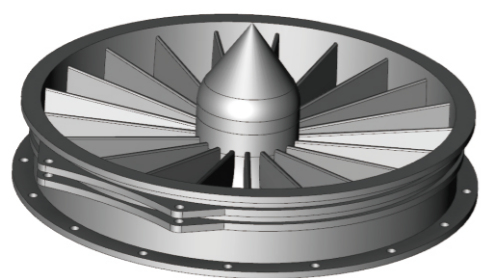
内涵道核心机  
Endogenous core machine



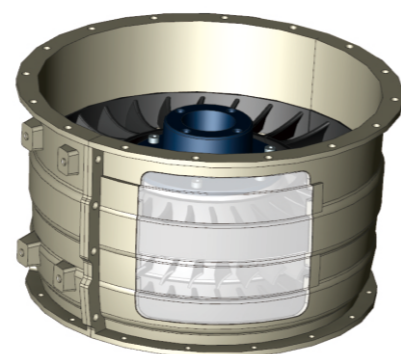
核心机转子总成  
Core machine rotor assembly



进气机匣总成  
Intake gearbox  
assembly



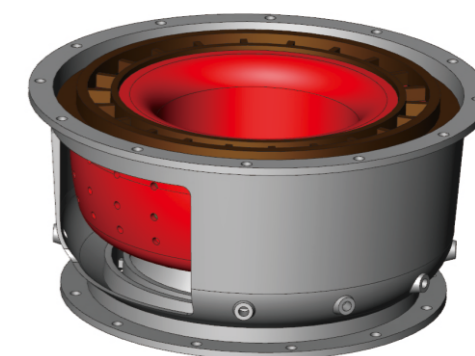
低压压气机总成  
Low pressure  
compressor assembly



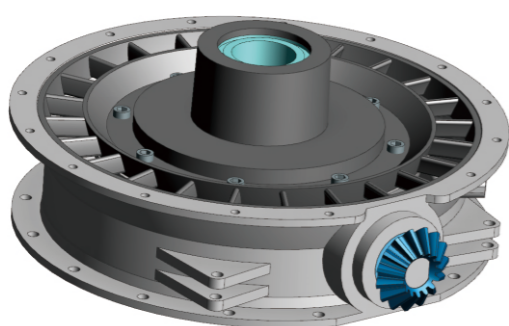
高压气机组件  
High pressure compressor  
components



燃烧室总成  
Combustion chamber  
assembly



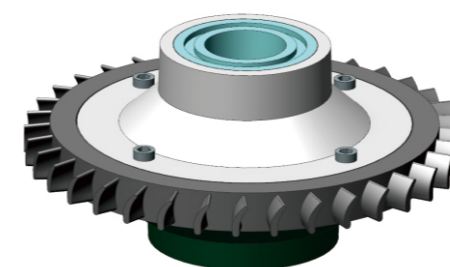
中介机匣总成  
Intermediate receiver  
assembly



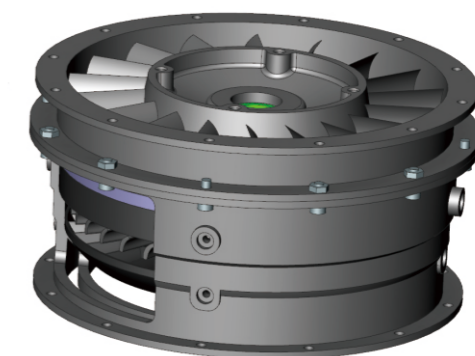
齿轮箱总成  
Gearbox assembly



高压涡轮总成  
High pressure turbine  
assembly



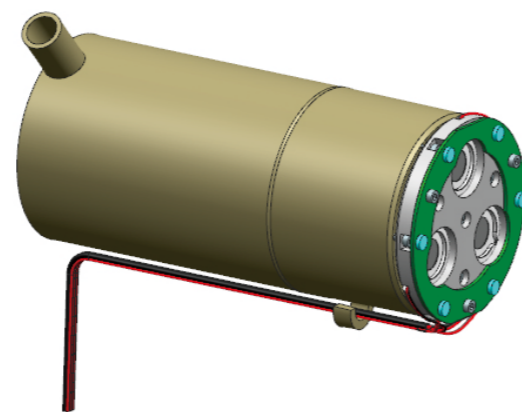
低压涡轮总成  
Low pressure turbine  
assembly



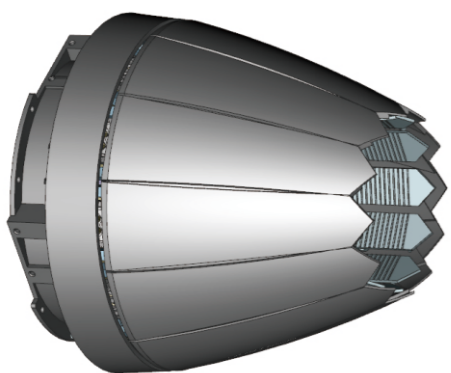
加力喷管总成  
Enhanced nozzle  
assembly



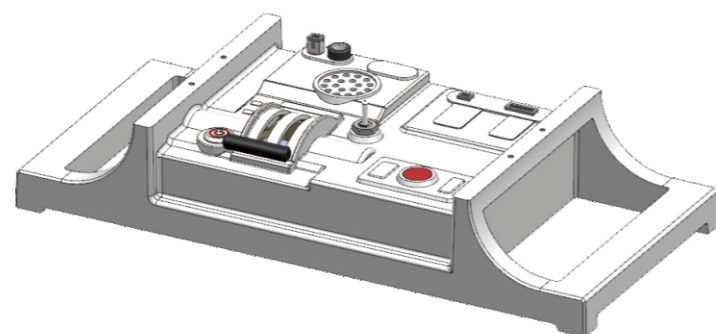
雾化器总成  
Nebulizer assembly



尾喷口总成  
Tail nozzle assembly



底座总成  
Base assembly

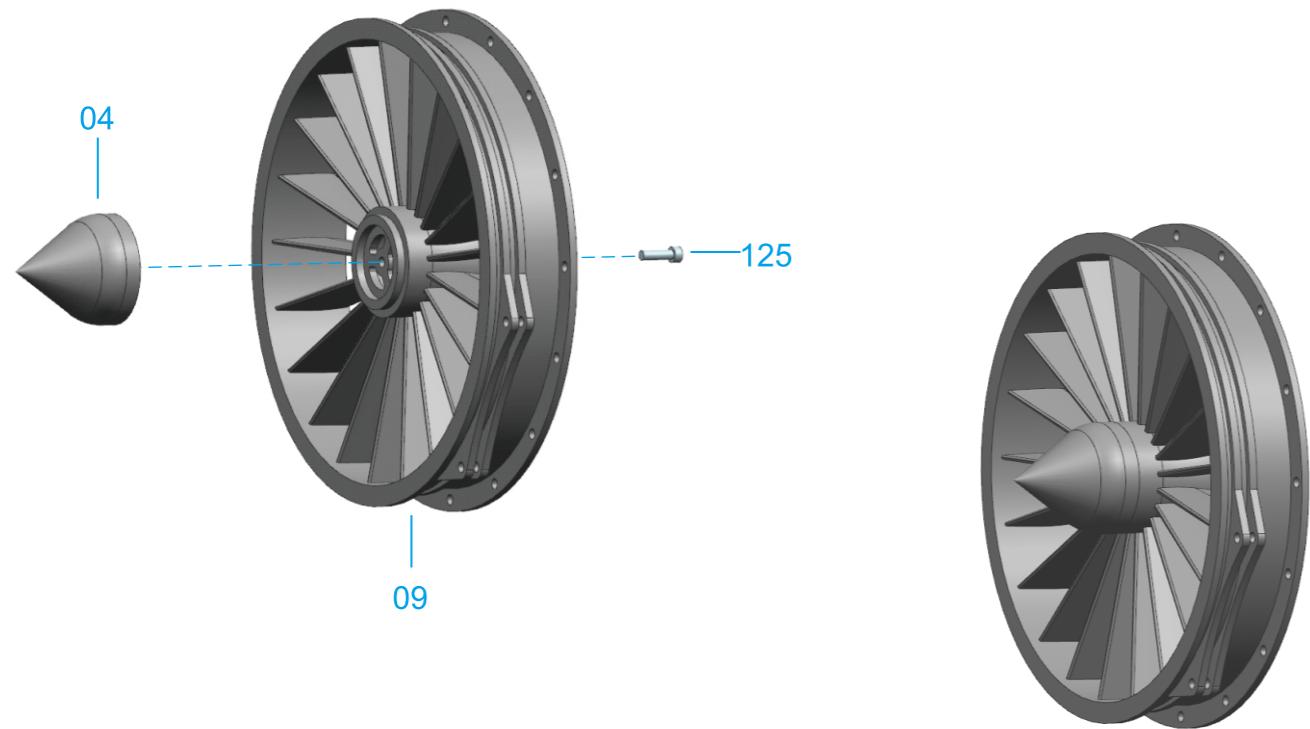


## 目录 CATALOG

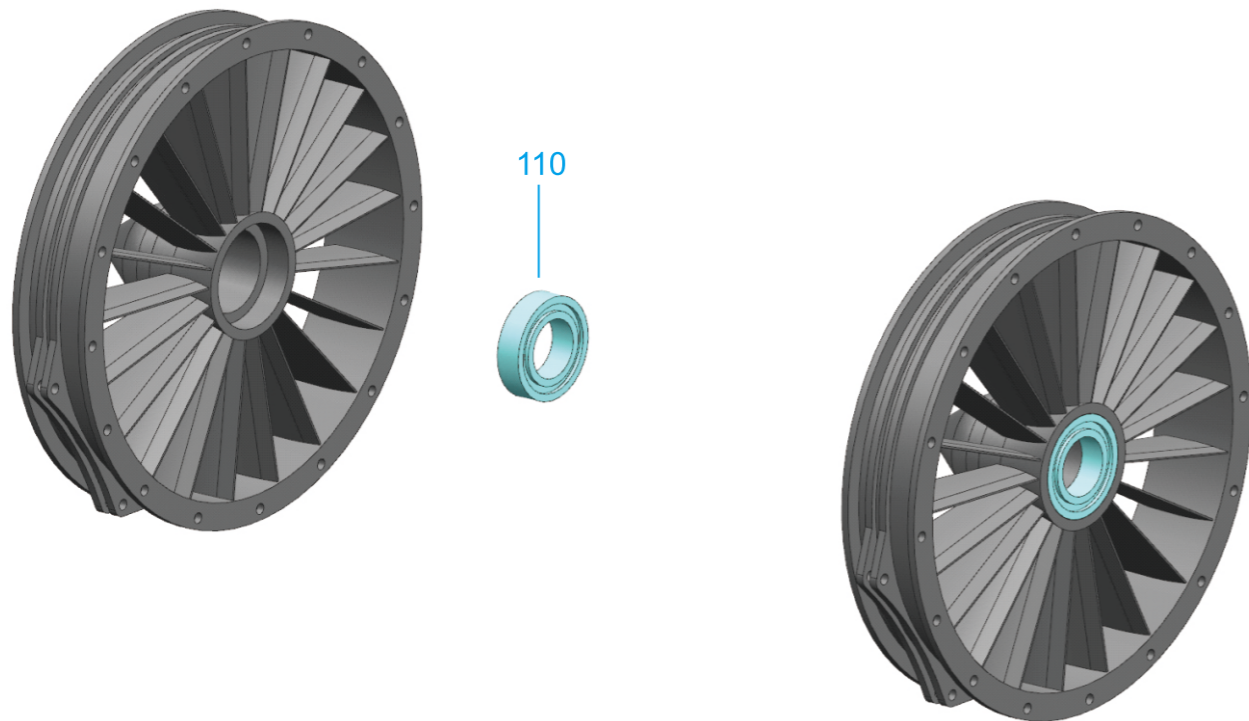
Assemble the intake gearbox component	
一、 组装进气机匣组件	007
Assemble the low-pressure compressor assembly	
二、 组装低压气机总成	008
Assemble the intermediate receiver assembly	
三、 组装中介机匣总成	014
Assemble the gearbox assembly	
四、 组装齿轮箱总成	021
Assemble the high-pressure compressor assembly	
五、 组装高压气机总成	027
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六、 组装燃烧室总成	039
Assemble the high-pressure turbine assembly	
七、 组装高压涡轮总成	041
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八、 组装低压涡轮总成	043
Nebulizer assembly	
九、 雾化器组件总成	047
Assemble the tailpipe assembly	
十、 组装尾喷管组件	048
Assemble the booster nozzle assembly	
十一、 组装加力喷管总成	053
Assemble each assembly	
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Assemble engine accessories	
十三、 组装发动机附件	074
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十四、 零件列表	085

## 一、组装进气机匣组件 **Assemble the intake gearbox component**

### 1.1、组装进气锥 **Assemble the intake cone**

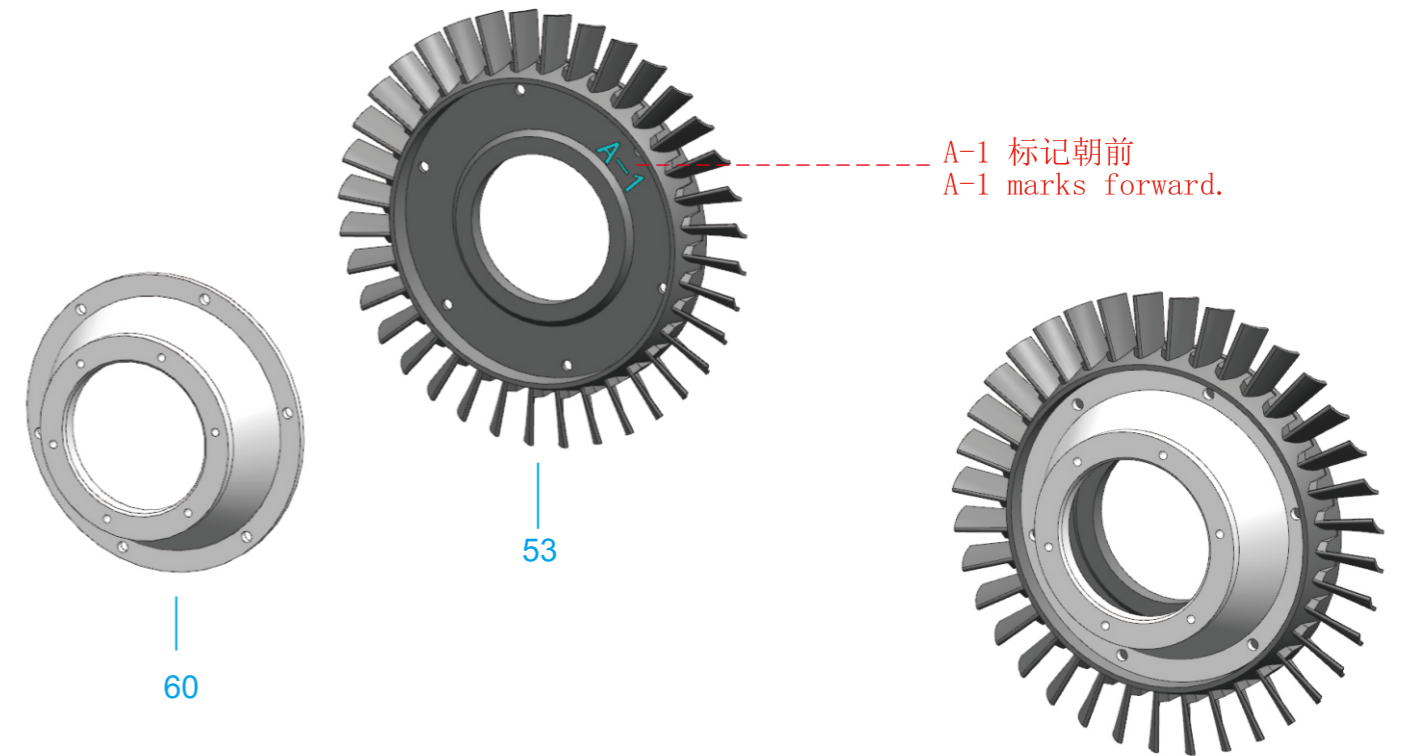


### 1.2、组装风扇轴承 **Assemble fan bearings**

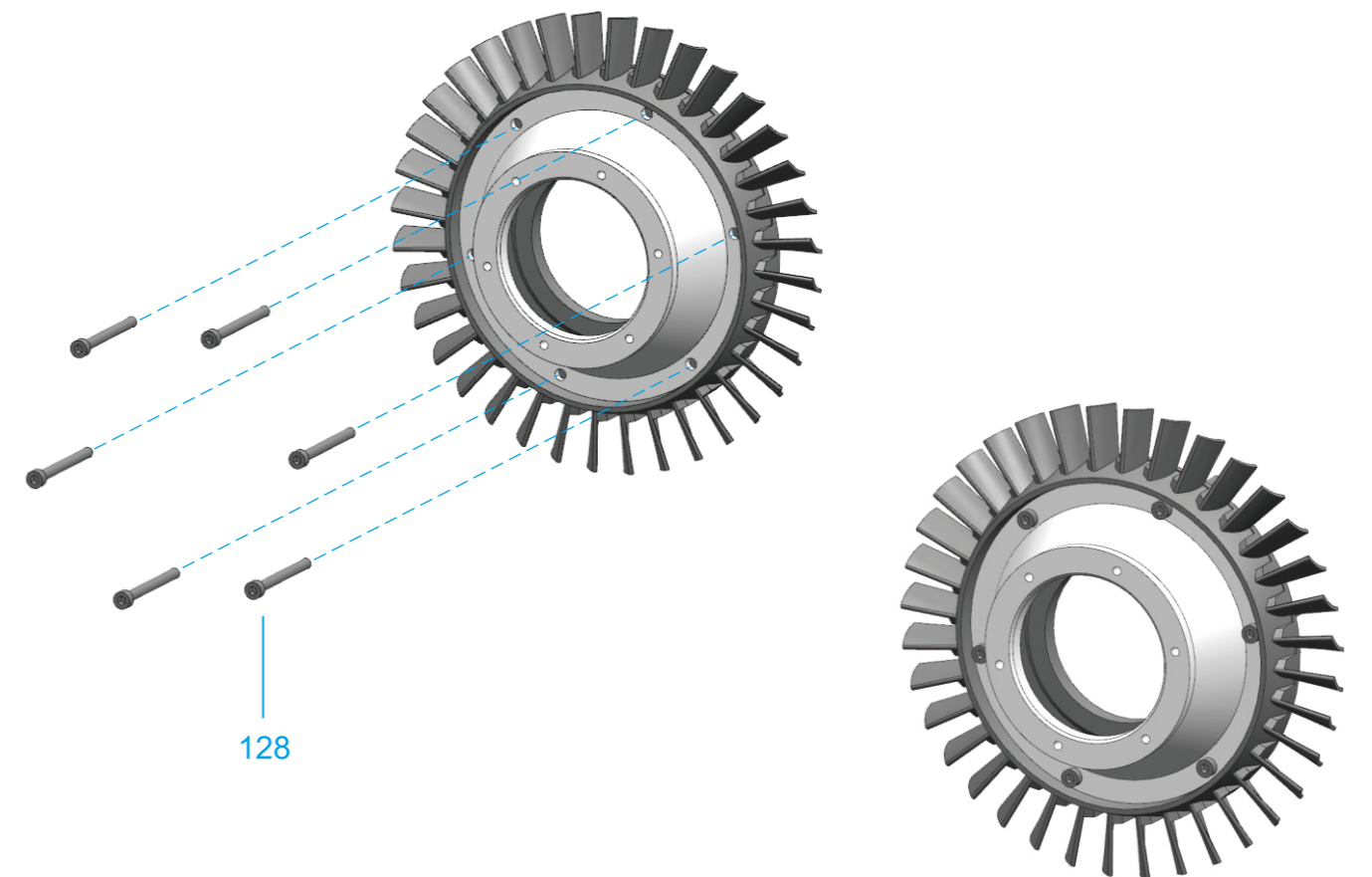


## 二、组装低气压气机总成 **Assemble the low-pressure compressor assembly**

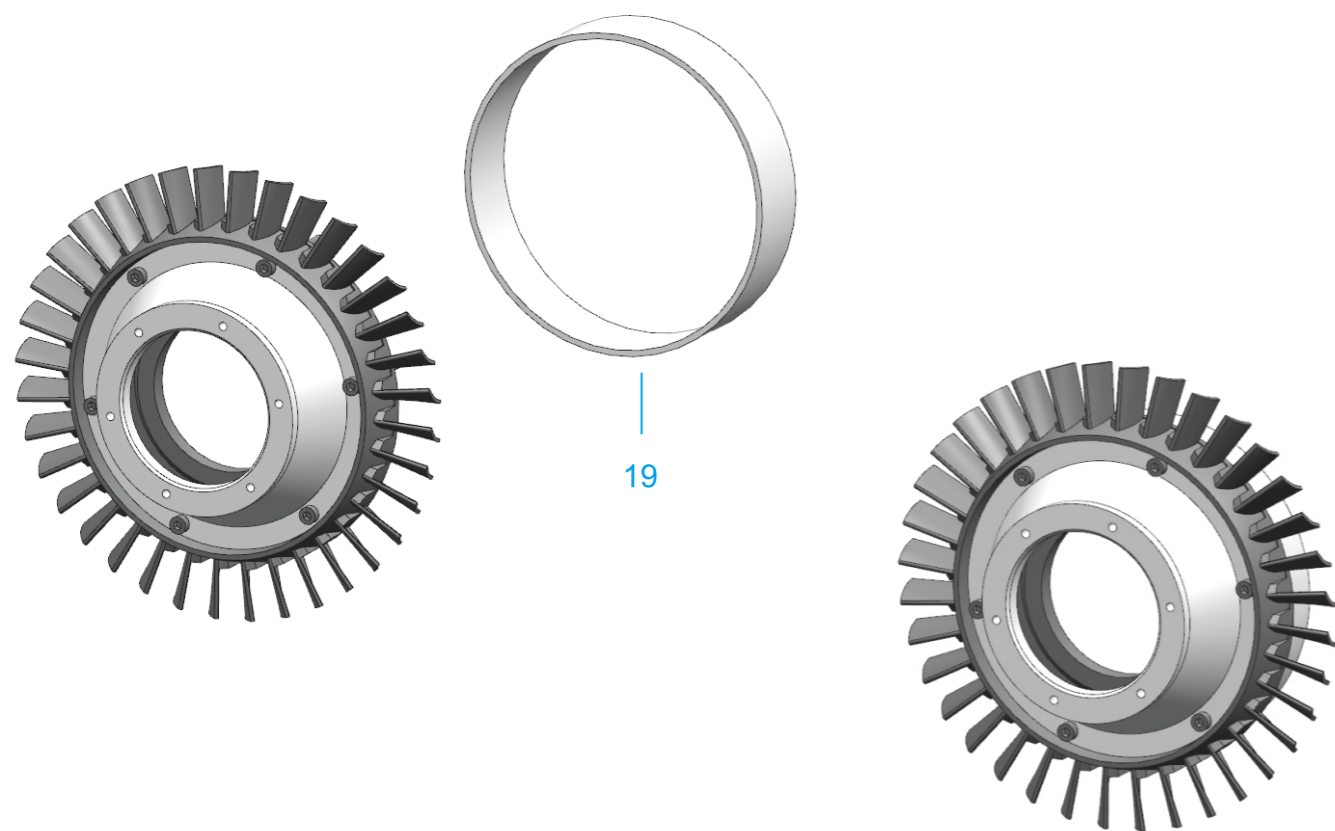
### 2.1、组装低压气机前盘 **Assemble the front plate of the low-pressure compressor**



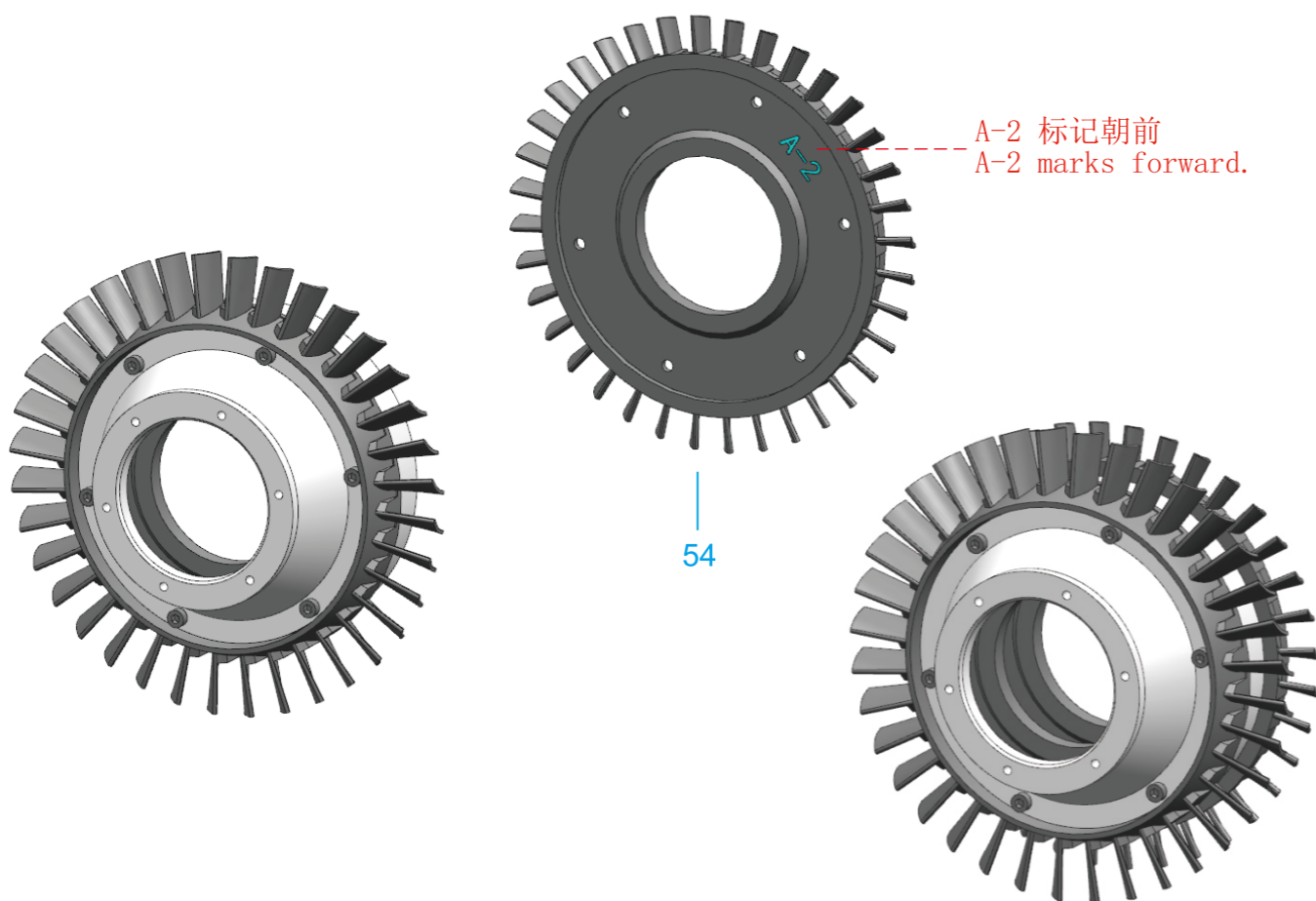
### 2.2、组装一级低压转子 **Assemble the first stage low-pressure rotor**



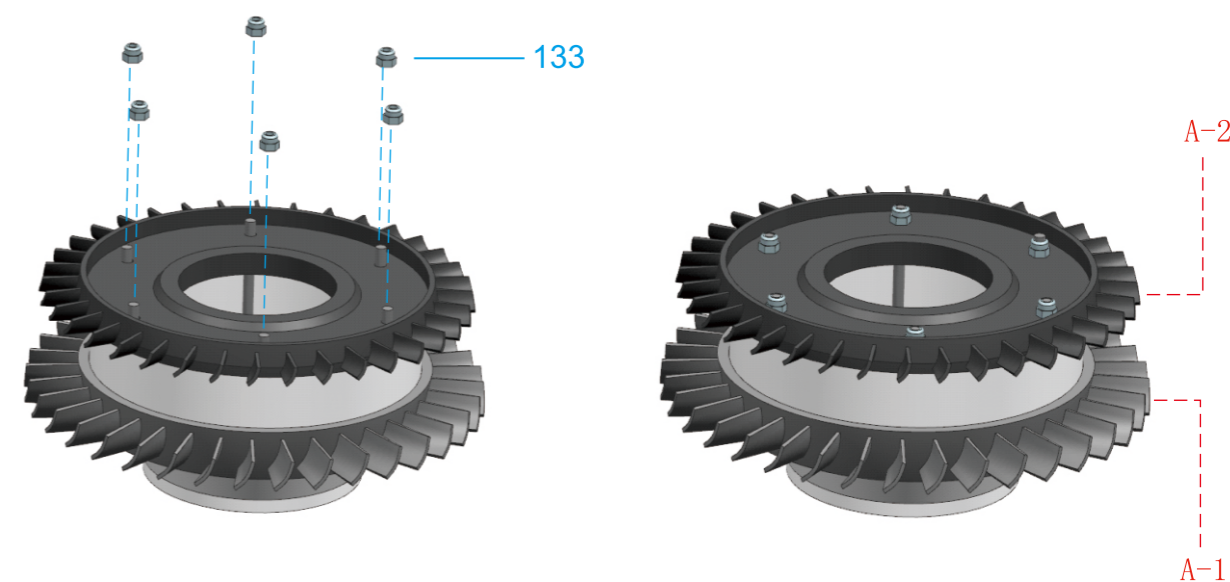
## 2.3、组装低压连接环 Assemble the low-voltage connecting ring



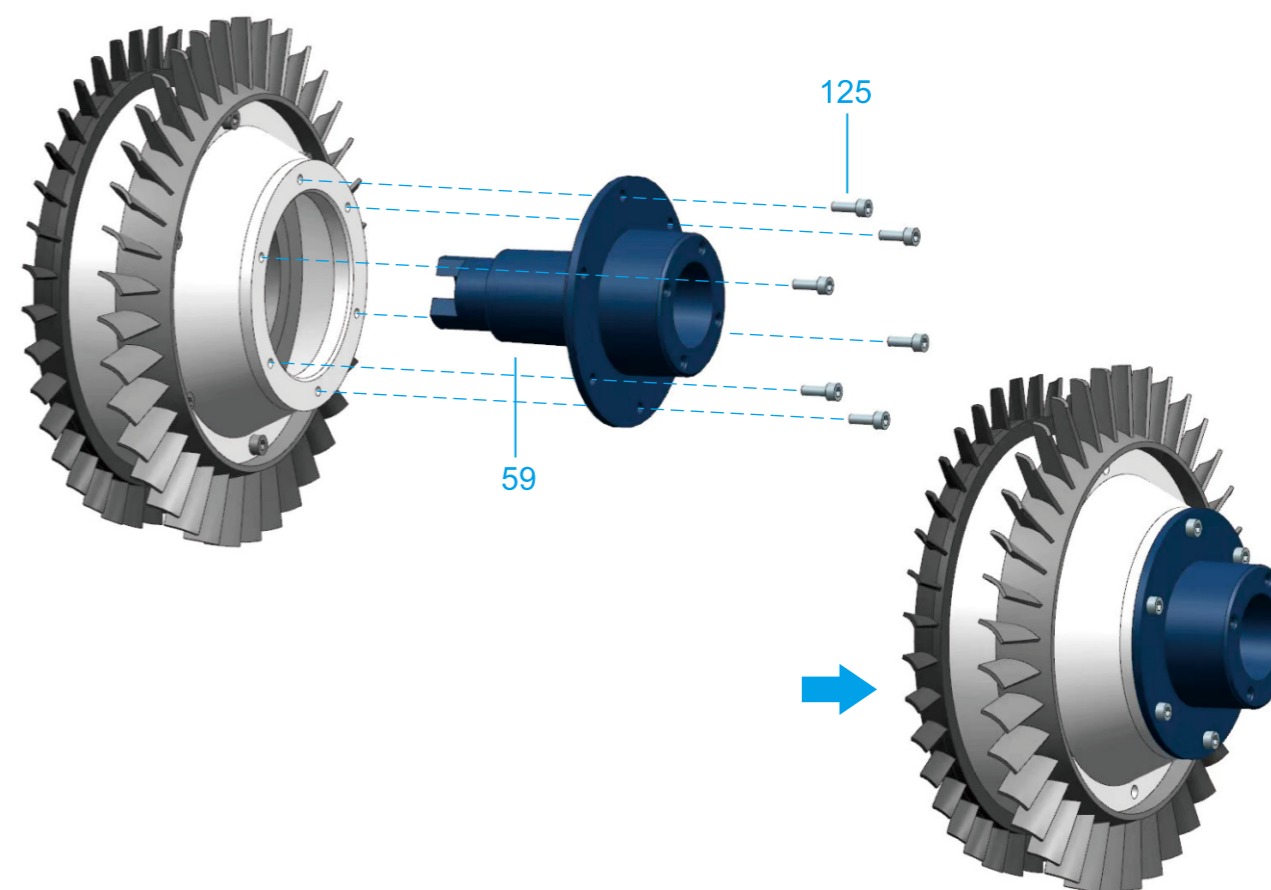
## 2.4、组装二级低压转子 Assemble the secondary low-pressure rotor



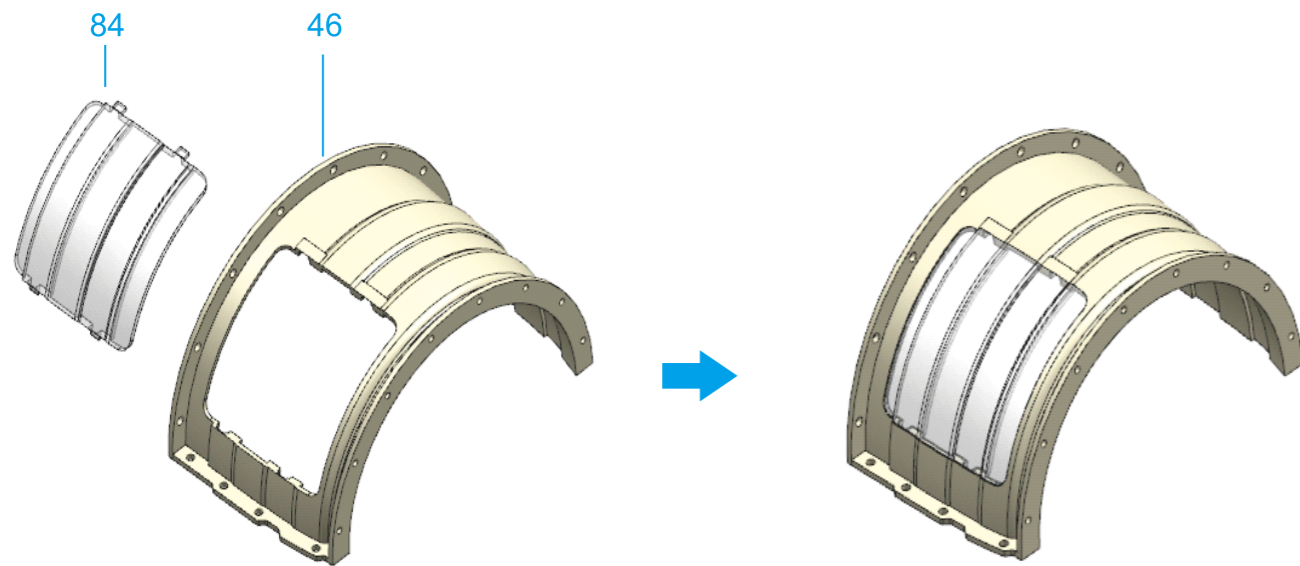
## 2.5、锁紧转子螺丝 Tighten the rotor screws



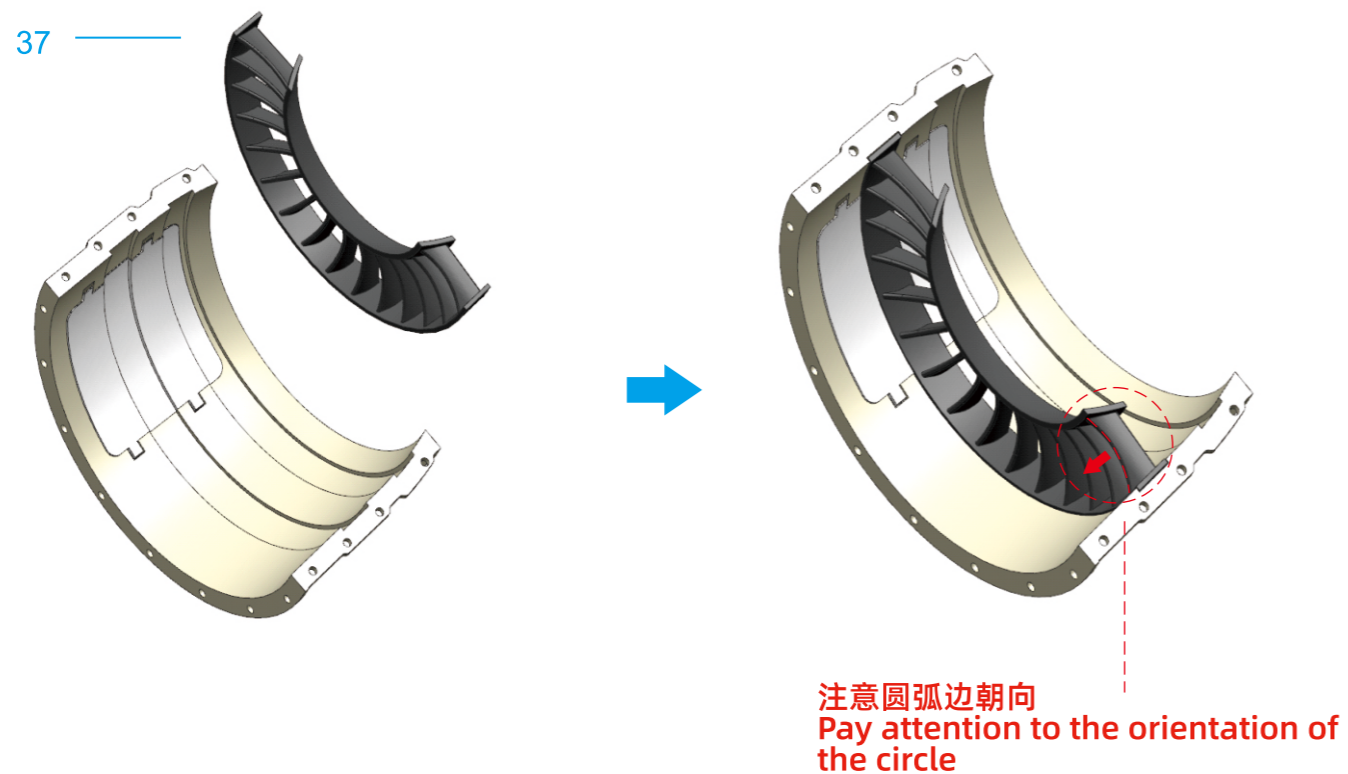
## 2.6、组装中心轴前段 Assemble the front section of the central axis



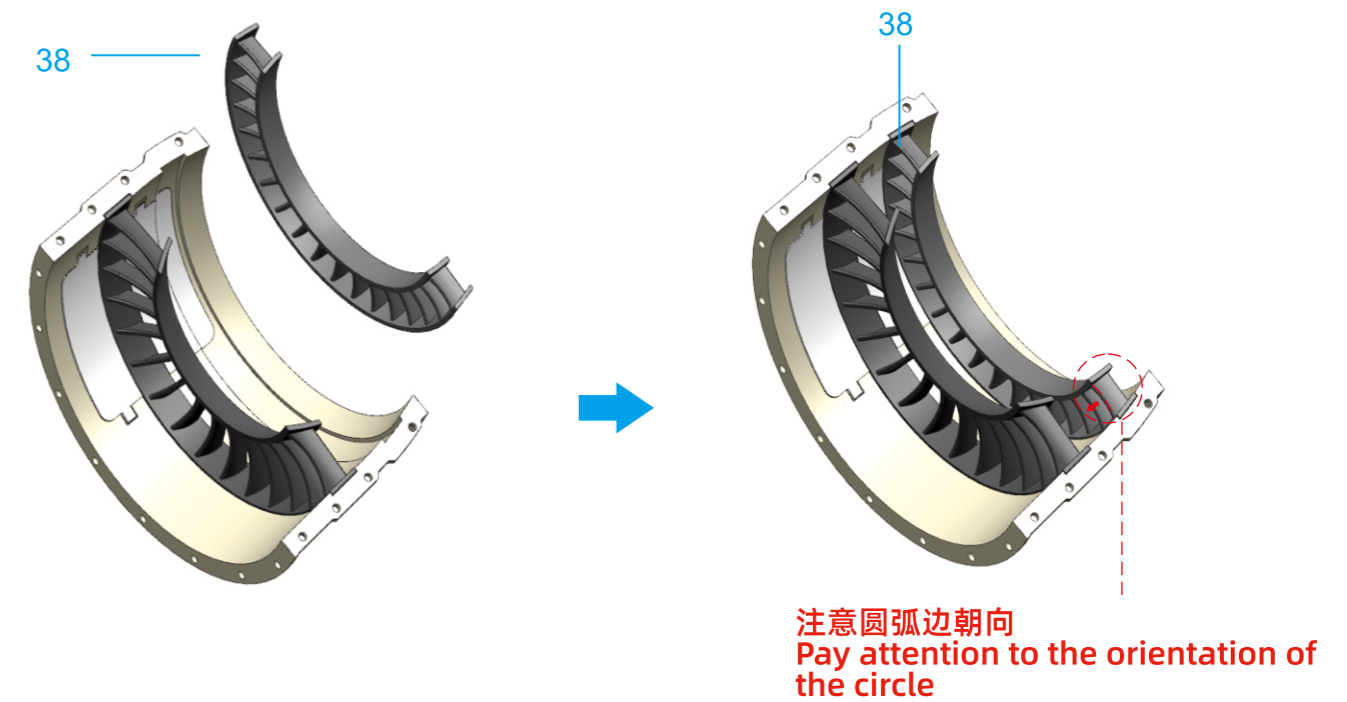
2.7、组装低压上机匣窗板 Assemble the low-voltage upper box window panel



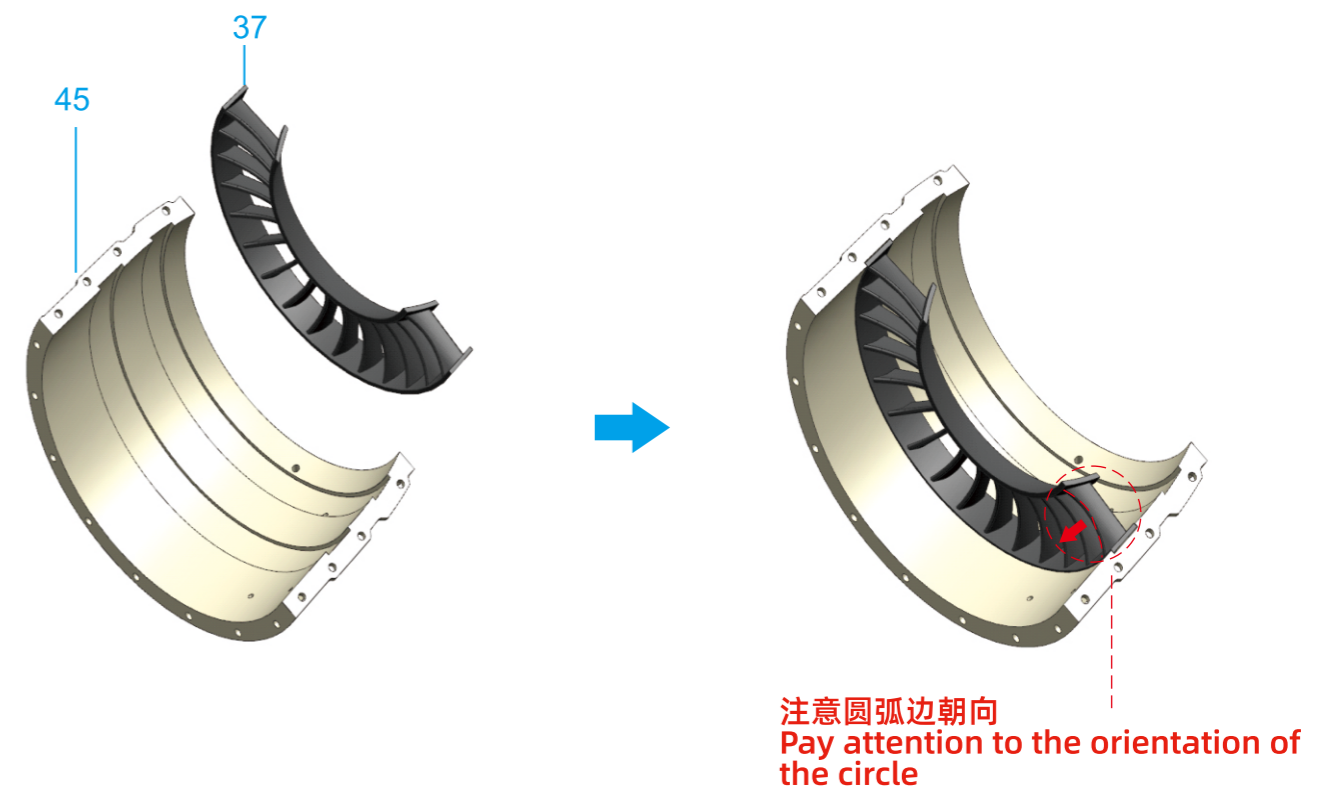
2.8、组装上机匣一级低压静子 Assemble the first stage low-pressure stator of the upper casing



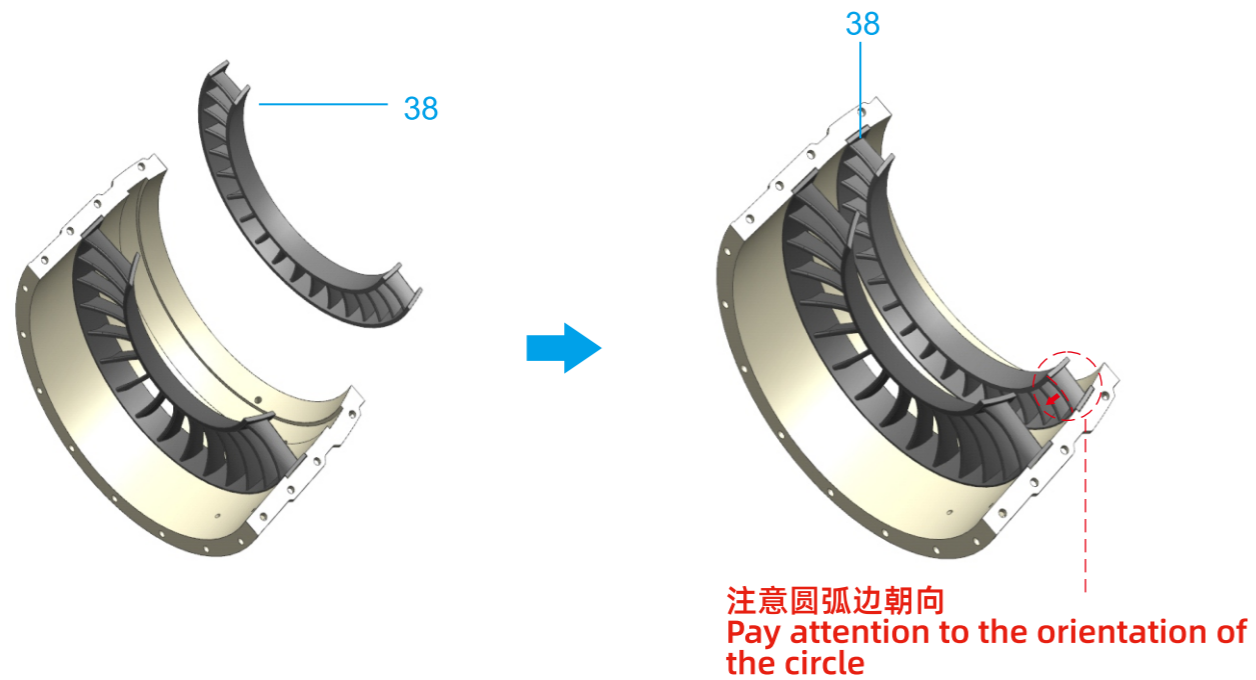
2.9、组装上机匣二级低压静子 Assemble the second stage low-pressure stator of the upper casing



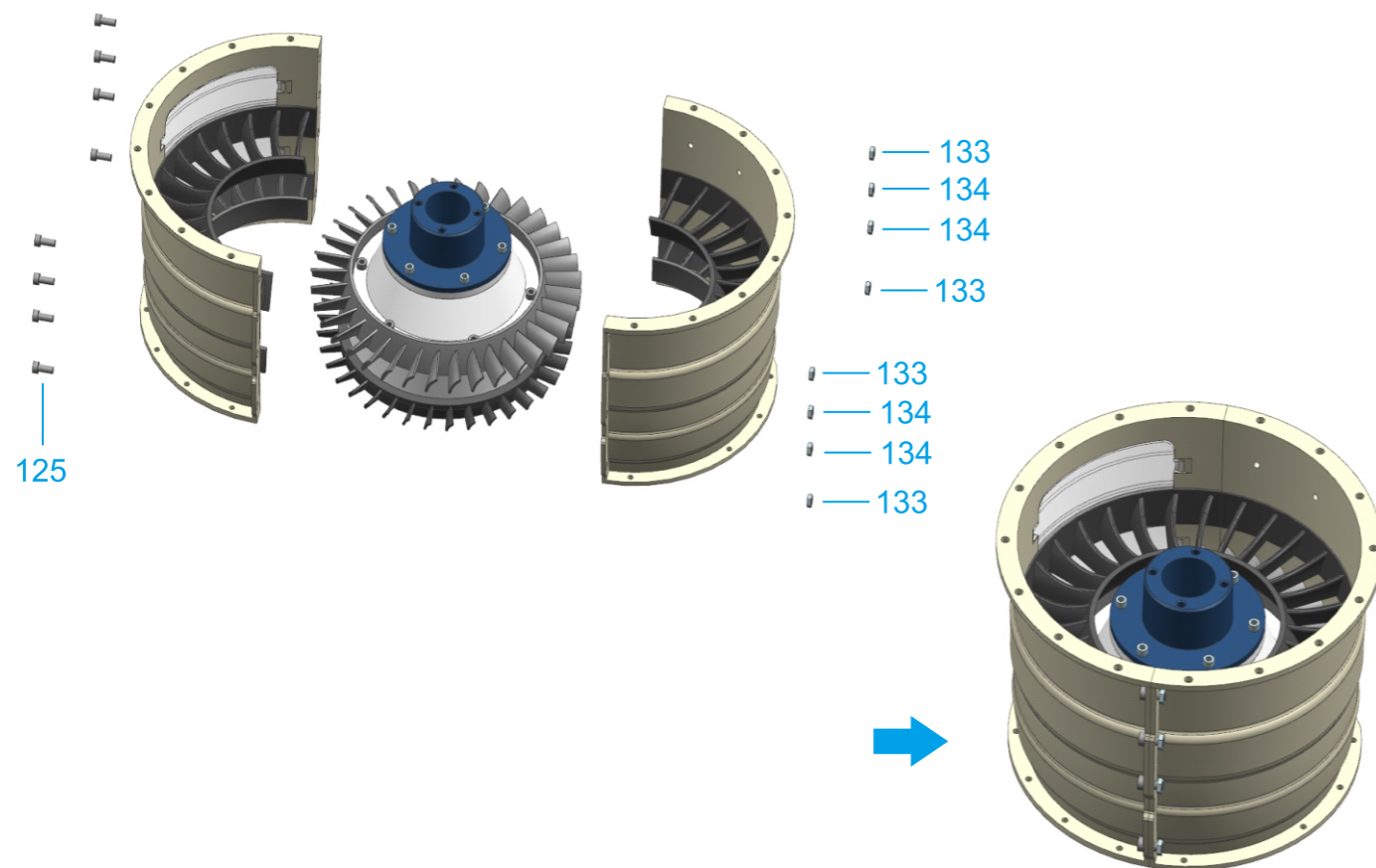
2.10、组装下机匣一级低压静子 Assemble the first stage low-pressure stator of the lower receiver



## 2.11、组装下机匣二级低压静子 Assemble the second stage low-pressure stator of the lower receiver

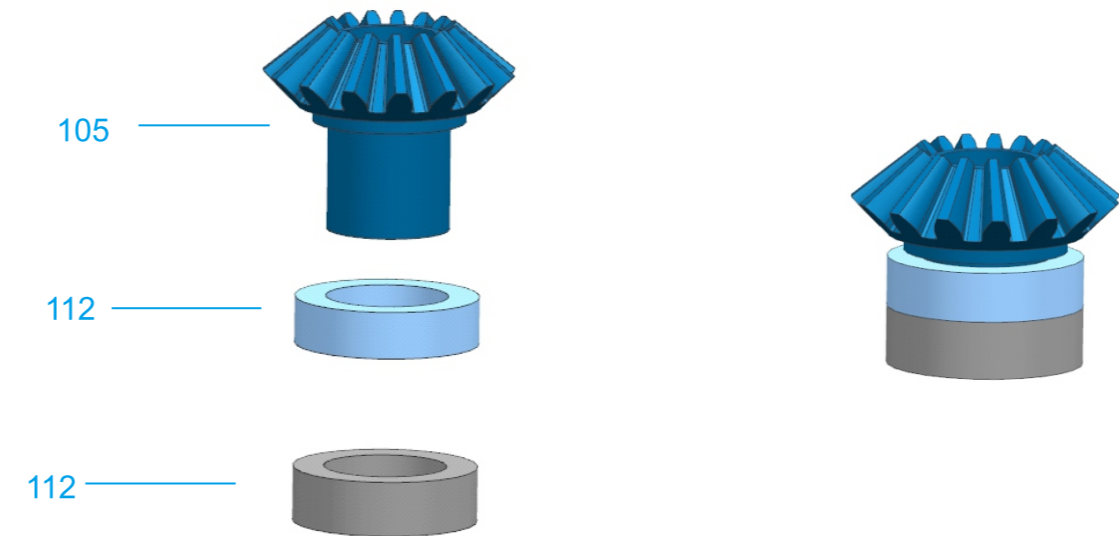


## 2.12、总装低压气机总成 Final assembly of low-pressure gas turbine assembly

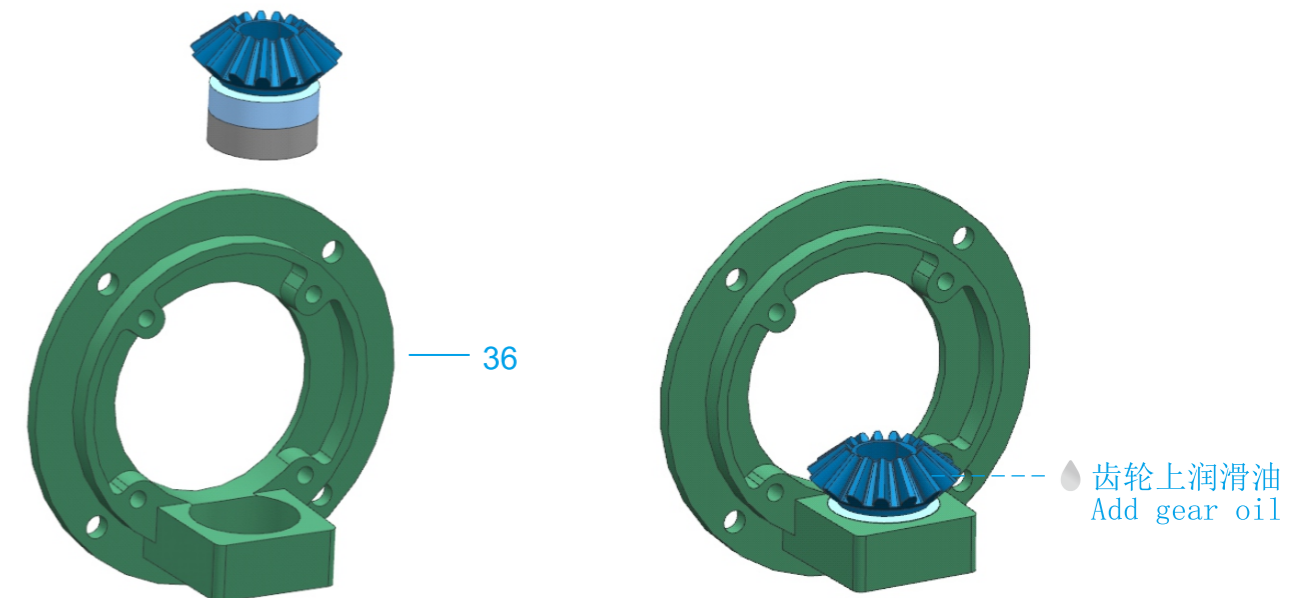


## 三、组装中介机匣总成 Assemble the intermediate receiver assembly

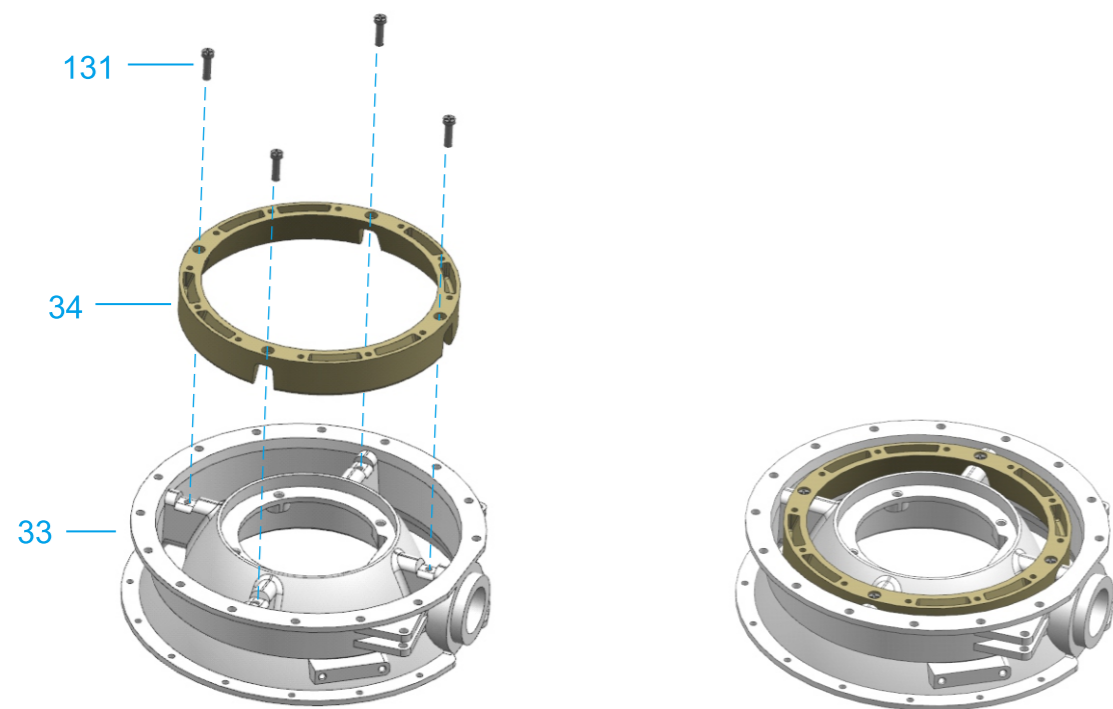
## 3.1、组装小锥齿轮轴承 Assemble the small bevel gear bearing



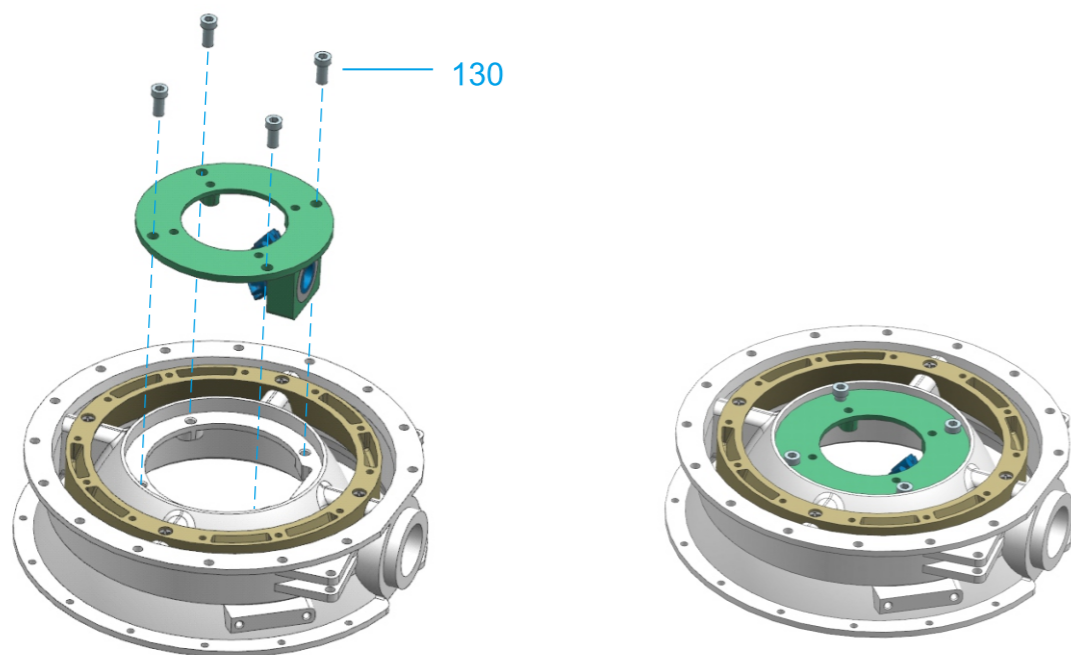
## 3.2、组装锥齿轮 Assemble bevel gear



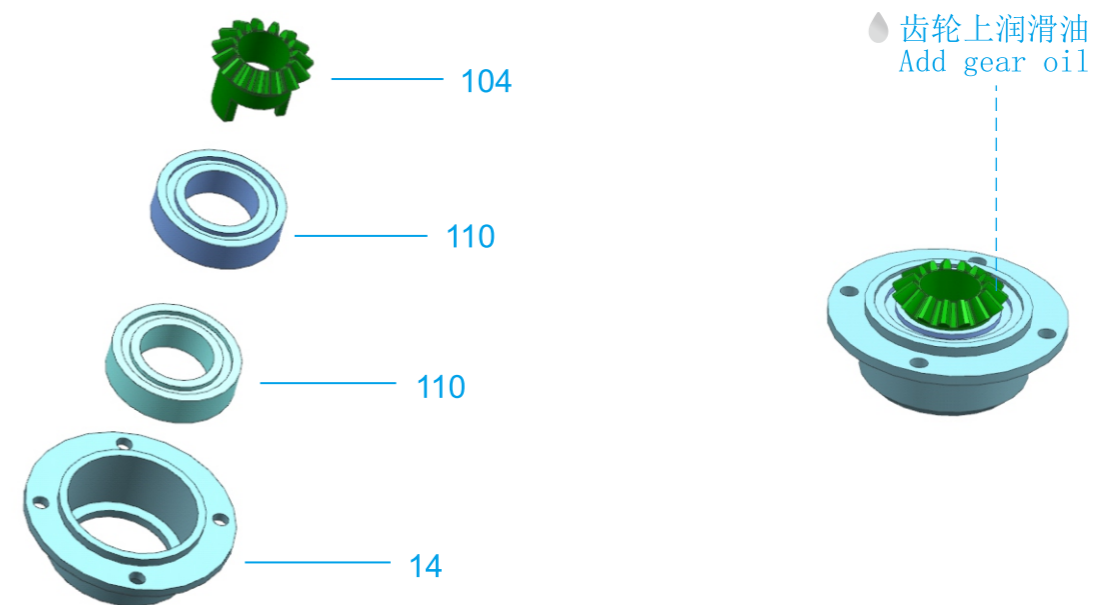
## 3.3、组装分流环 Assemble the diversion ring



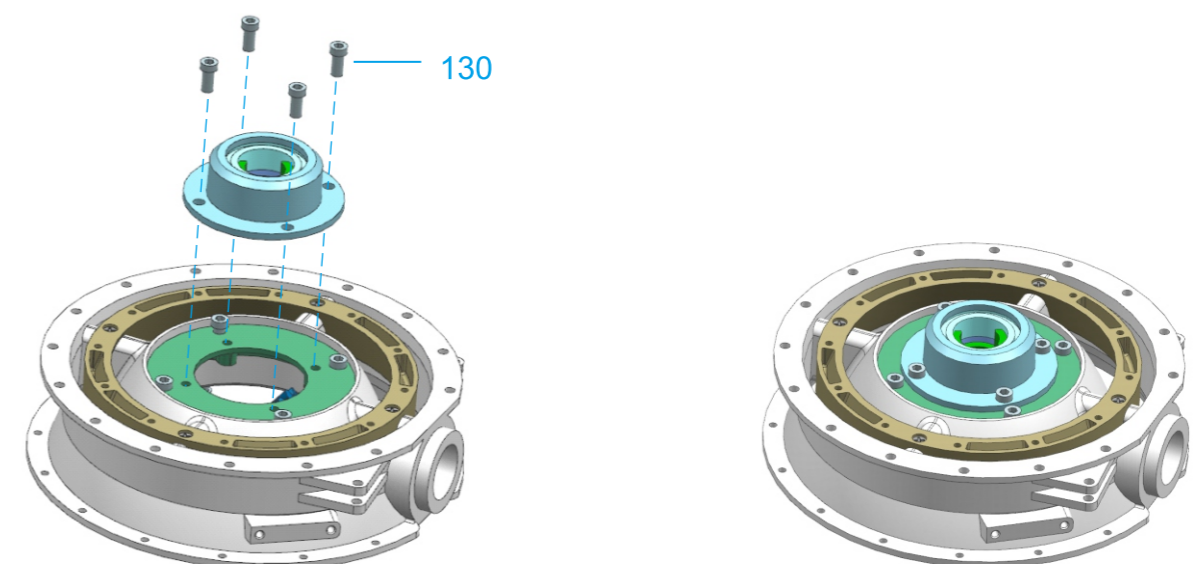
## 3.4、组装锥齿轮总成 Assemble the bevel gear assembly



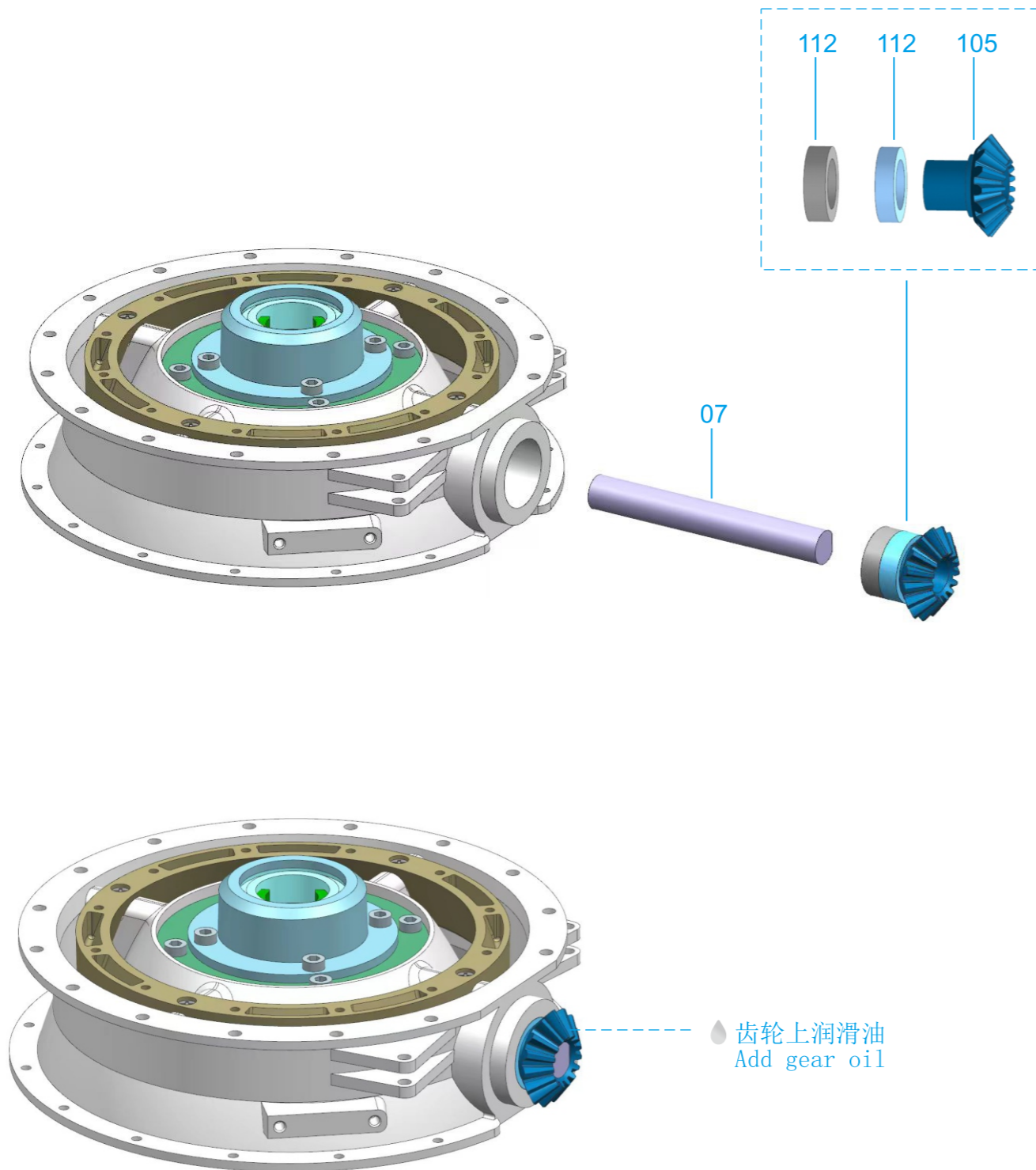
## 3.5、组装中心锥齿轮 Assemble the central bevel gear



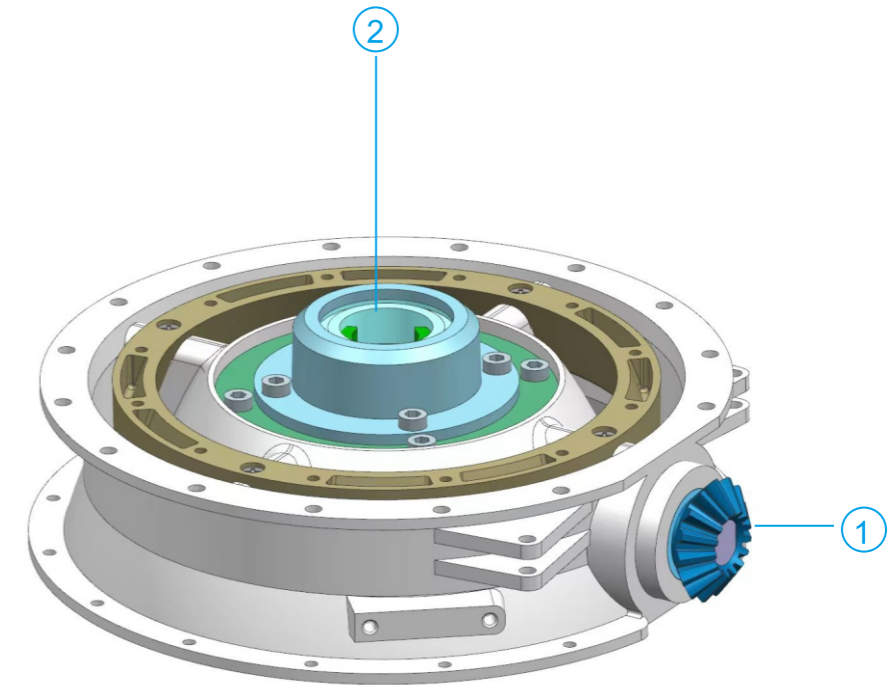
## 3.6、组装3号轴承座 Assemble the 3rd bearing seat



## 3.7、组装传动轴Assemble the transmission shaft

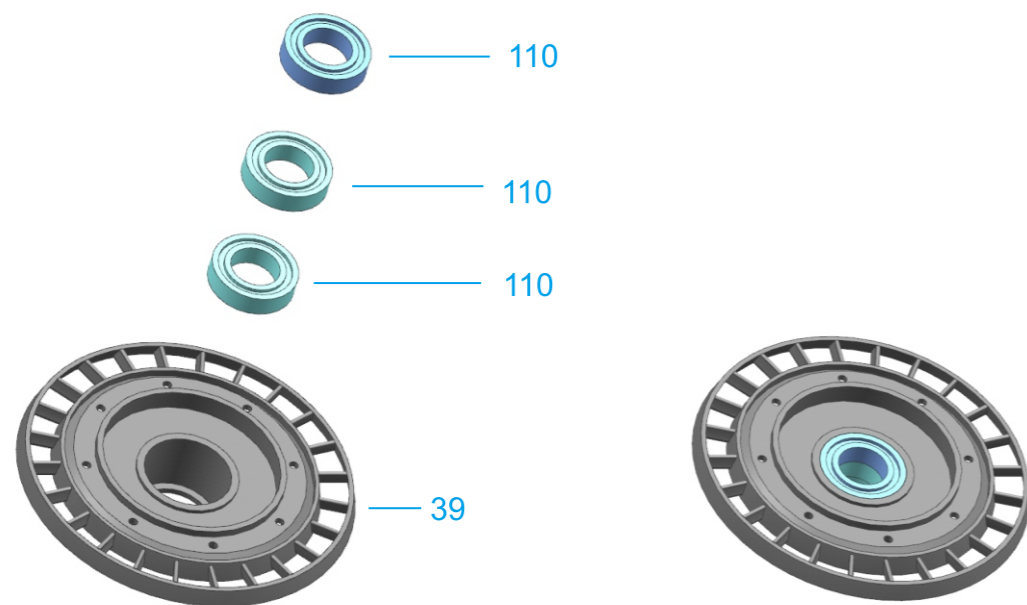


## 3.8、测试Test

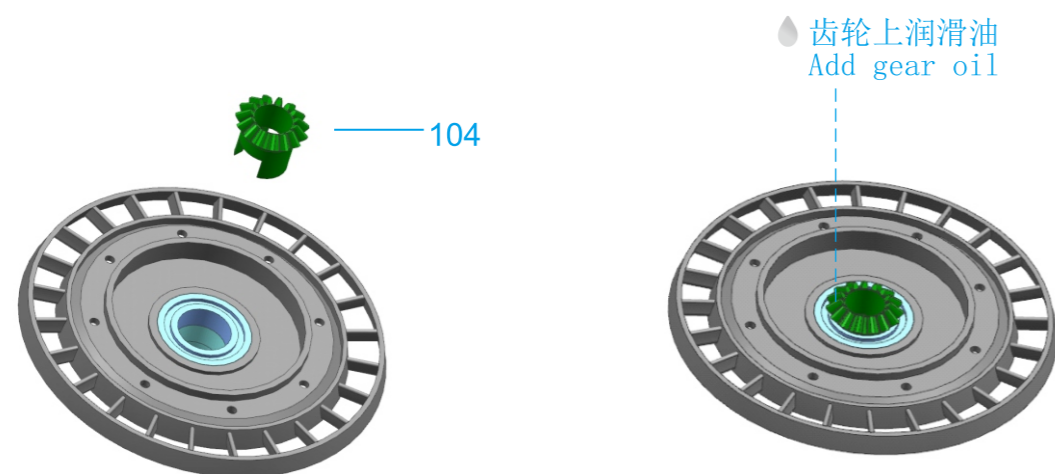


- 1、用手转动锥齿轮
- 2、观察中心锥齿轮是否转动
- 1、Rotate the bevel gear by hand
- 2、Observe whether the central bevel gear rotates

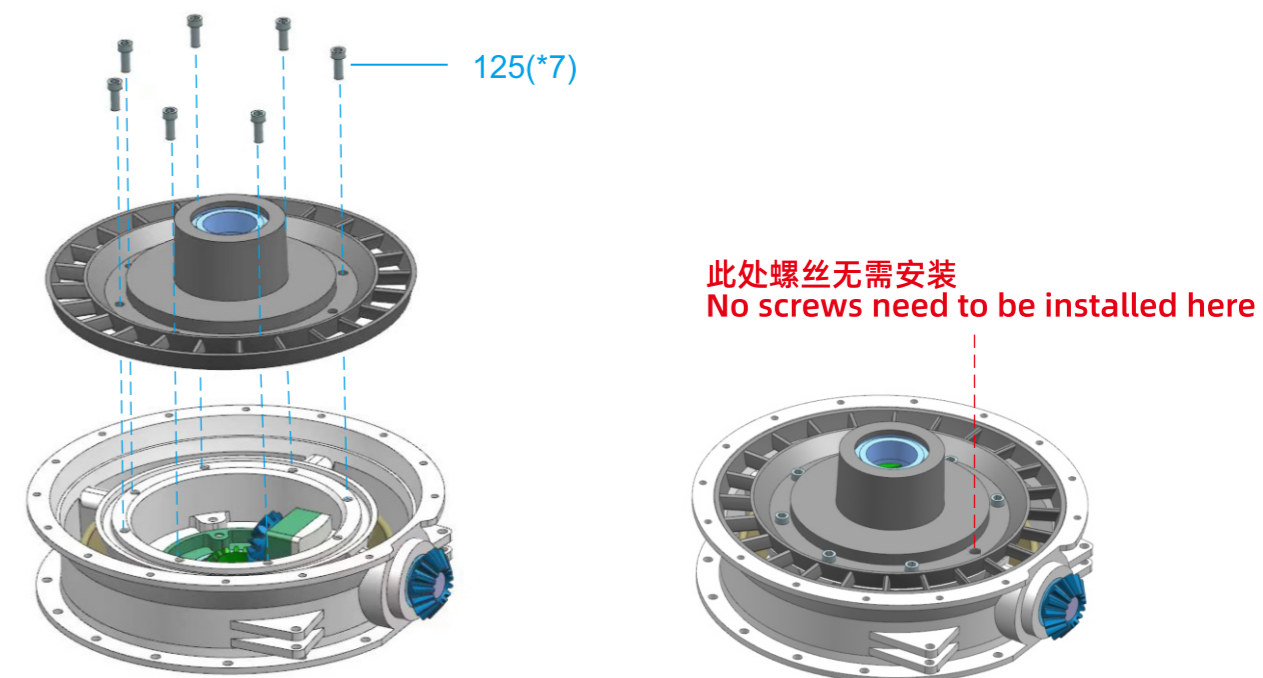
## 3.9、组装2号轴承Assemble the No.2 bearing



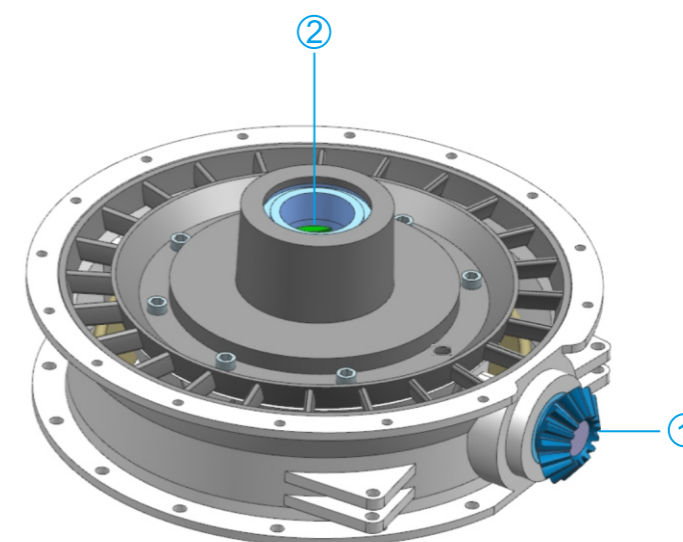
## 3.10、组装中心锥齿轮Assemble the central bevel gear



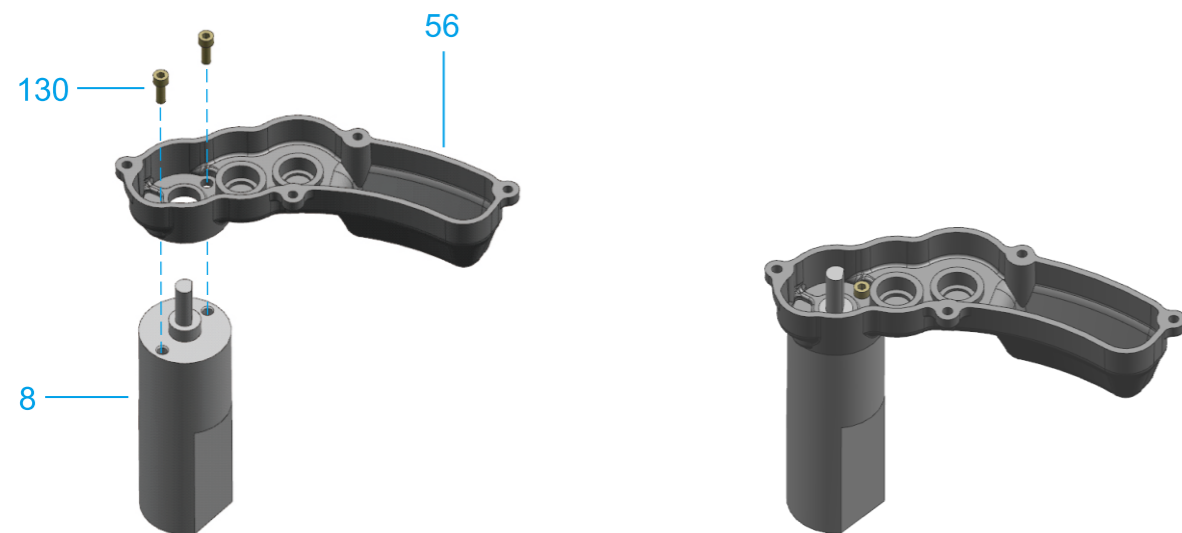
## 3.11、组装一级高压静子Assemble a first stage high-voltage stator



## 3.12、测试 Test



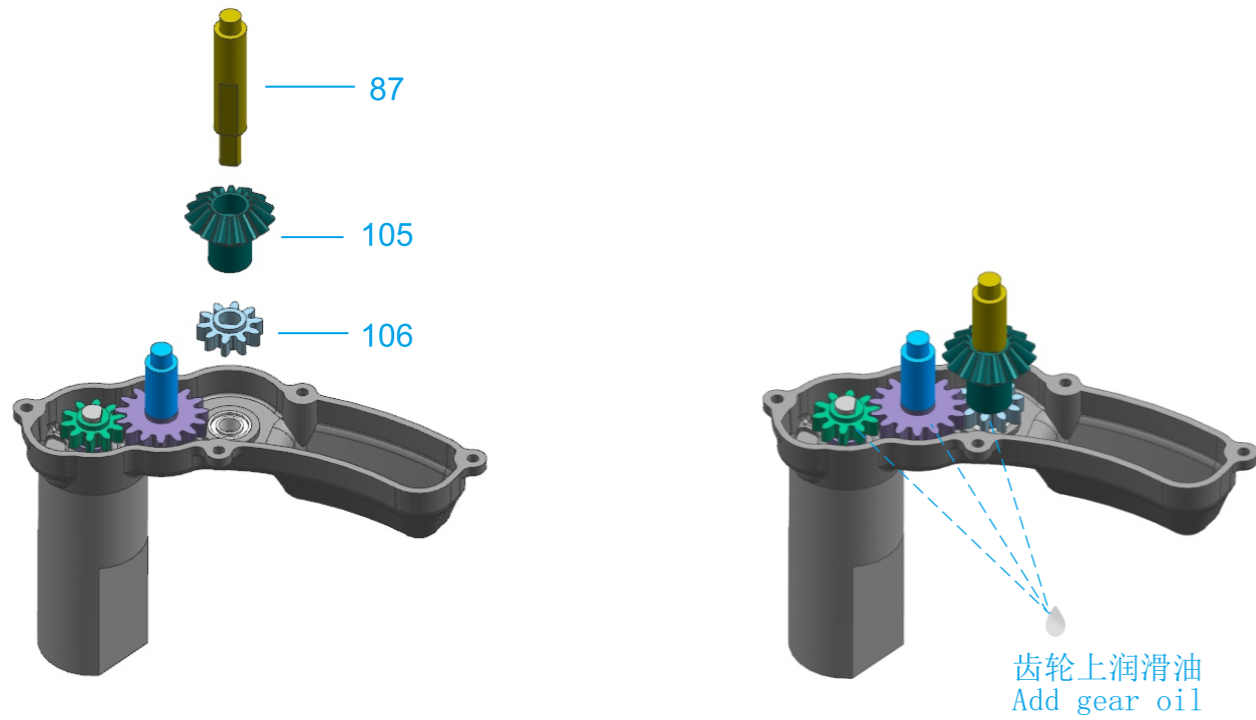
- 1、用手转动小锥齿轮
- 2、观察中心齿轮是否转动
- 1、Rotate the small bevel gear by hand
- 2、Observe whether the central gear rotates

四、组装齿轮箱总成 **Assemble the gearbox assembly**4.1、组装电机 **Assemble the motor**4.2、组装电机齿轮 **Assembling motor gears**4.3、组装过渡轴轴承 **Assemble transition shaft bearings**4.4、组装锥齿轴轴承 **Assemble the tapered shaft bearing**

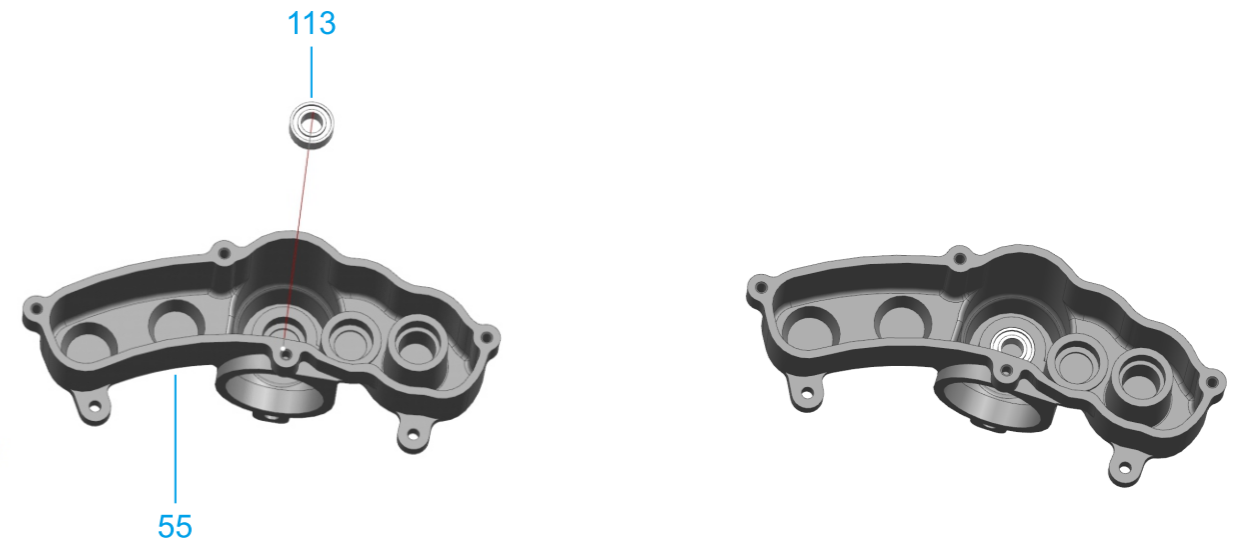
4.5、组装过渡轴 Assemble transition shaft



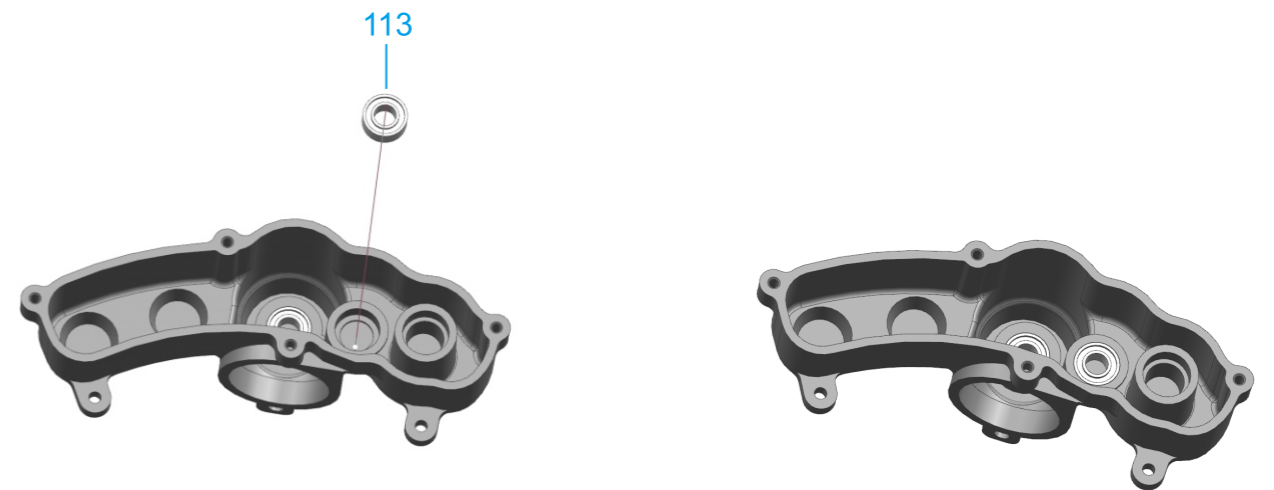
4.6、组装锥齿轴 Assemble the bevel gear shaft



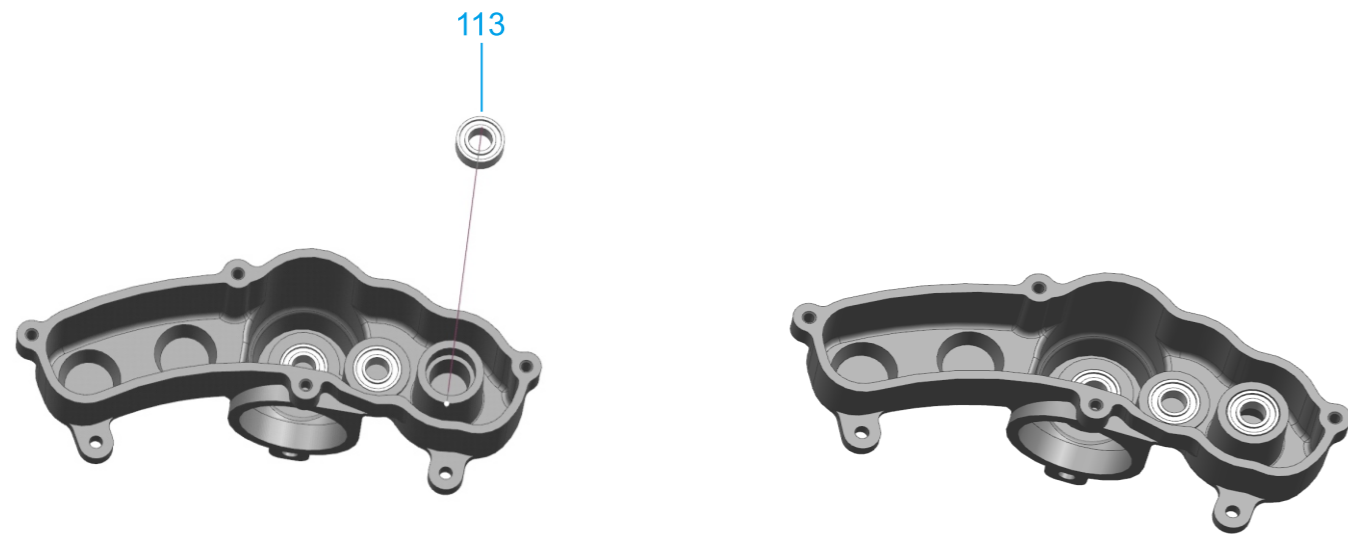
4.7、组装锥齿轴轴承 Assemble the tapered shaft bearing



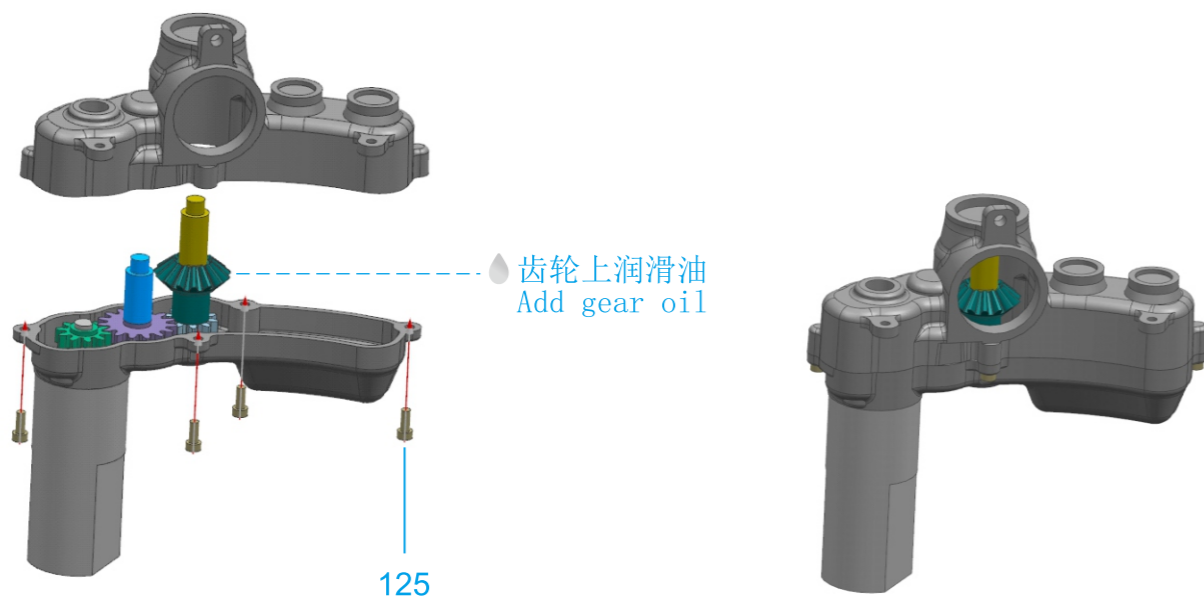
4.8、组装过渡轴轴承 Assemble transition shaft bearings



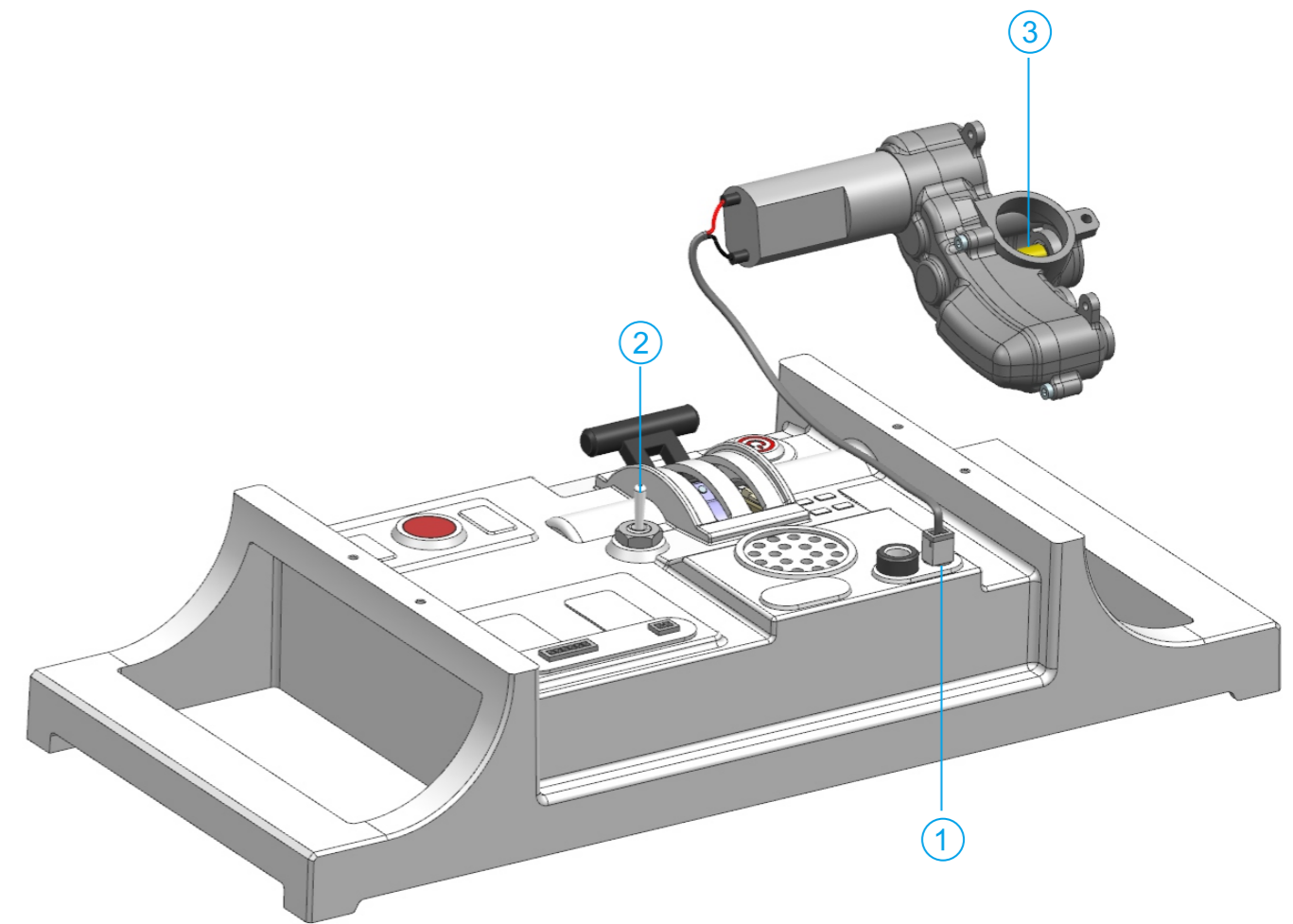
## 4.9、组装电机轴轴承Assembly of motor shaft bearings



## 4.10、组装齿轮箱体Assemble the gearbox body



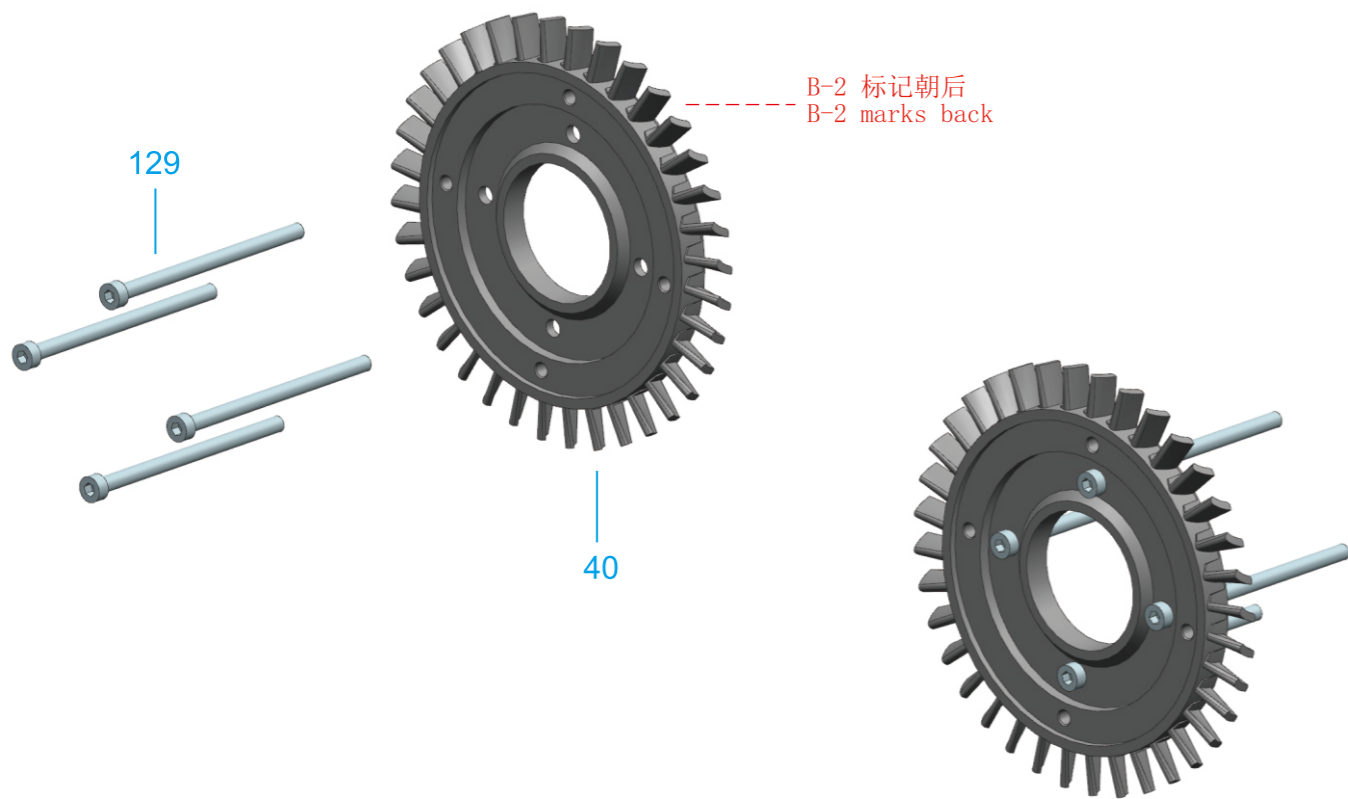
## 4.11、测试Test



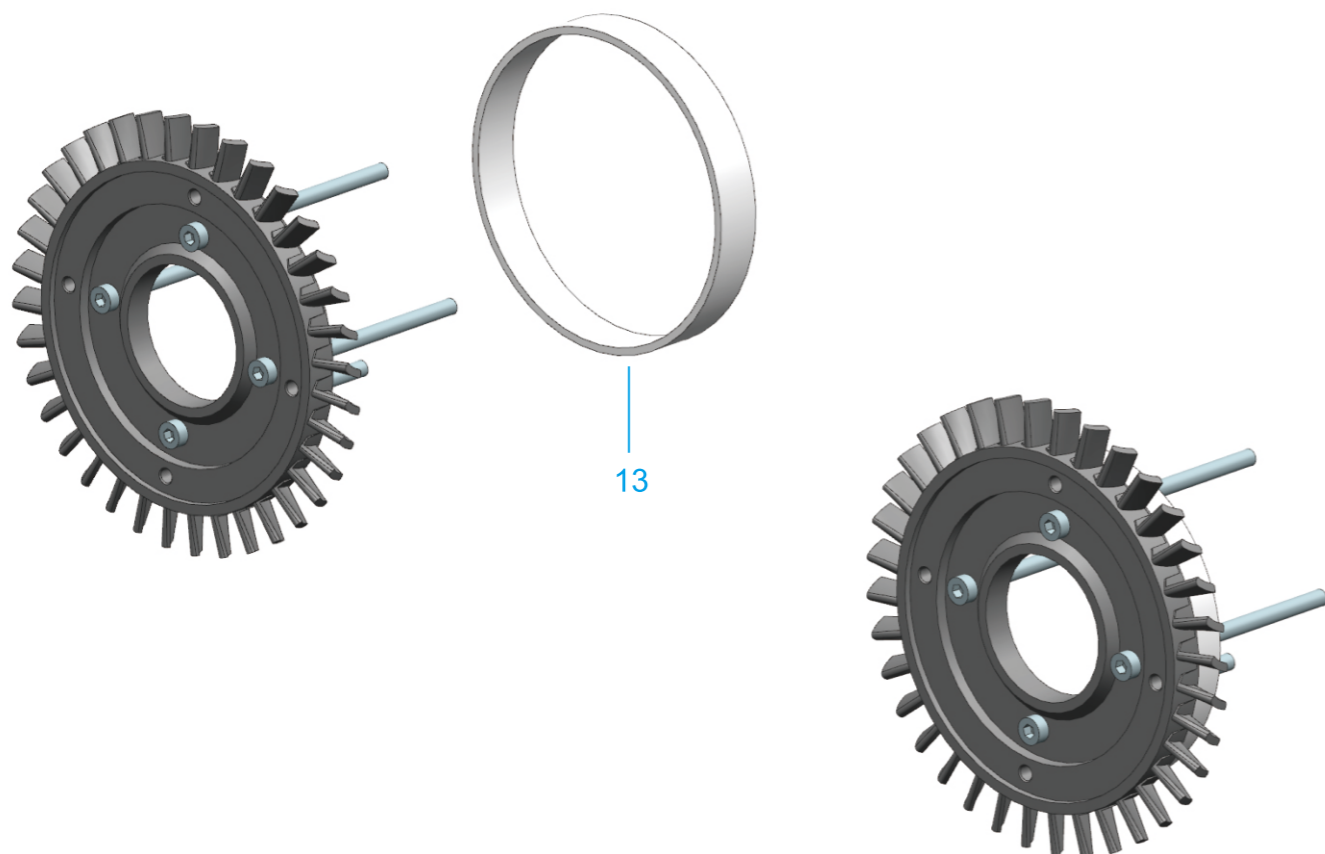
- 1、连接电机线与底座线
- 2、打开总开关
- 3、观察齿轮箱是否正常运行
- 1、 Connect the motor wire to the base wire
- 2、 Turn on the main switch
- 3、 Observe whether the gearbox is operating normally

五、 组装高压气机总成 **Assemble the high-pressure compressor assembly**

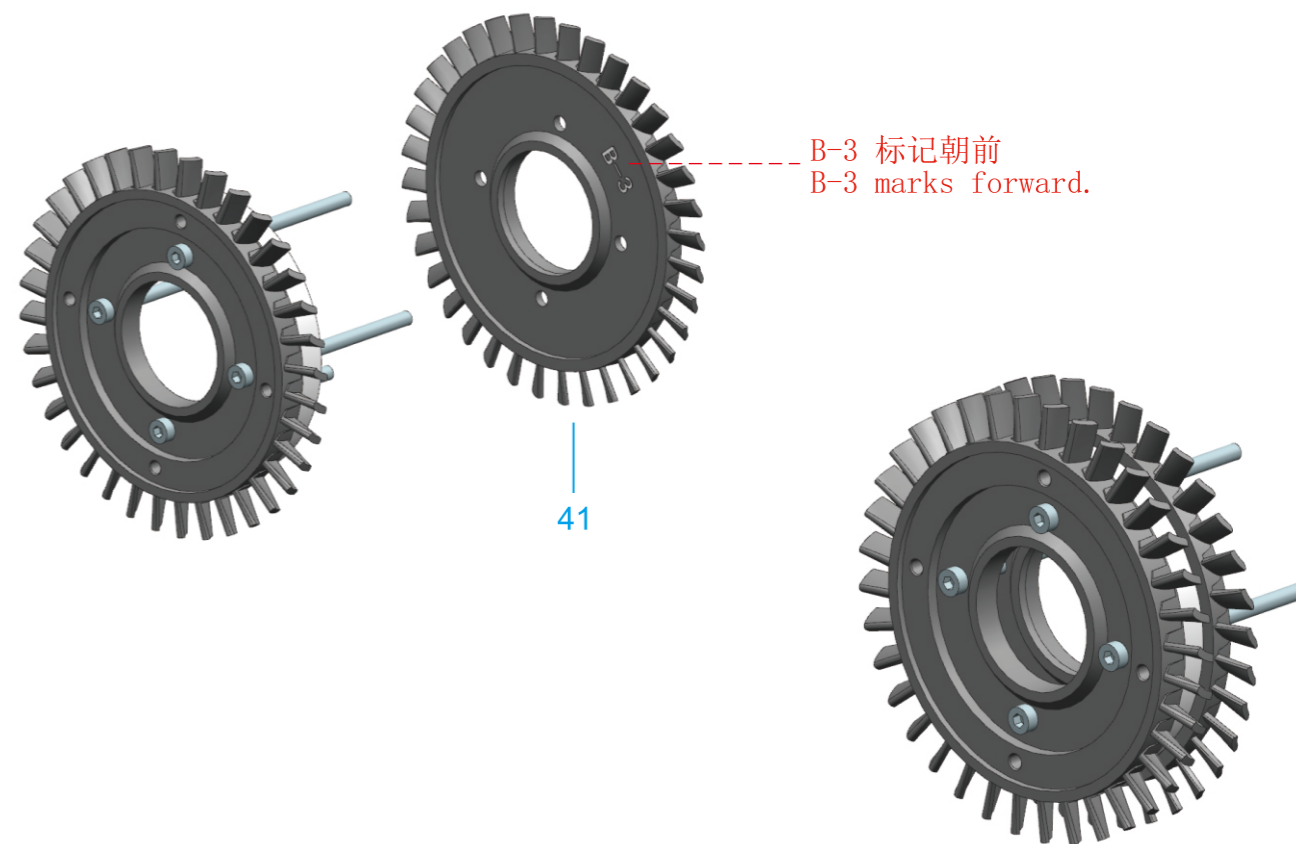
5.1、 组装二级高压转子 **Assemble the secondary high-pressure rotor**



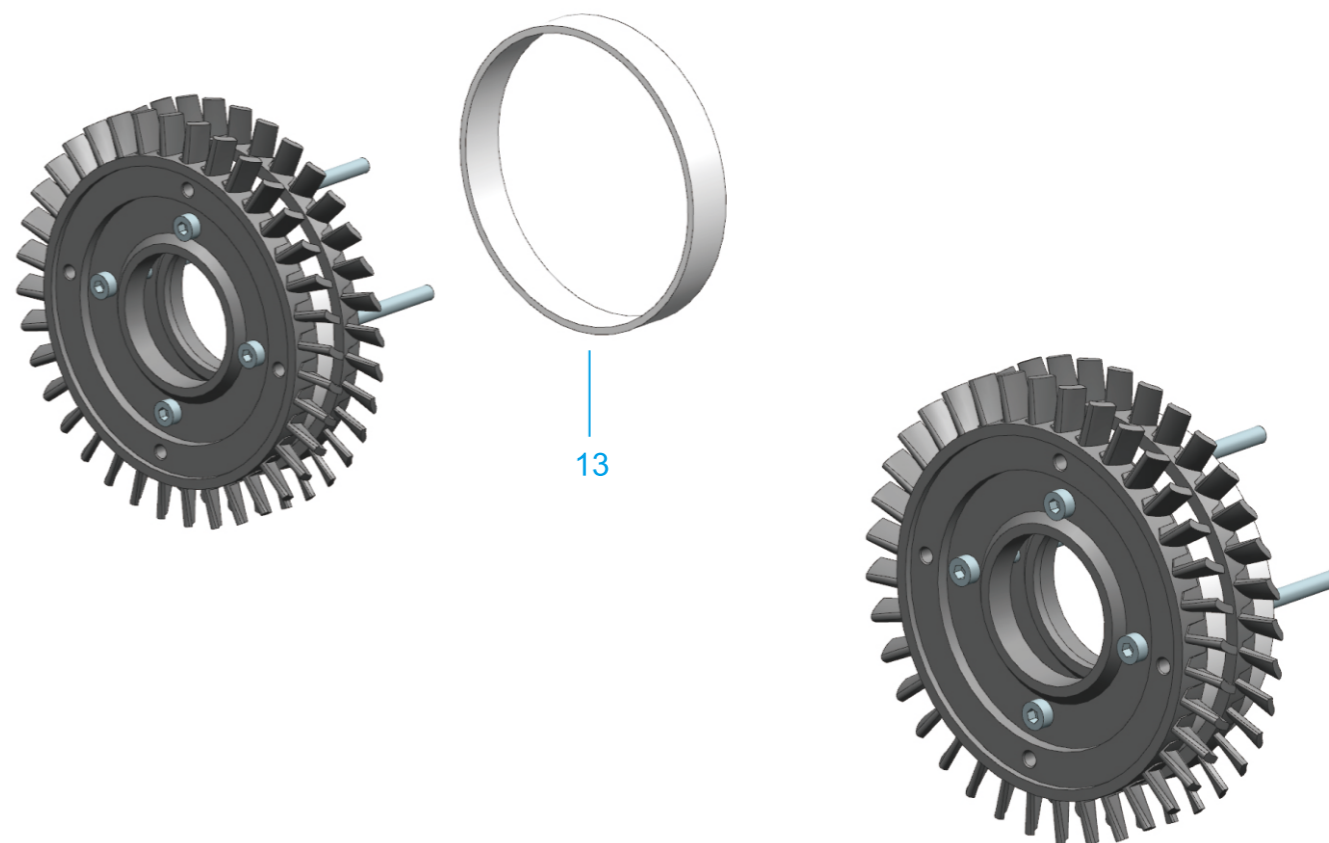
5.2、 组装高压转子连接杆 **Assemble the high-pressure rotor connecting ring**



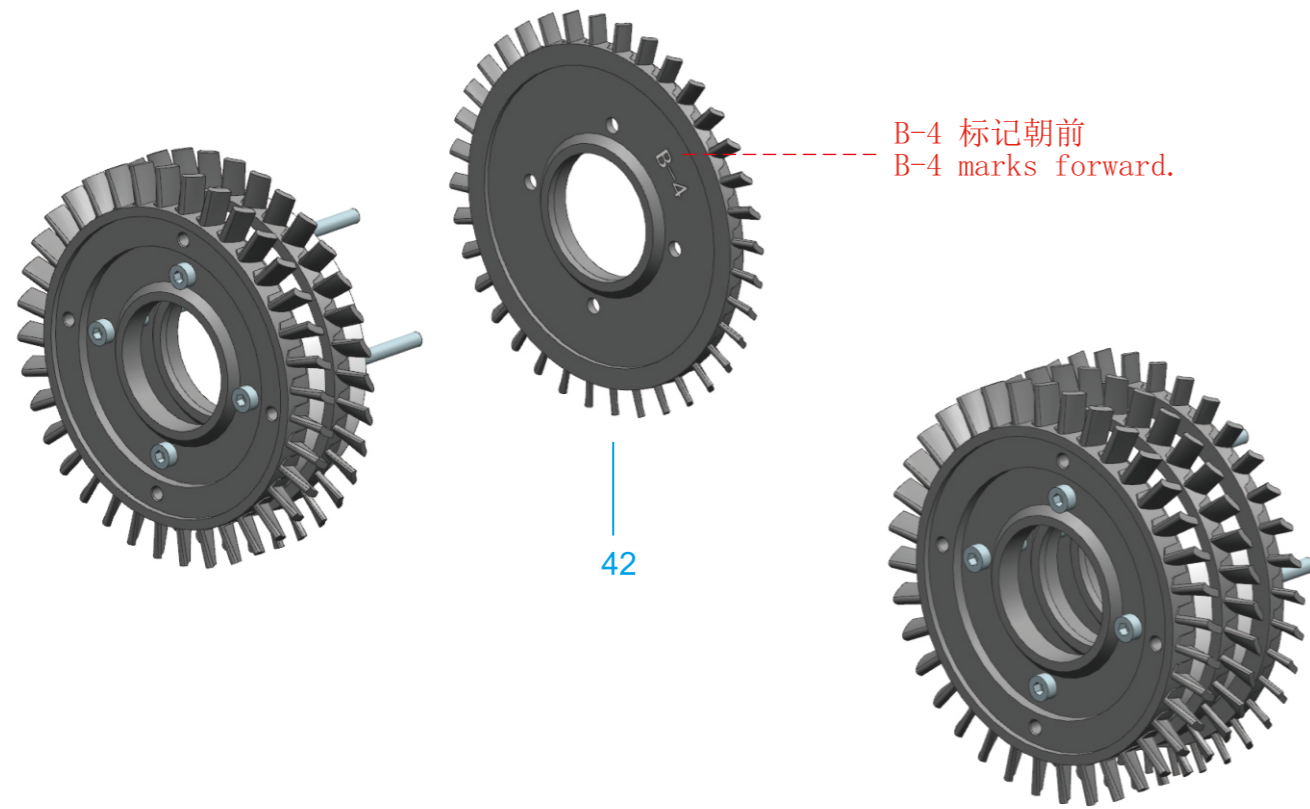
5.3、 组装三级高压转子 **Assemble the three-stage high-pressure rotor**



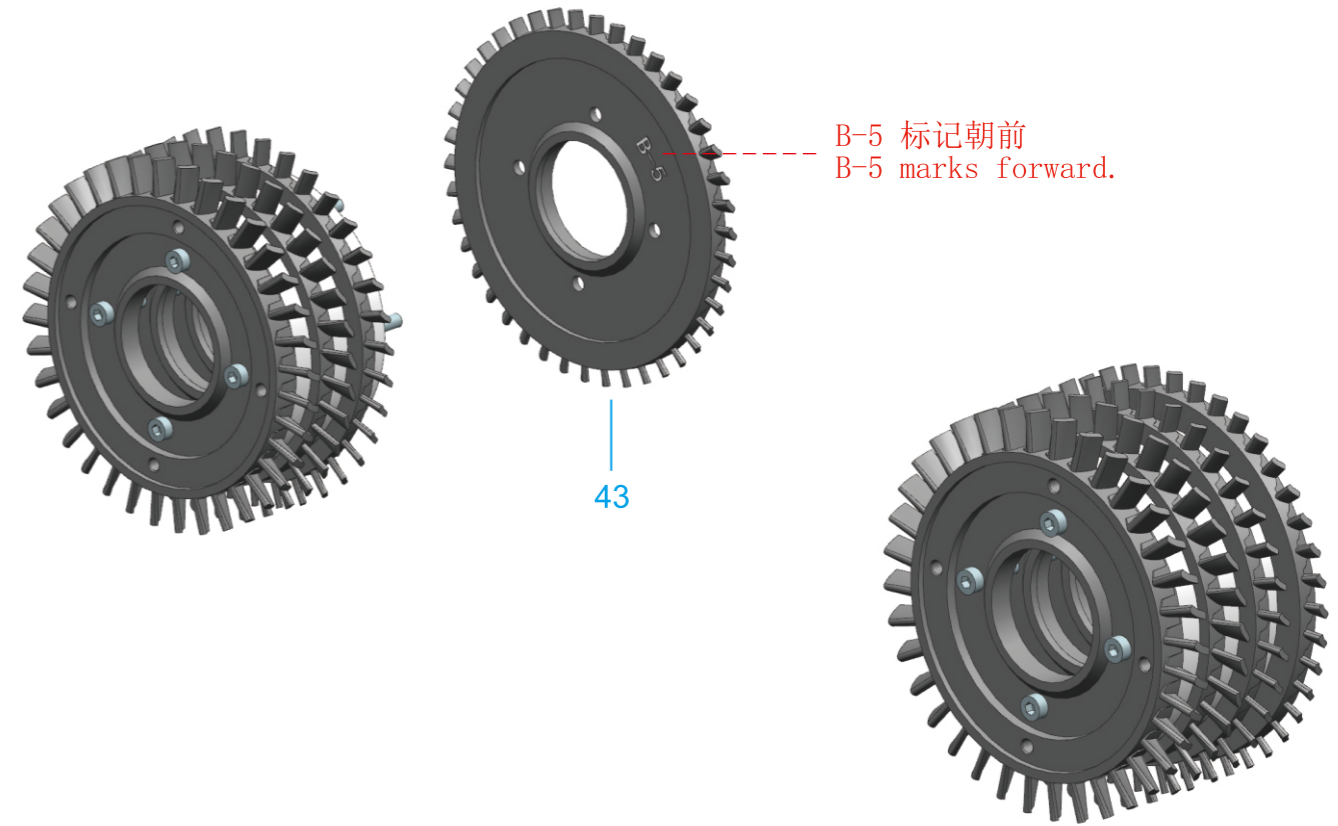
5.4、 组装高压转子连接环 **Assemble the high-pressure rotor connecting ring**



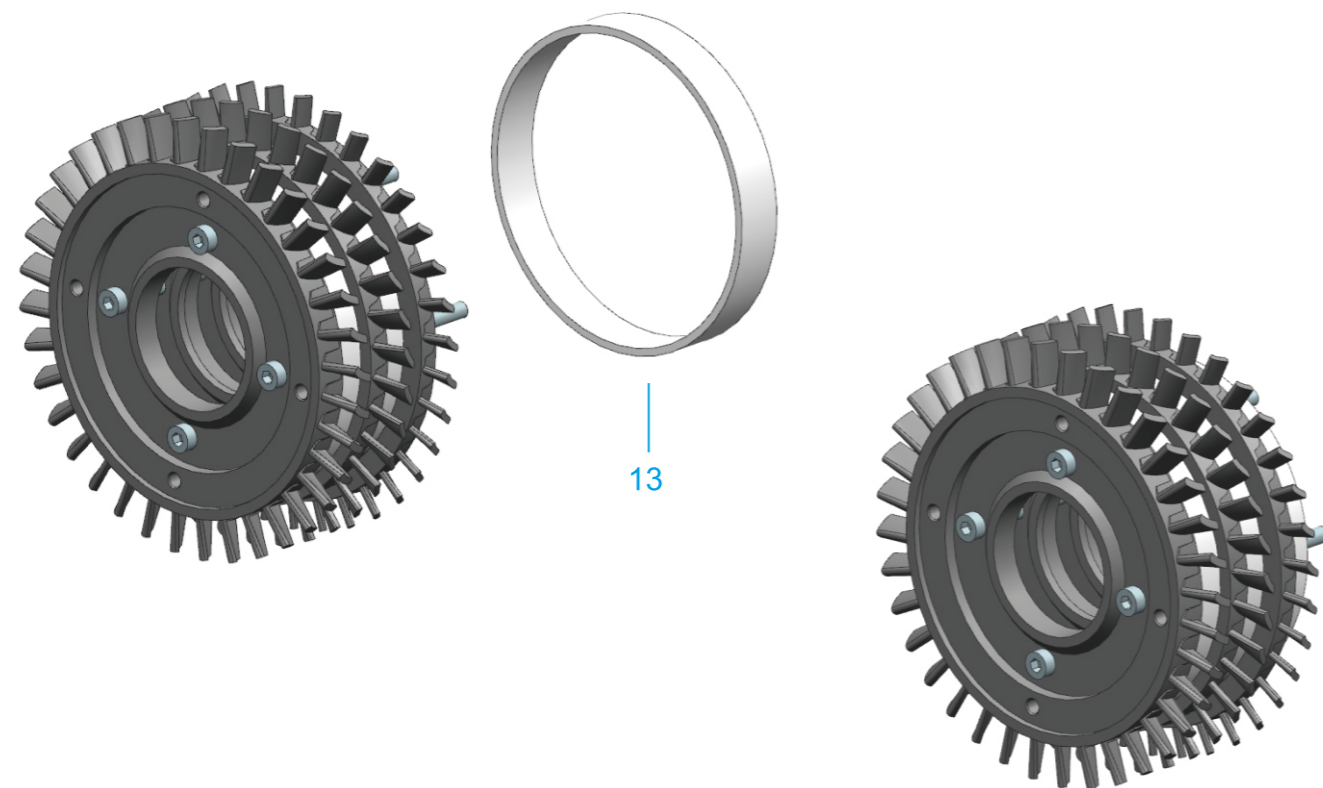
5.5、组装四级高压转子 Assemble the fourth stage high-pressure rotor



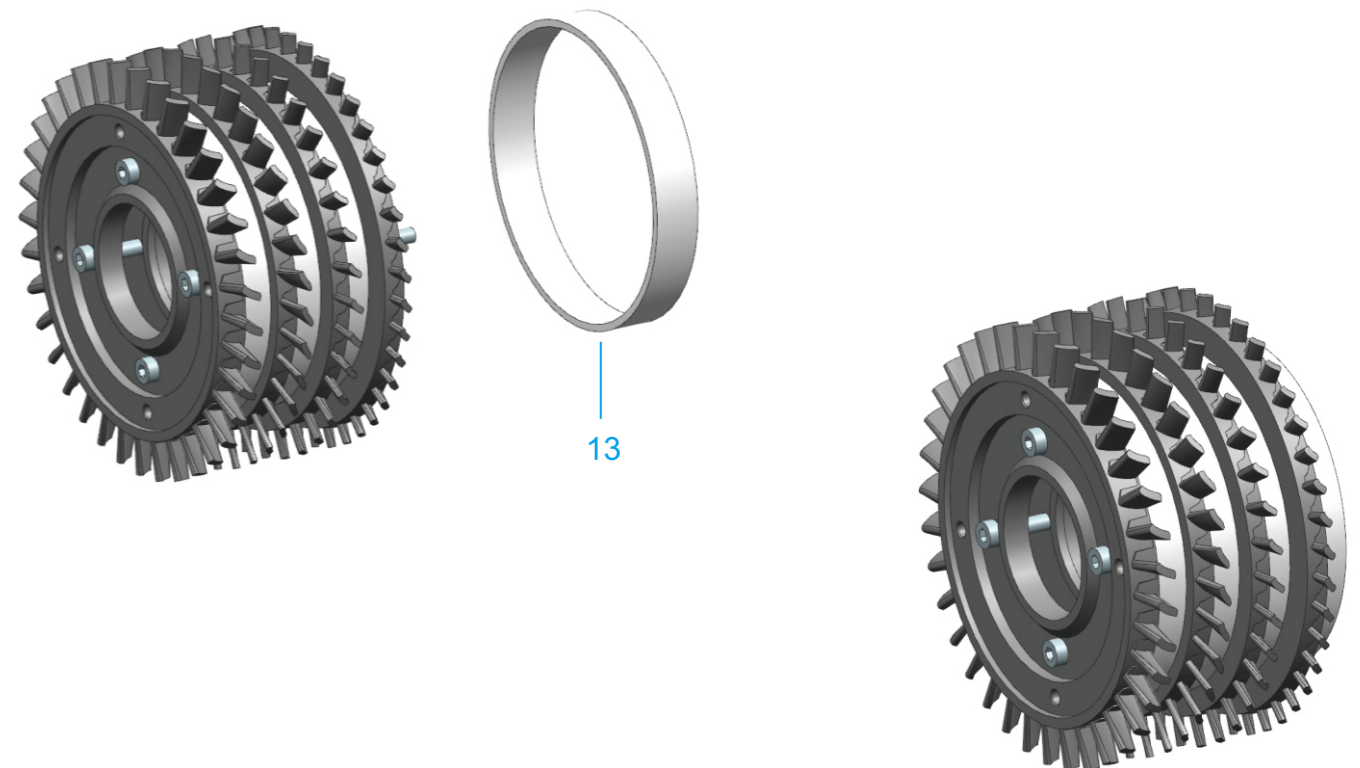
5.7、组装五级高压转子 Assemble the five stage high-pressure rotor



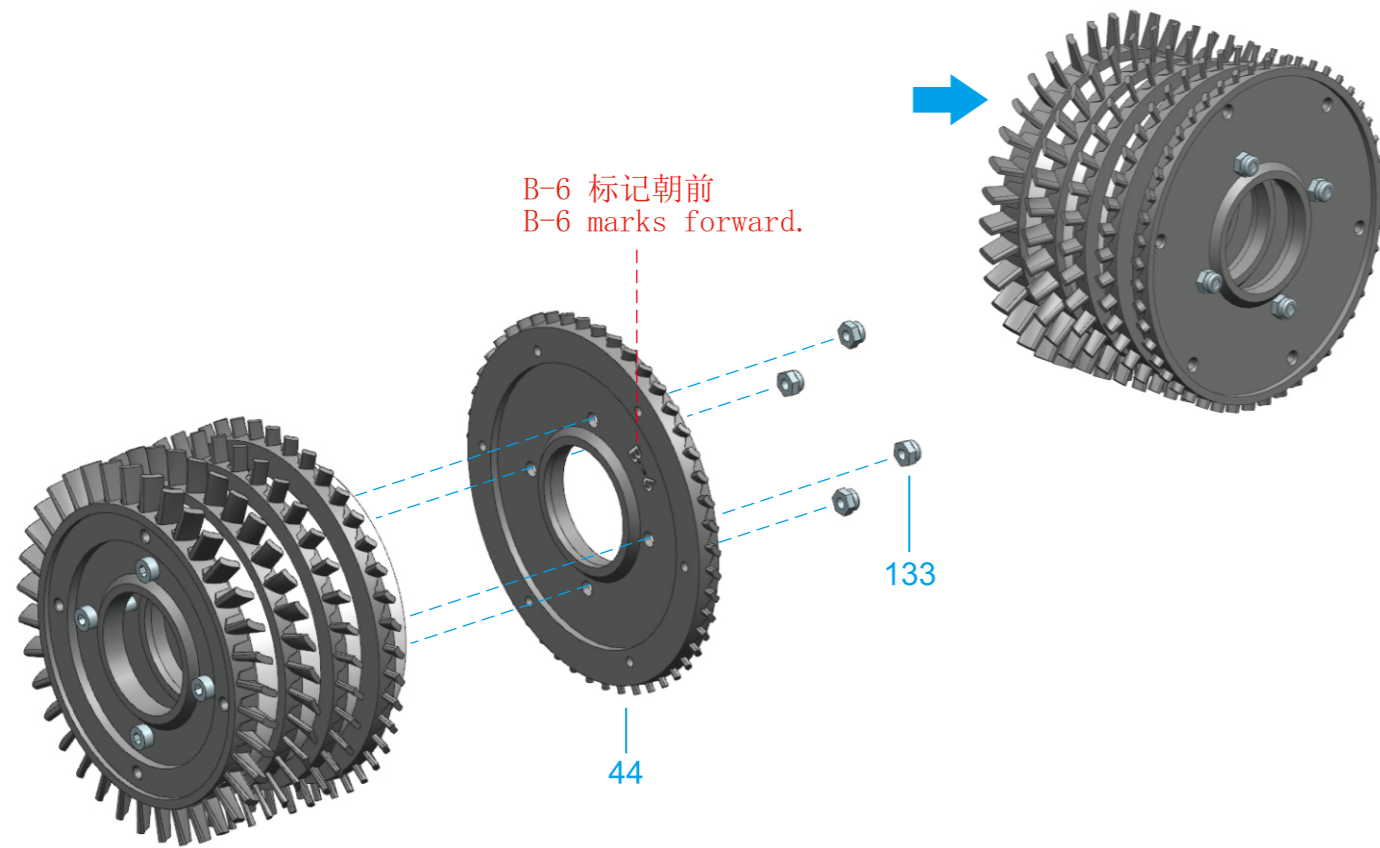
5.6、组装高压转子连接环 Assemble the high-pressure rotor connecting ring



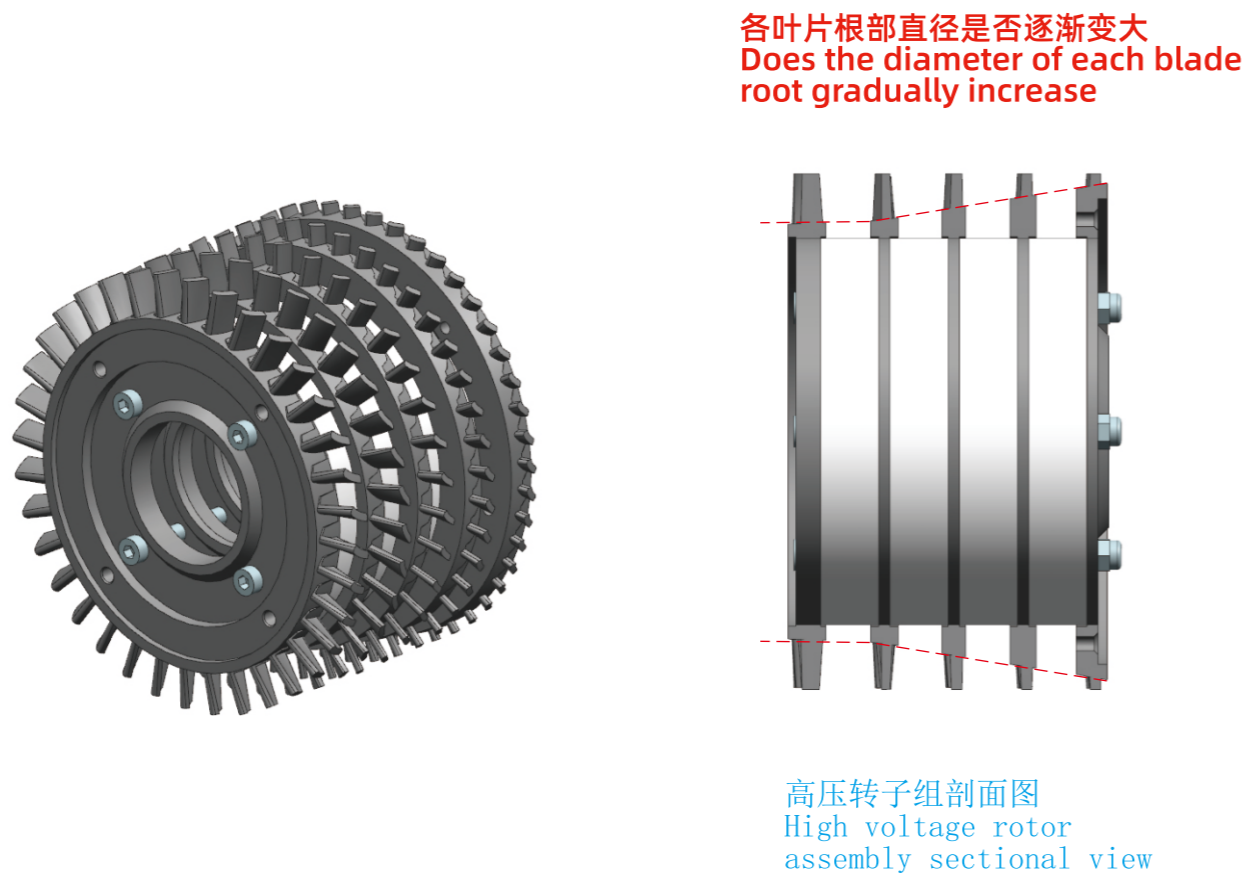
5.8、组装高压转子连接环 Assemble the high-pressure rotor connecting ring



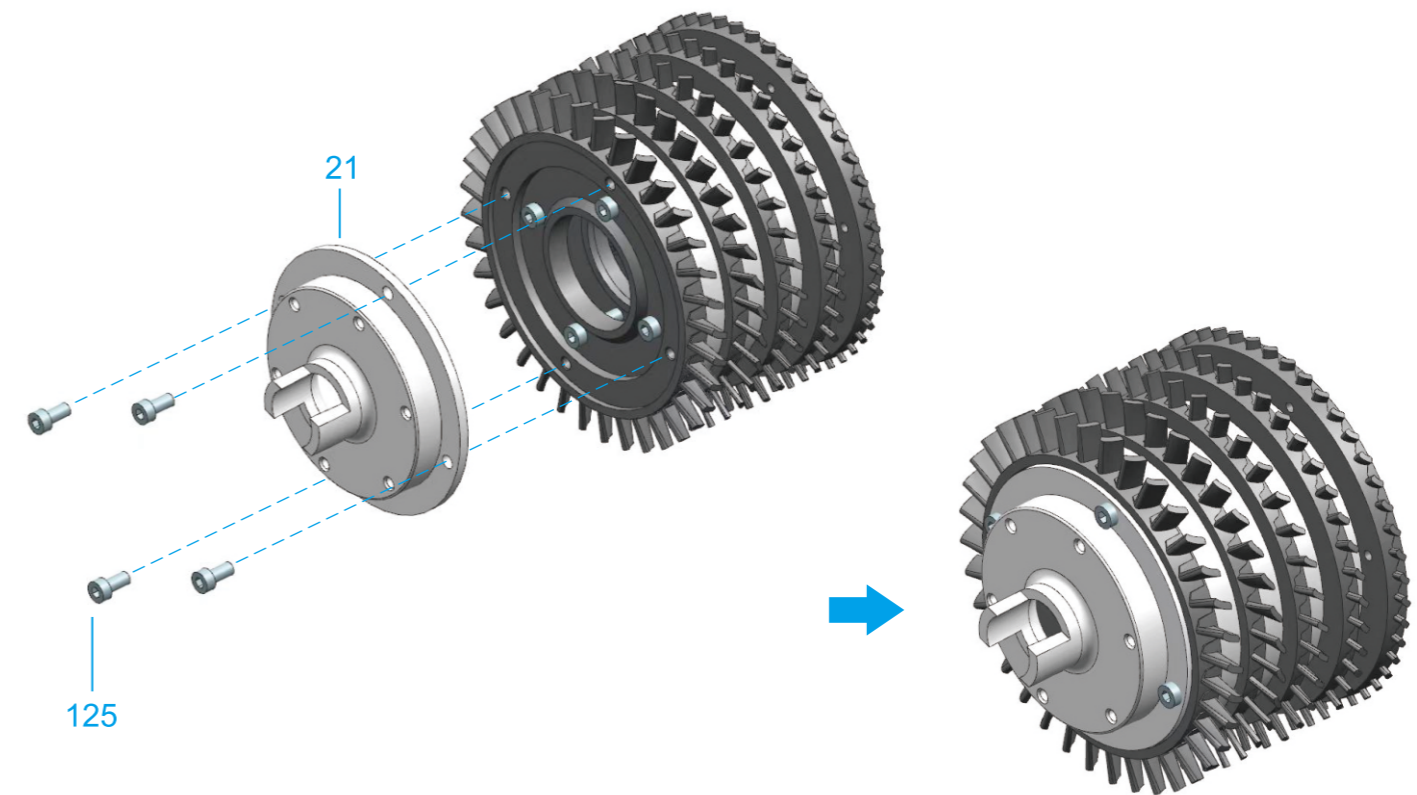
## 5.9、组装六级高压转子 Assemble the six stage high-pressure rotor



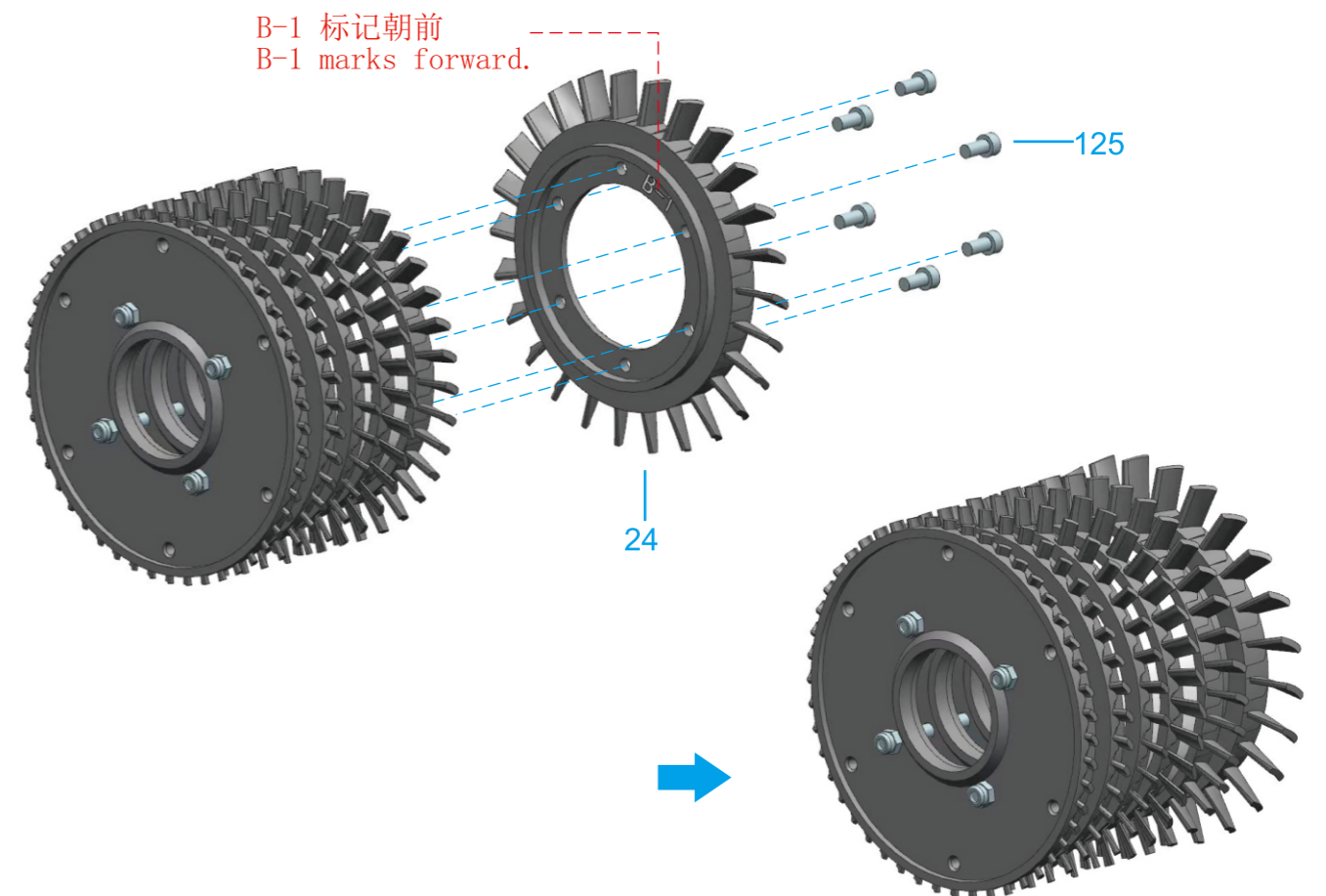
## 5.10、检查 Inspect



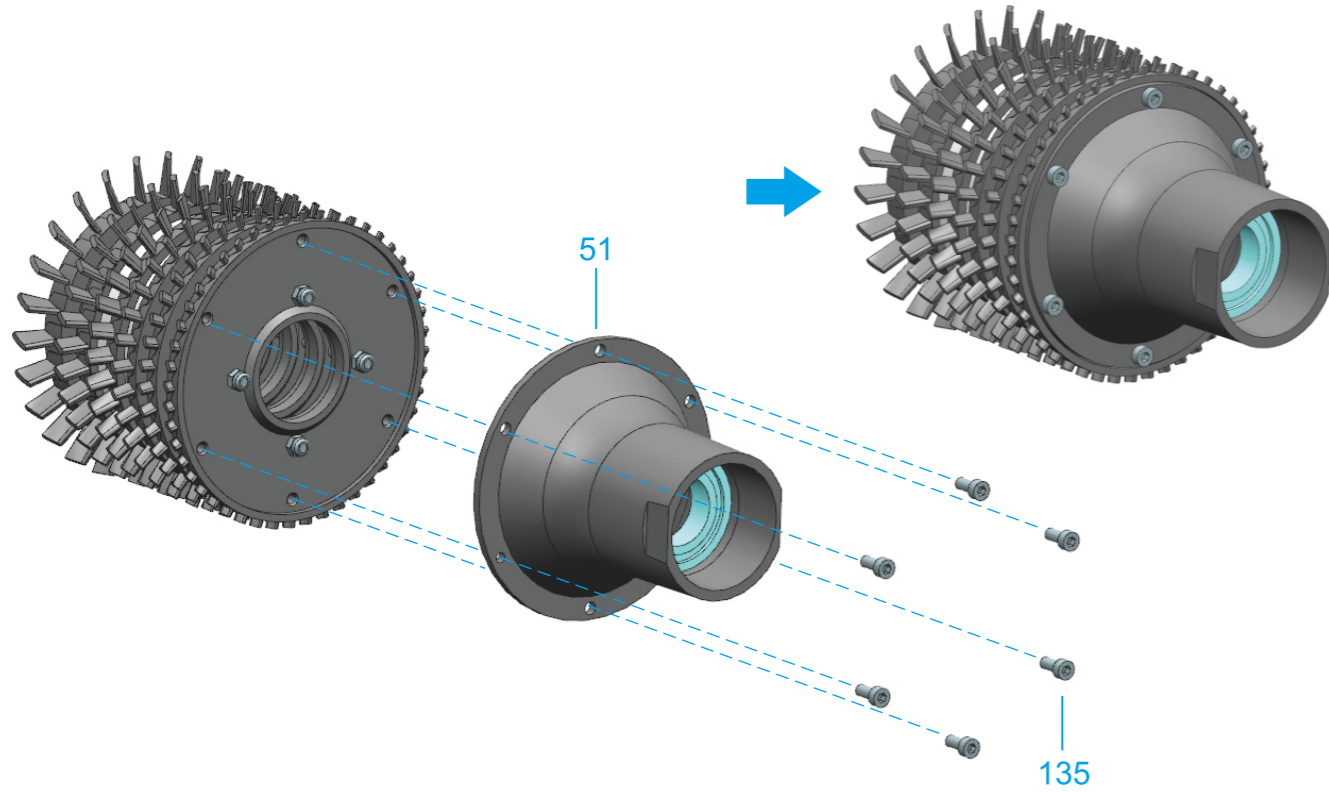
## 5.11、组装高压气机前盘 Assemble the front plate of the high-pressure compressor



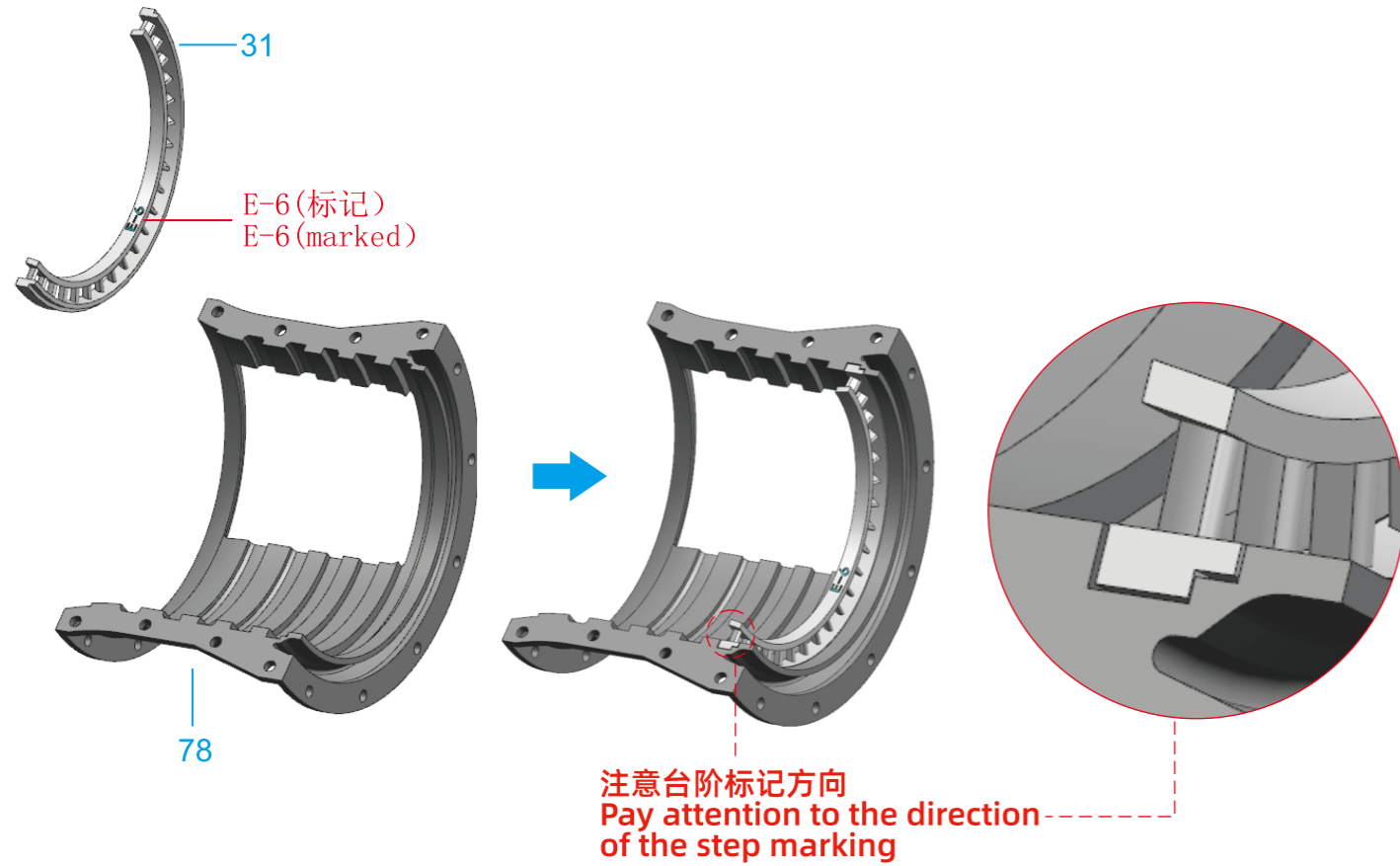
## 5.12、组装一级高压转子 Assemble the first stage high-pressure rotor



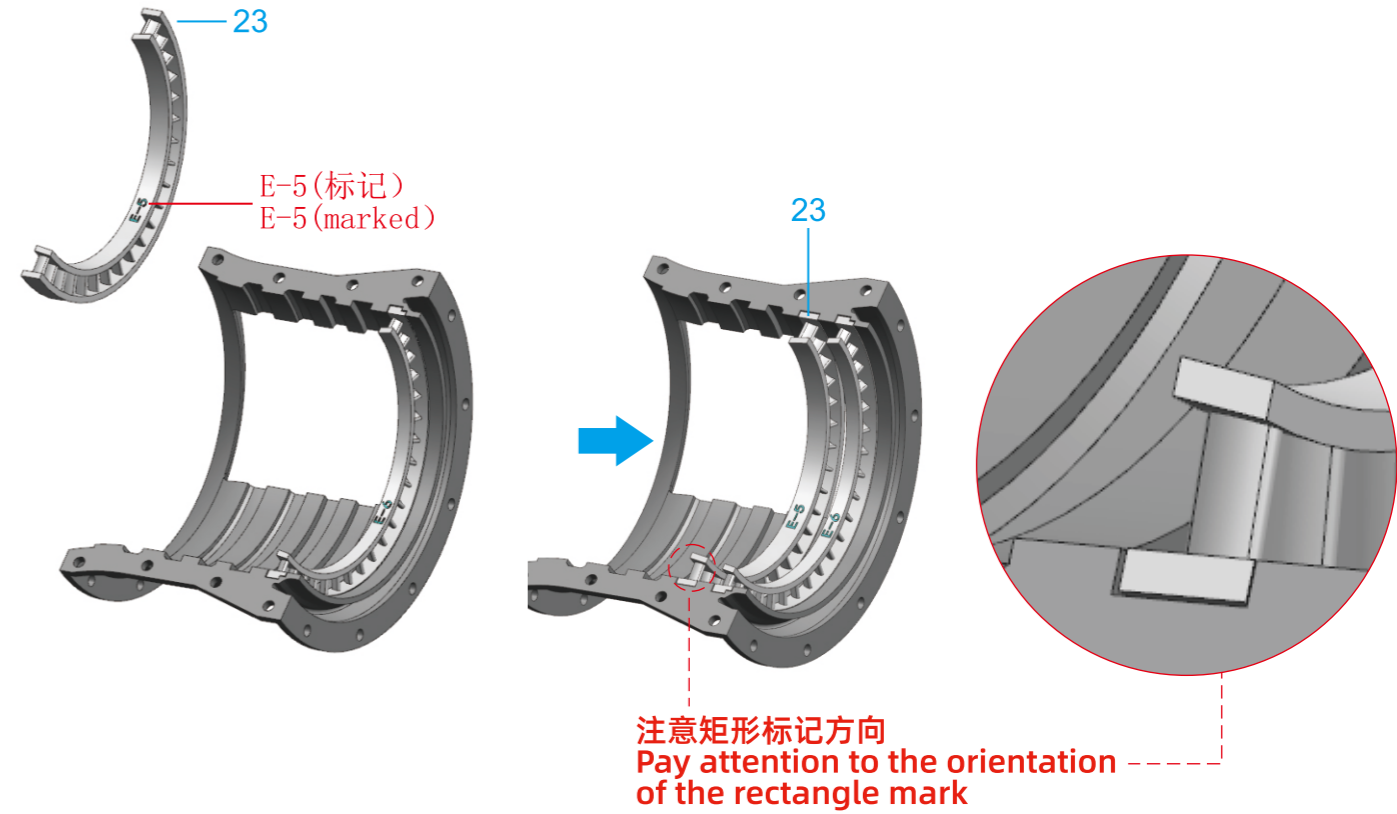
5.13、组装高压转子后盘 Assemble the high-pressure rotor rear plate



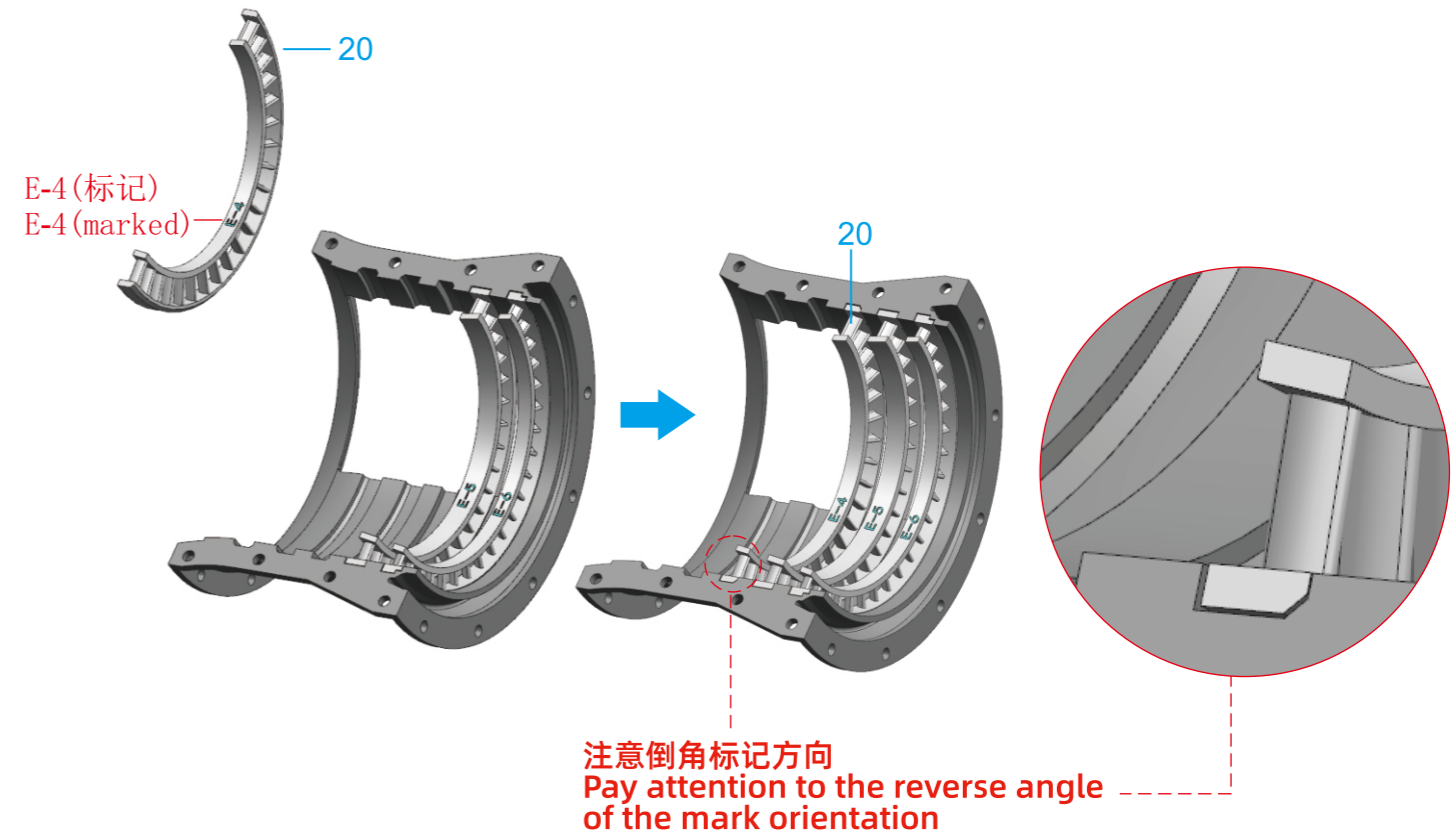
5.14、组装上机匣六级高压静子 Assemble the upper receiver six stage high-pressure stator



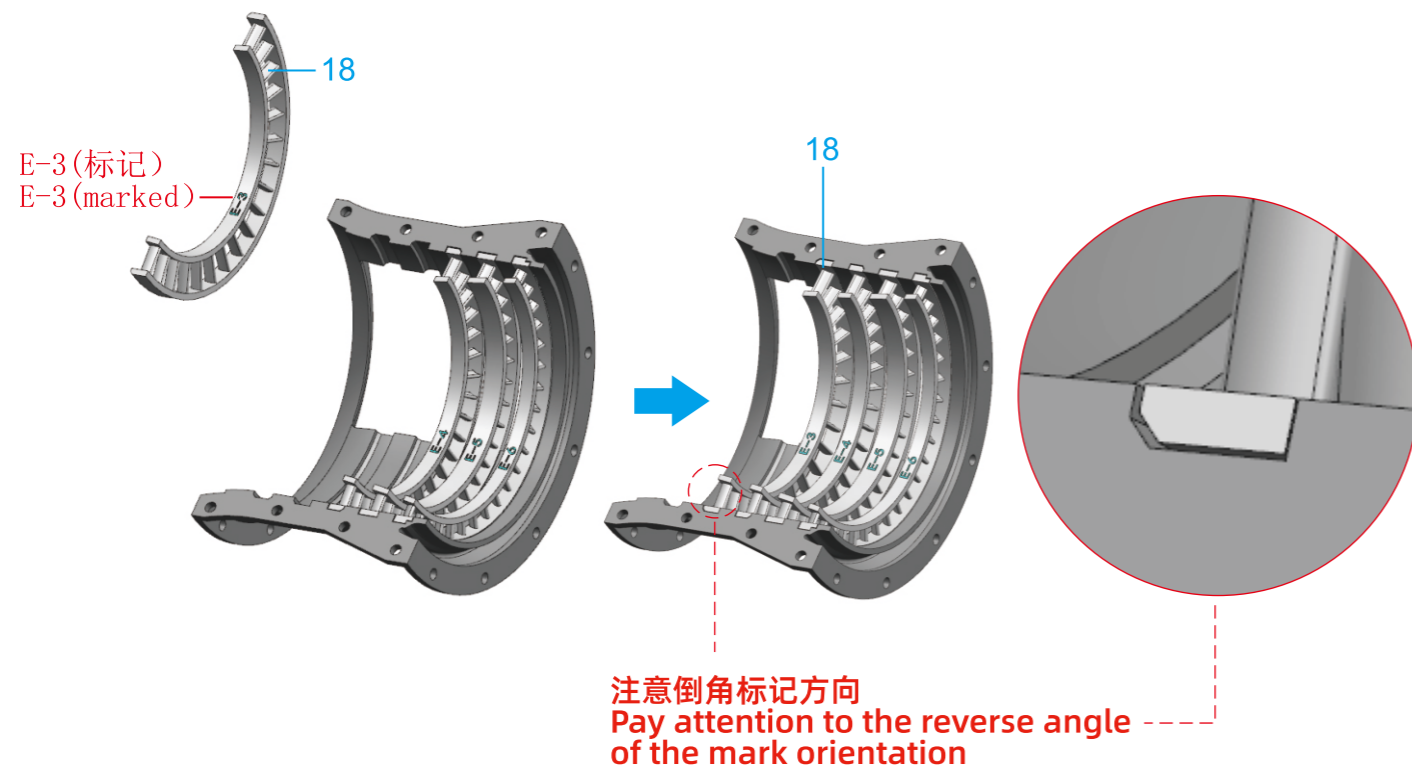
5.15、组装上机匣五级高压静子 Assemble the upper receiver with a five stage high-pressure stator



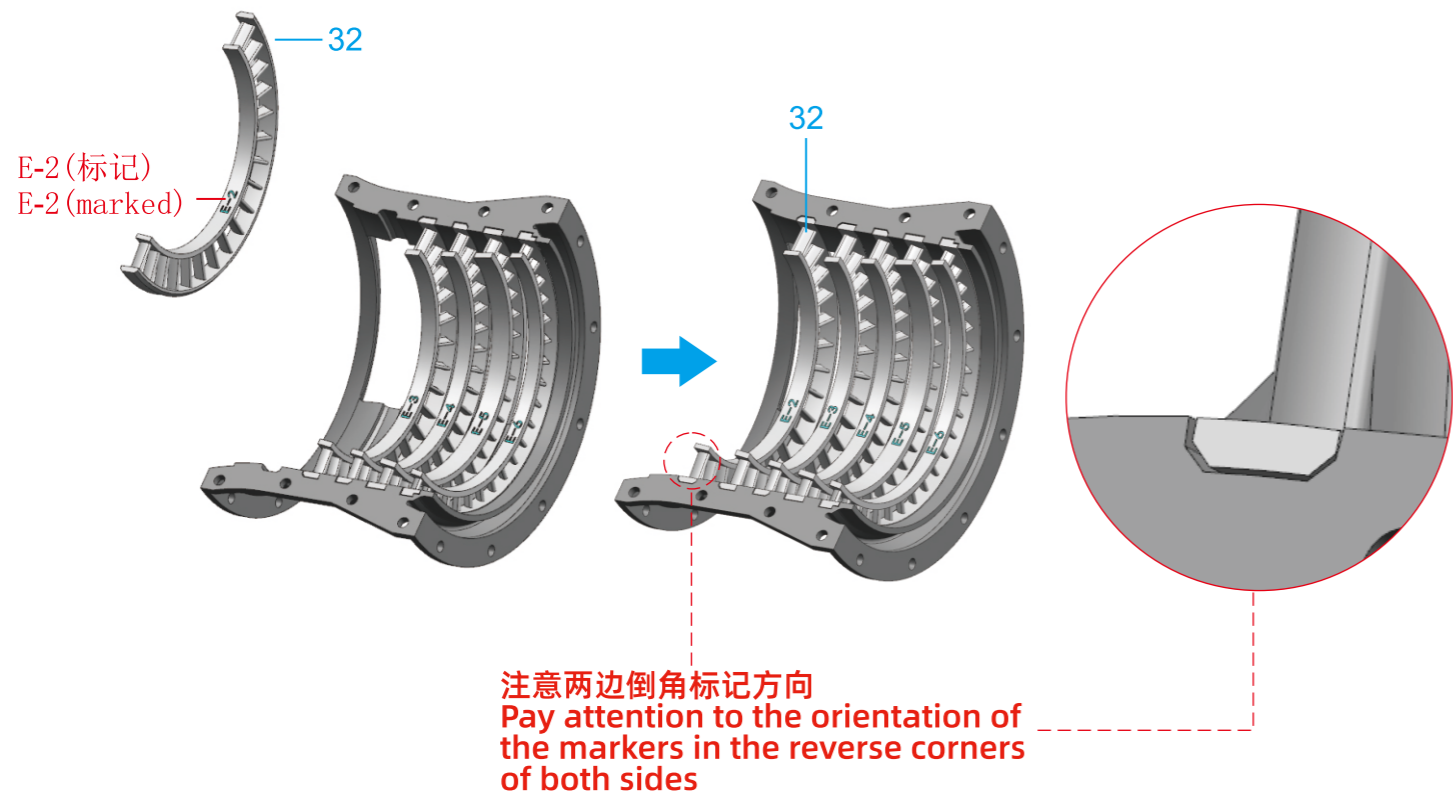
5.16、组装上机匣四级高压静子 Assemble the fourth stage high-pressure stator of the upper casing



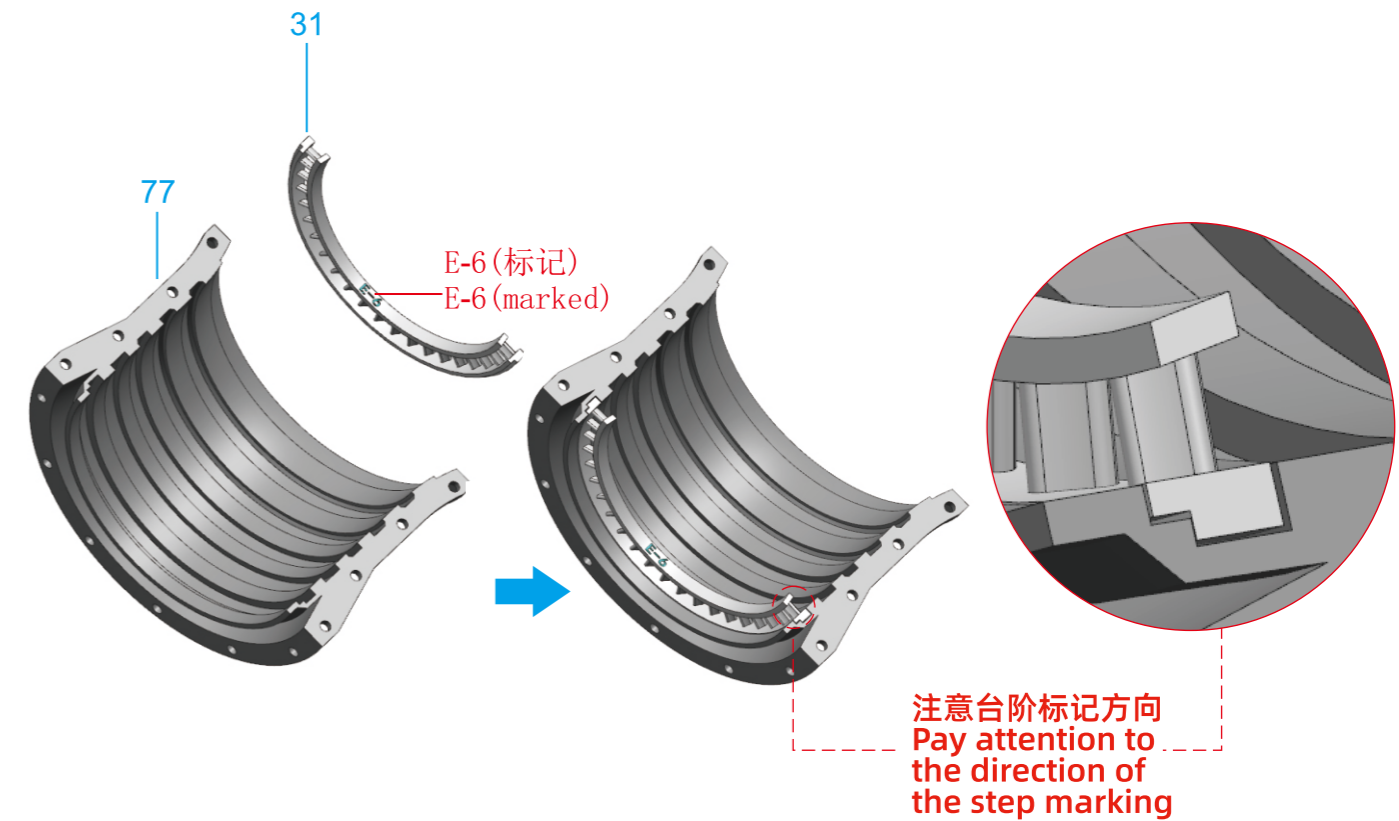
5.17、组装上机匣三级高压静子 Assemble the three-stage high-pressure stator on the upper casing



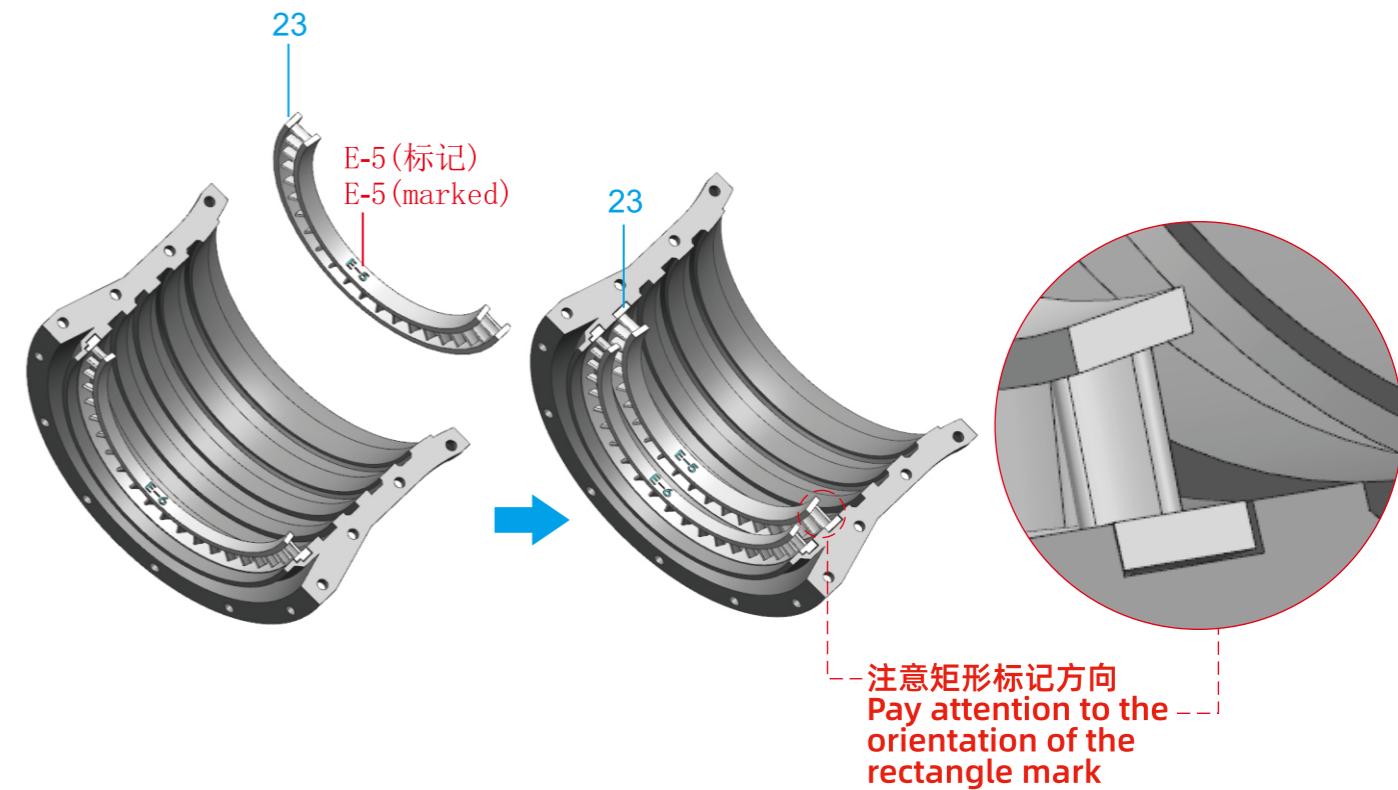
5.18、组装上机匣二级高压静子 Assemble the second stage high-pressure stator of the upper casing



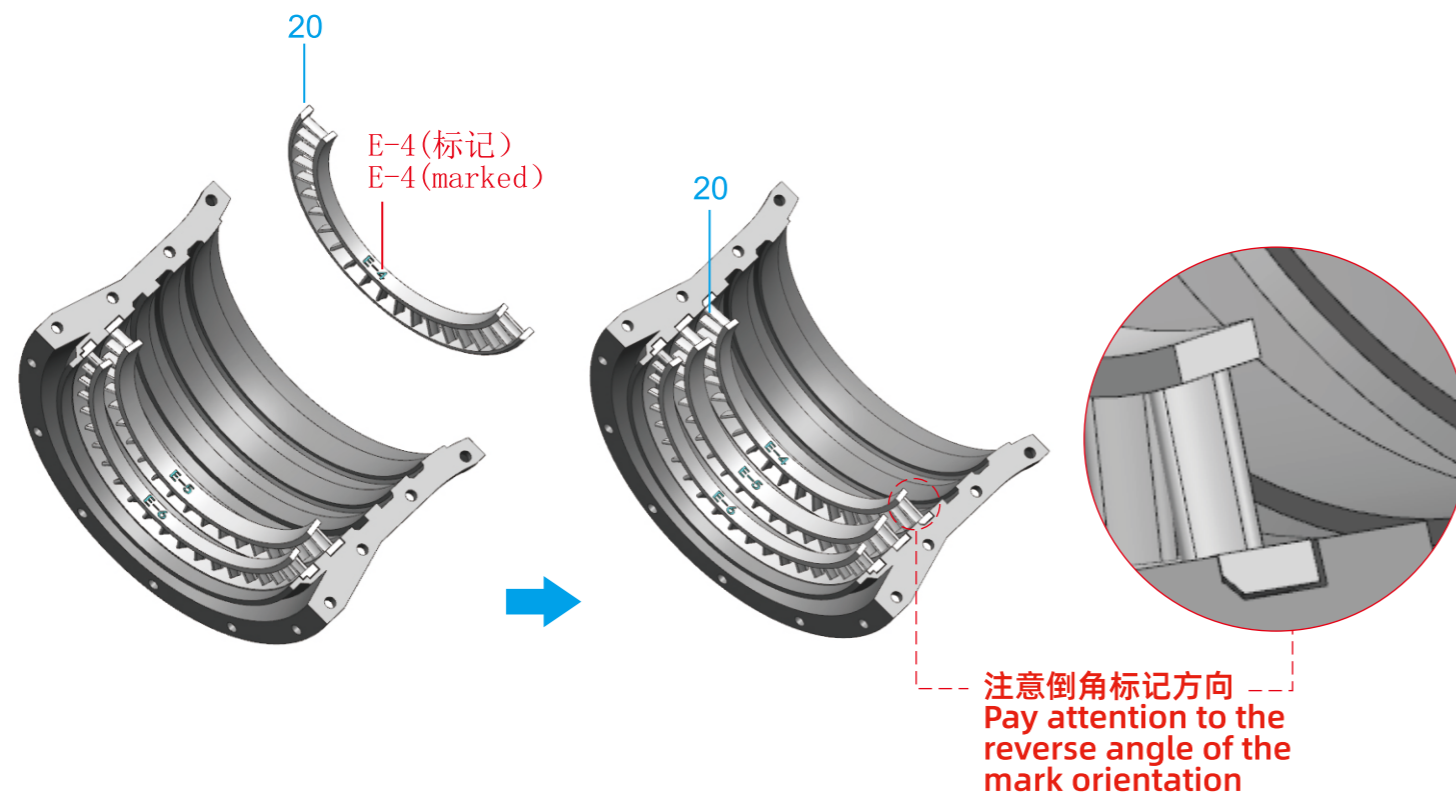
5.19、组装下机匣六级高压静子 Assemble the six stage high-pressure stator of the lower receiver



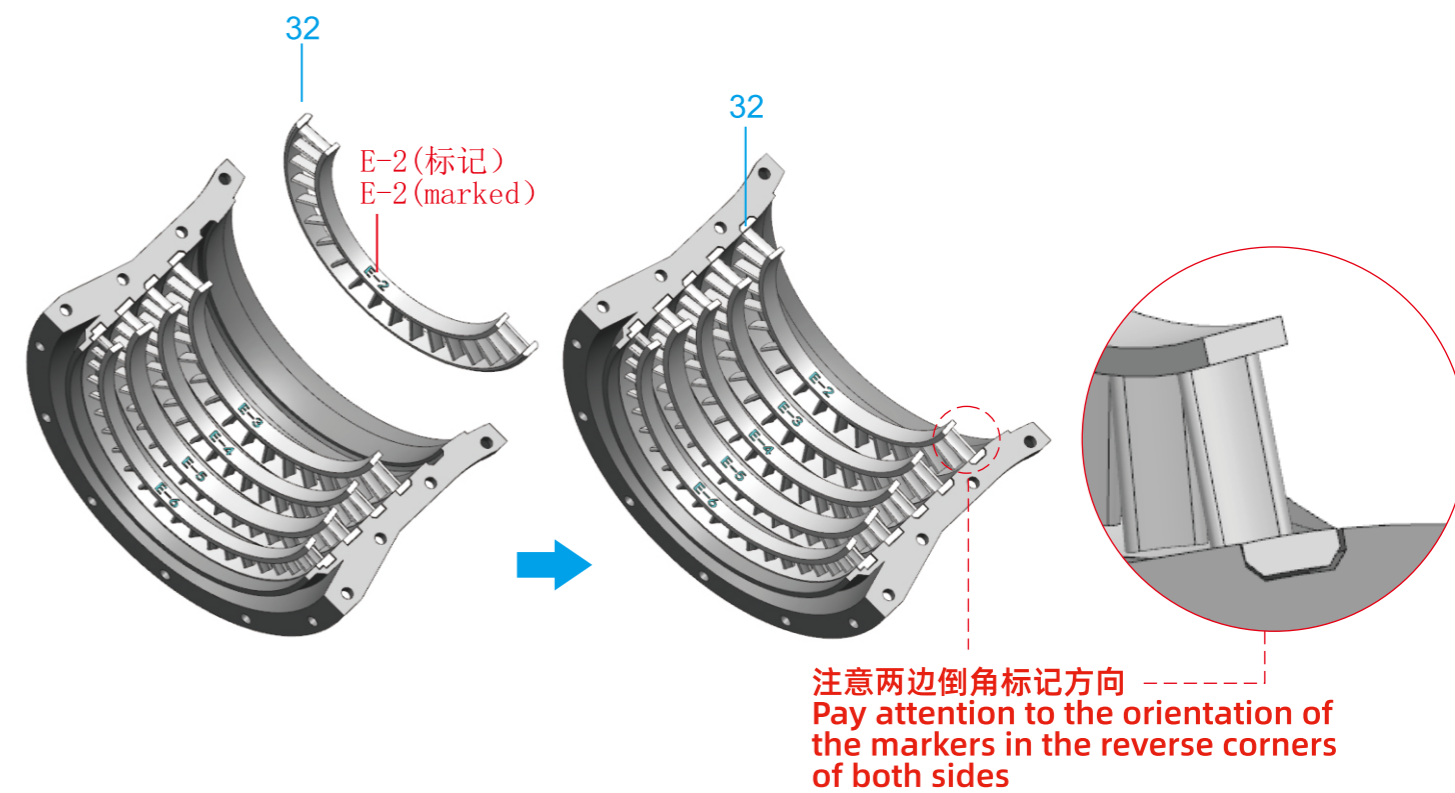
5.20、组装下机匣五级高压静子 Assemble the fifth stage high-pressure stator of the lower receiver



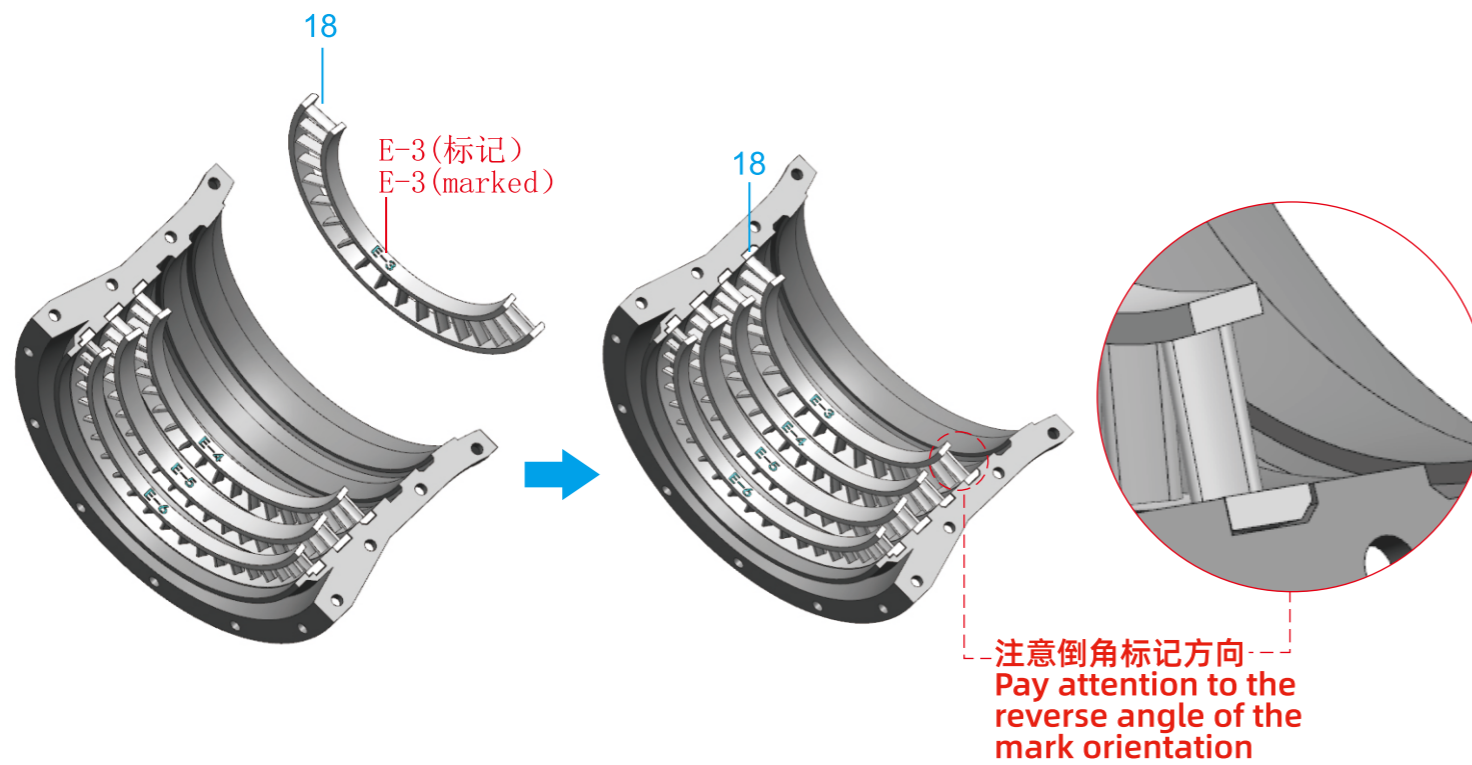
5.21、组装下机匣四级高压静子 Assemble the fourth stage high-pressure stator of the lower receiver



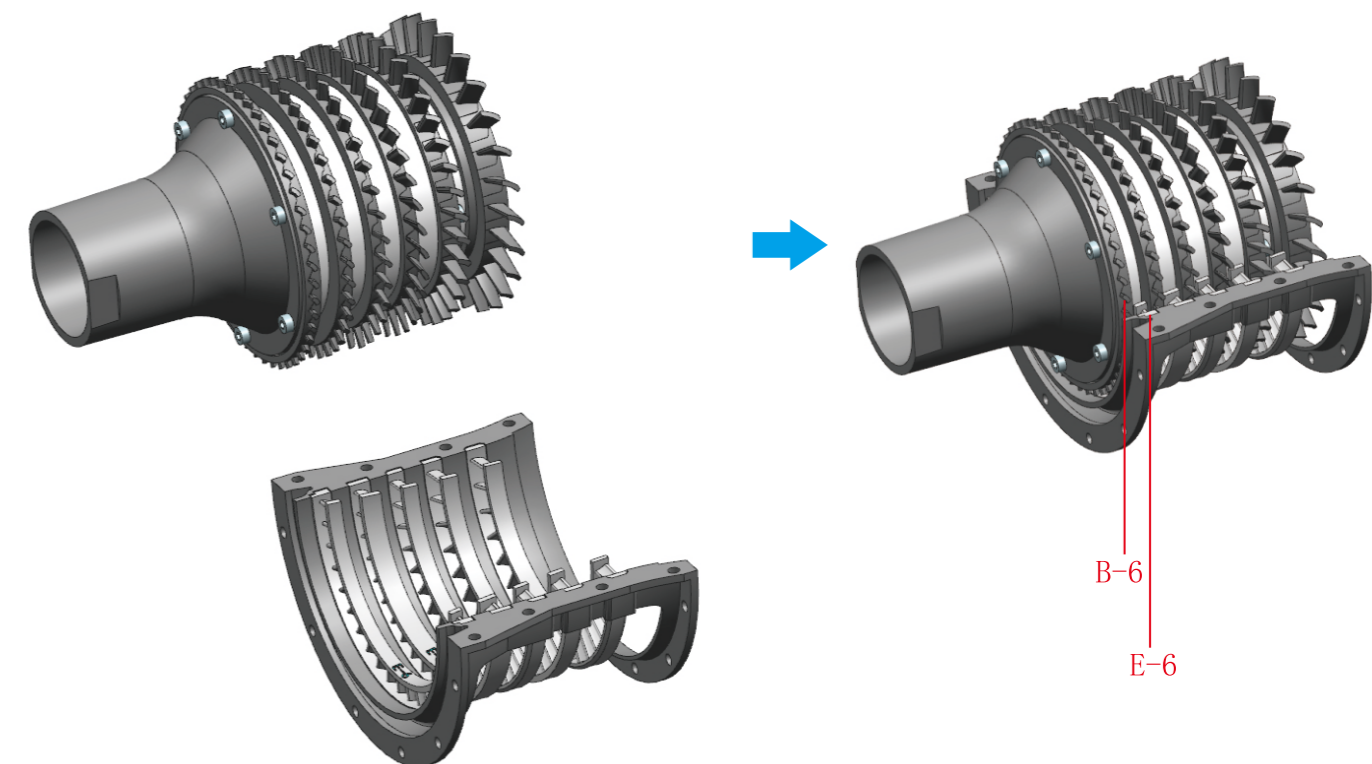
5.23、组装下机匣二级高压静子 Assemble the second stage high-pressure stator of the lower receiver



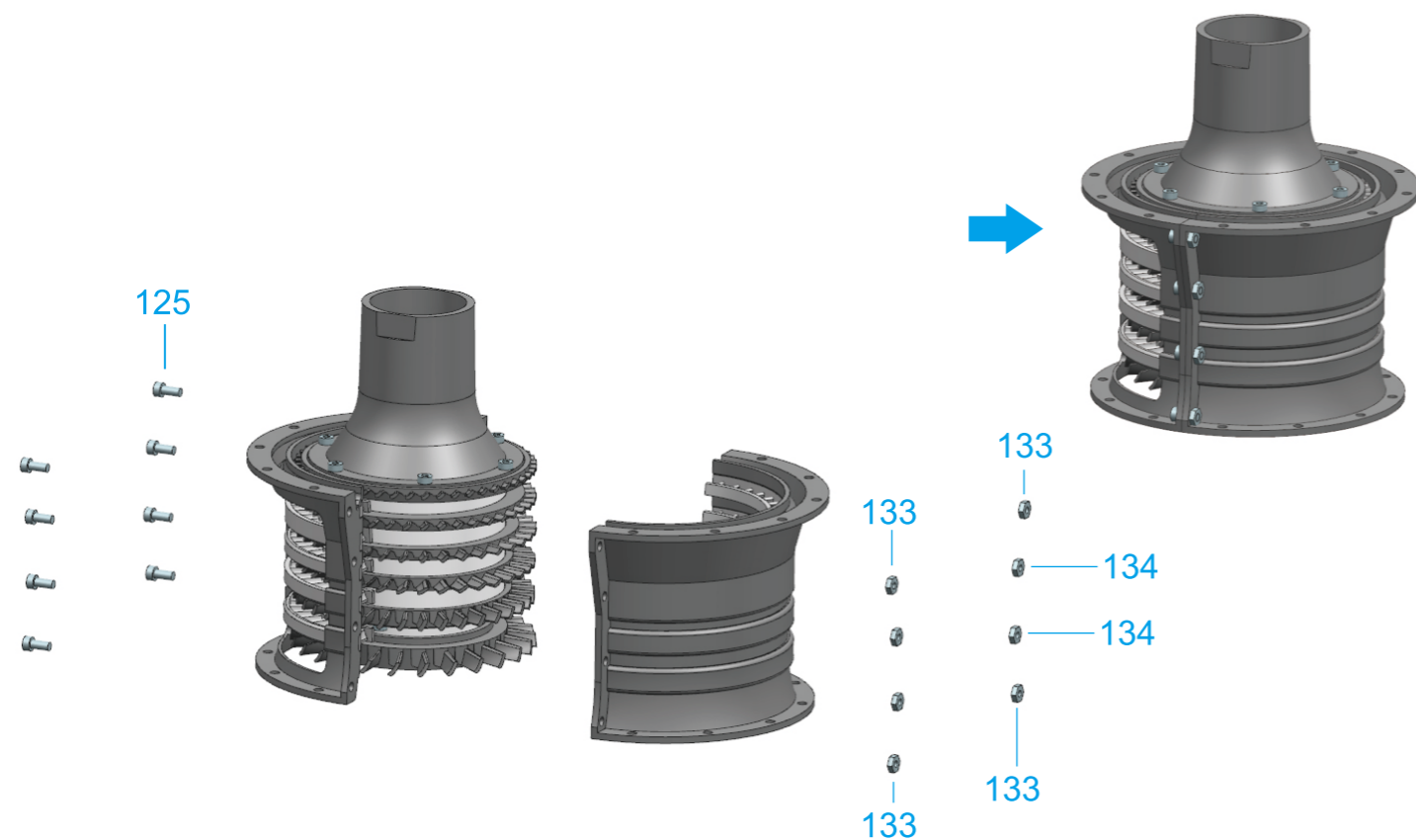
5.22、组装下机匣三级高压静子 Assemble the three-stage high-pressure stator of the lower receiver



5.24、组装高压气机上机匣 Assemble the upper casing of high-pressure compressor

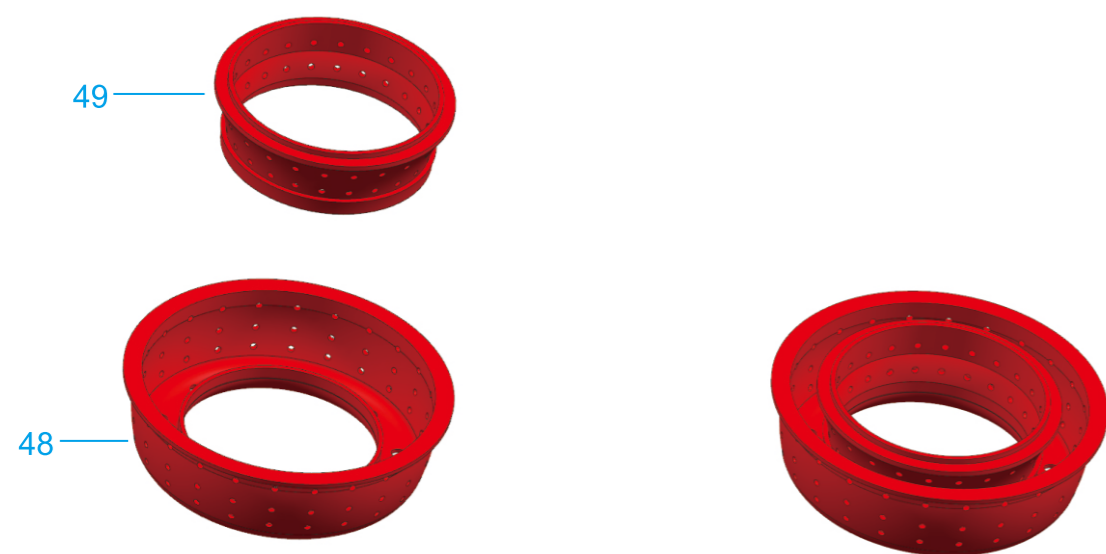


## 5.25、组装高压气机下机匣 Assemble the lower casing of high-pressure compressor

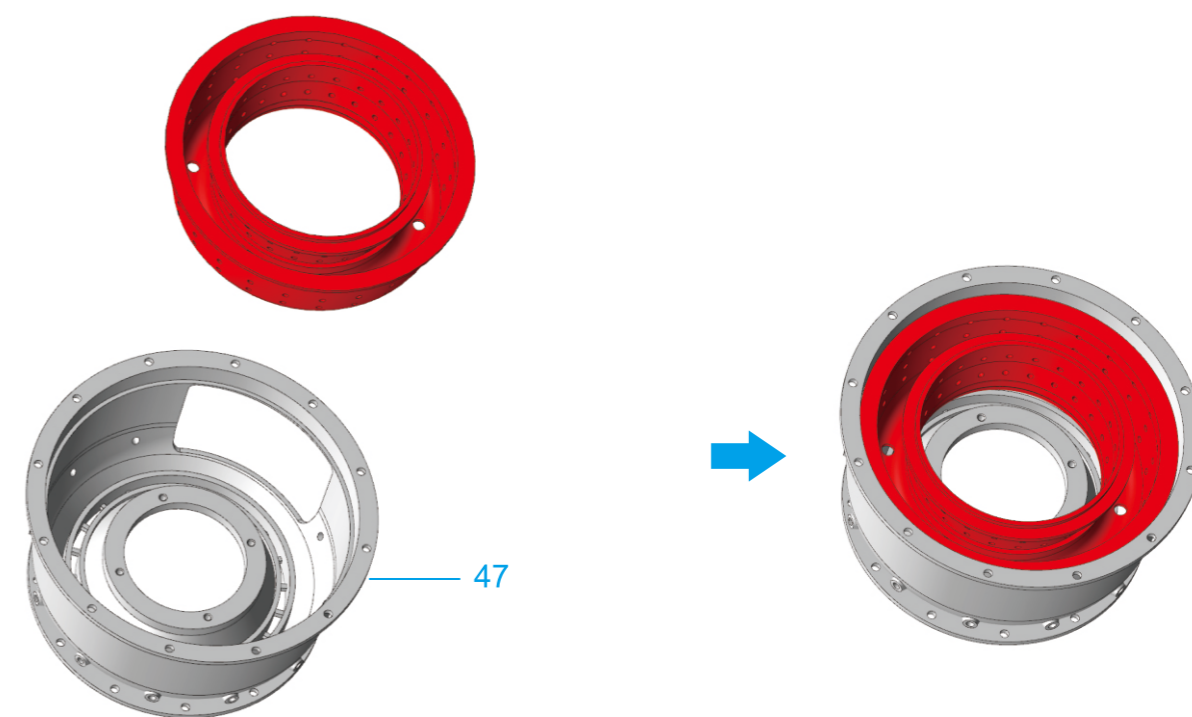


## 六、组装燃烧室总成 Assemble the combustion chamber assembly

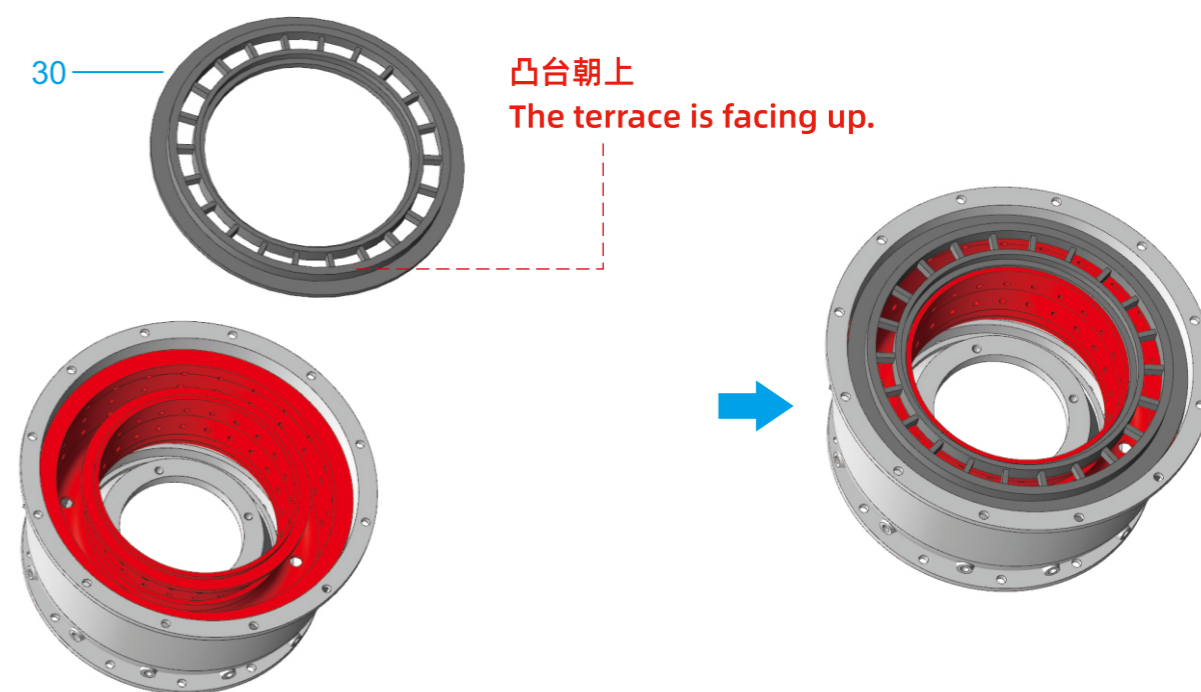
## 6.1、组装燃烧室外壳 Assemble the combustion chamber housing



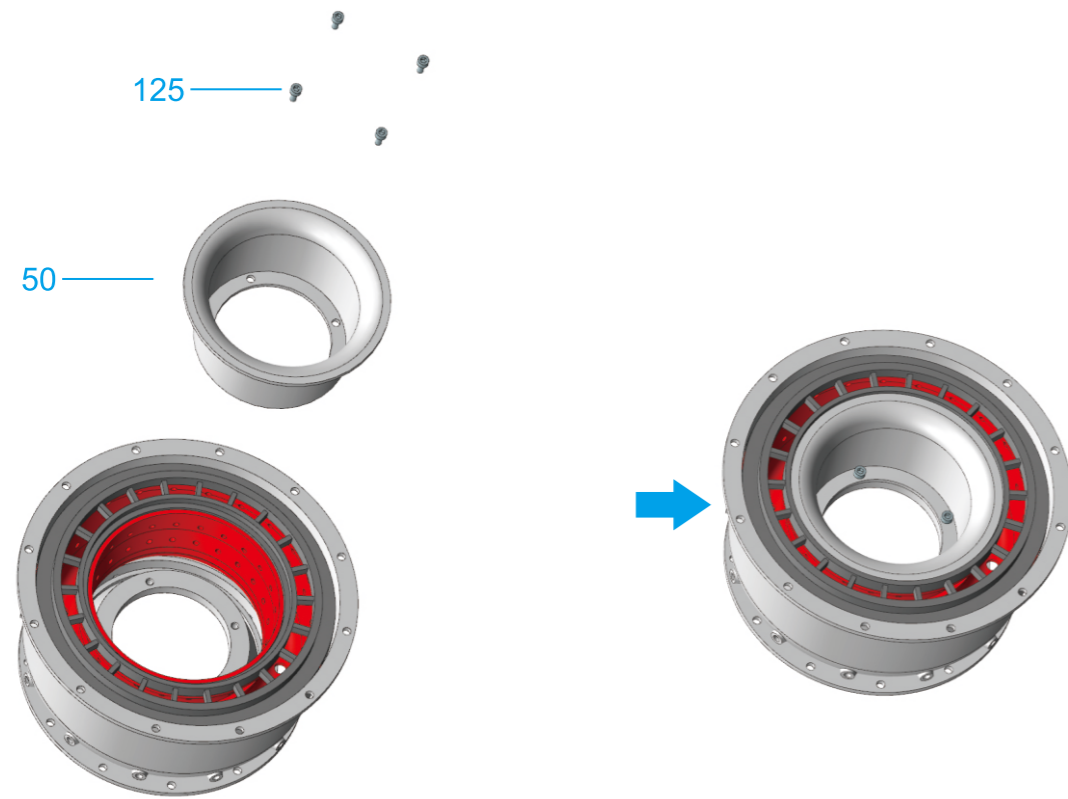
## 6.2、组装燃烧室外机匣 Assemble the outdoor unit casing of the combustion chamber



## 6.3、组装高压涡轮静子 Assemble high-pressure turbine stator

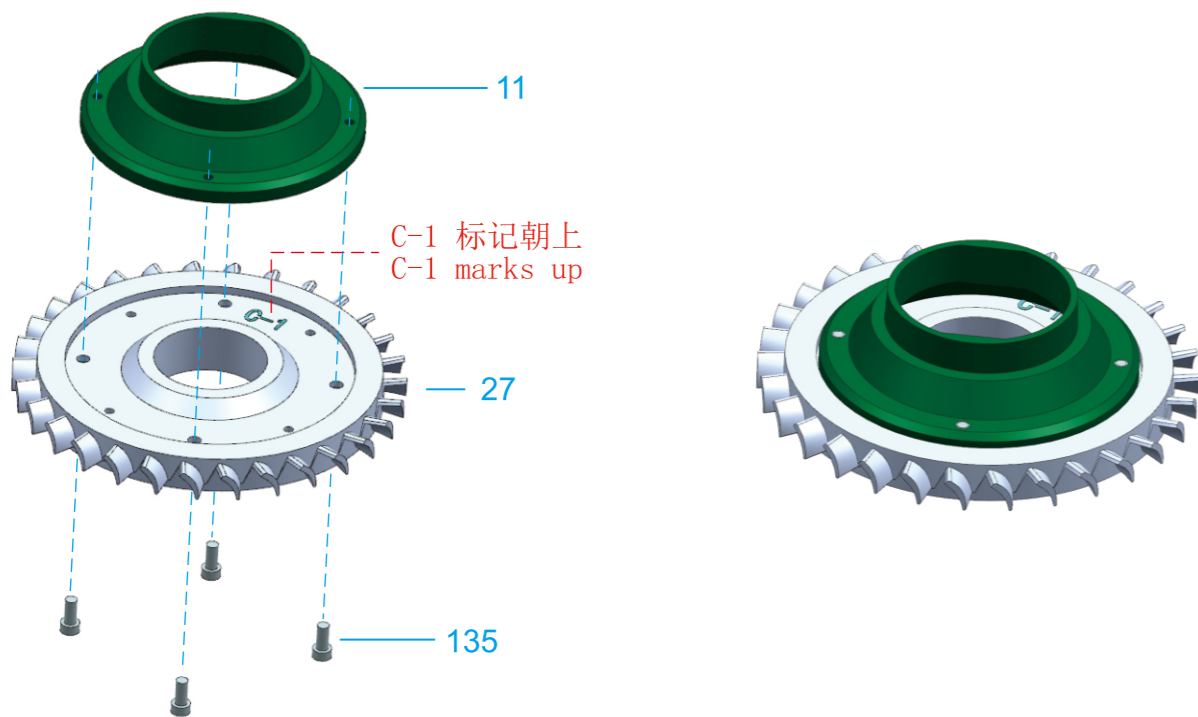


## 6.4、组装燃烧室内机匣 Assemble the combustion chamber casing

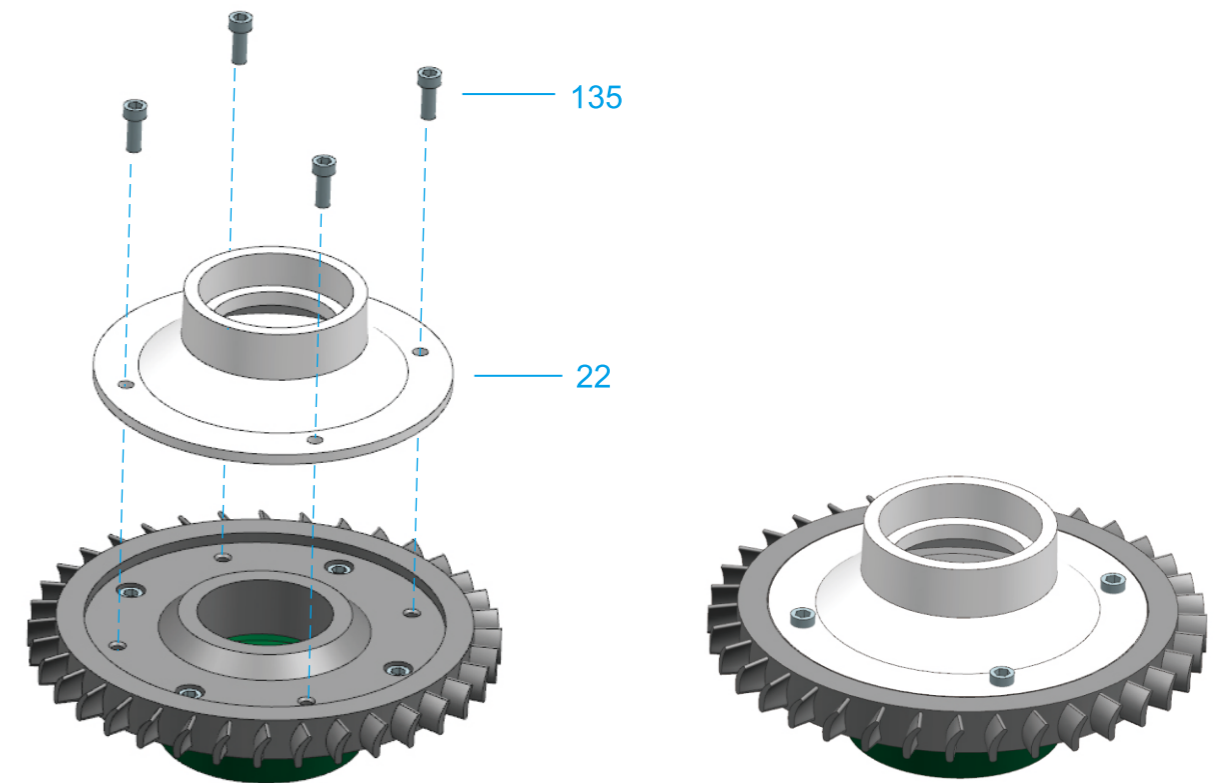


## 七、组装高压涡轮总成 Assemble the high-pressure turbine assembly

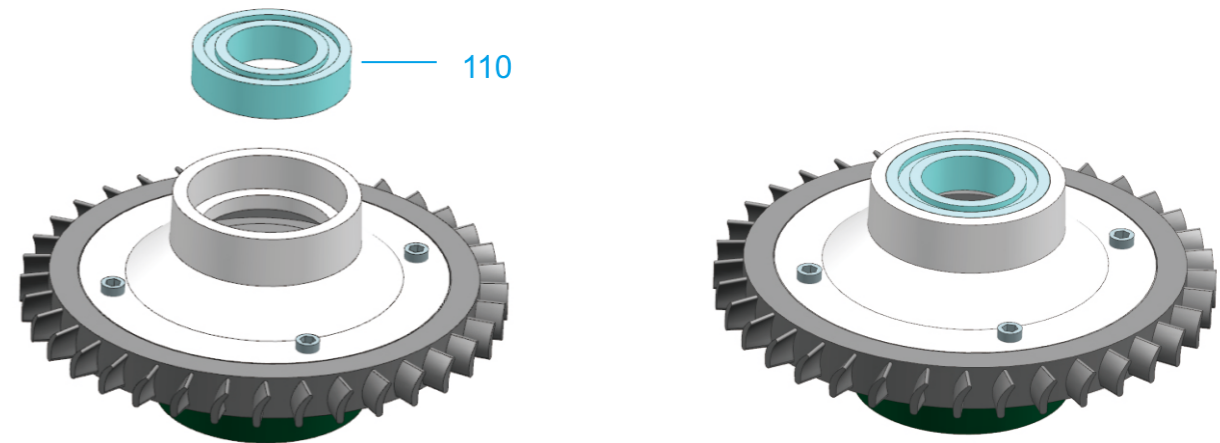
## 7.1、组装高压涡轮 Assemble high-pressure turbine

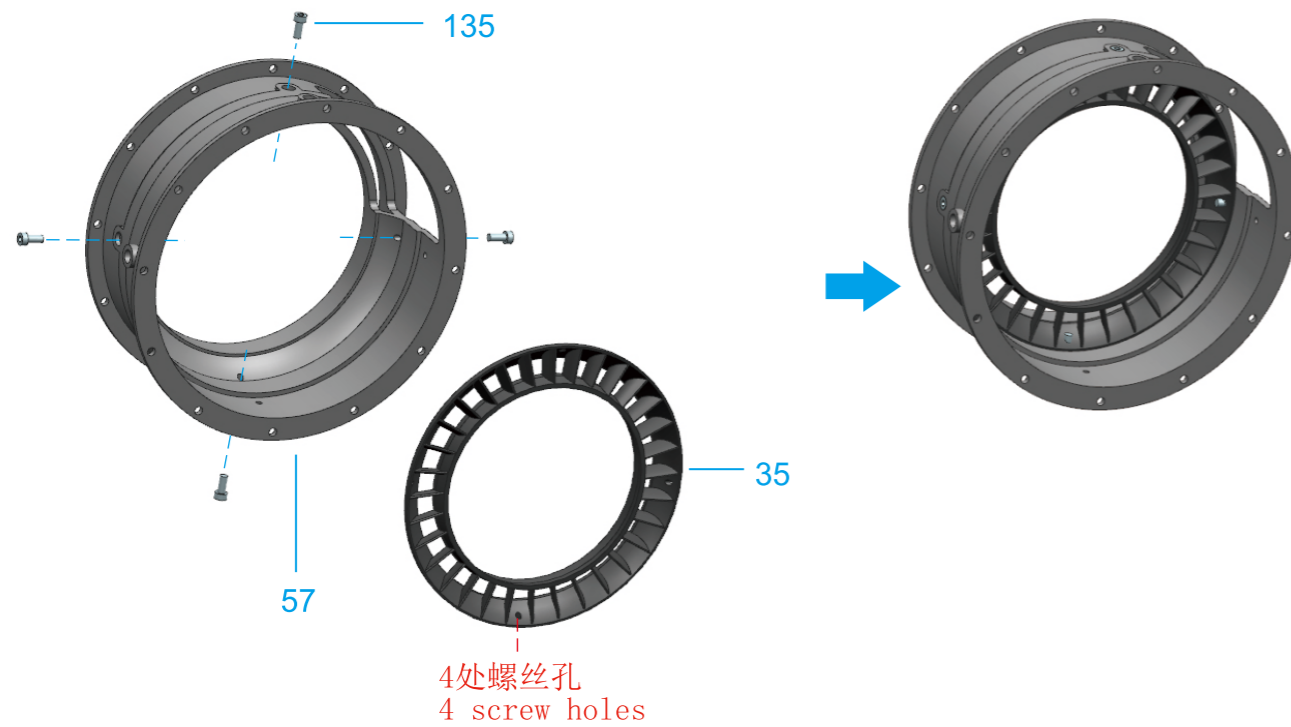
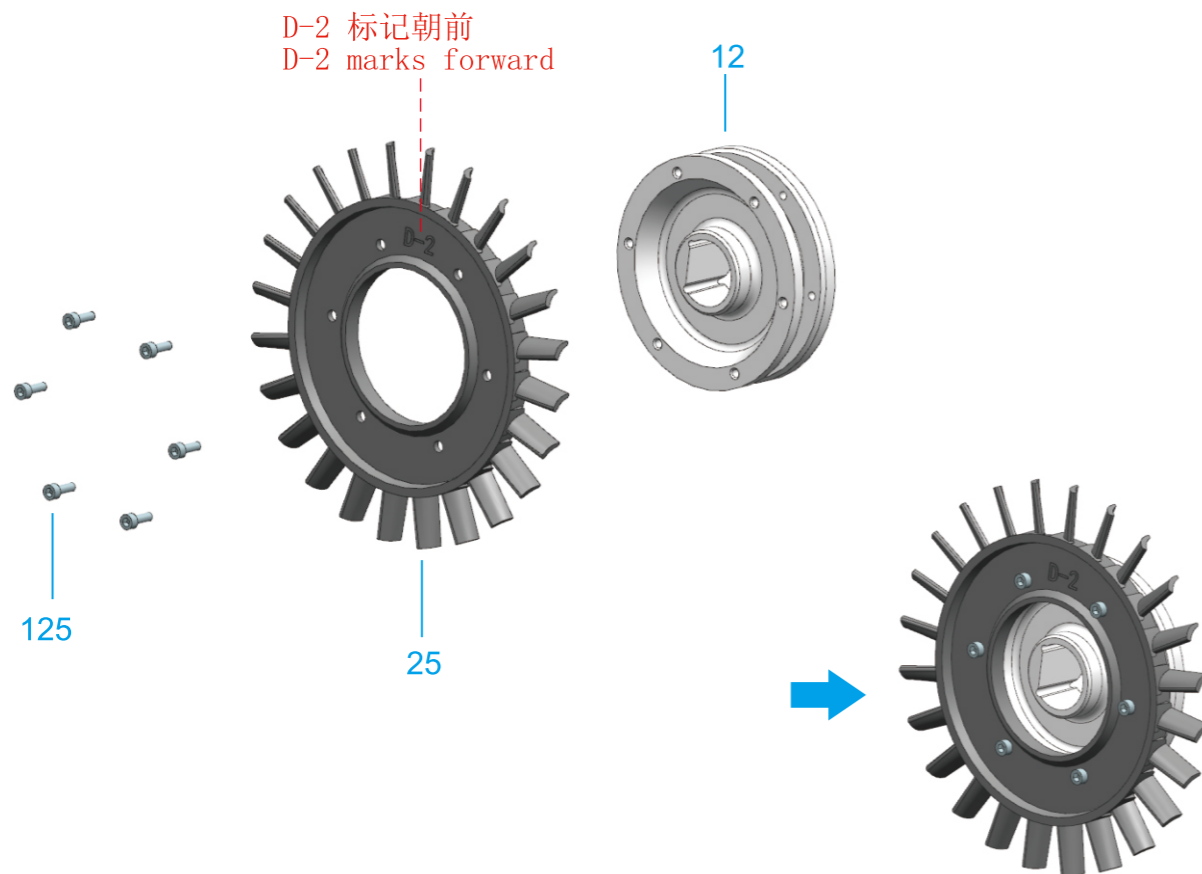
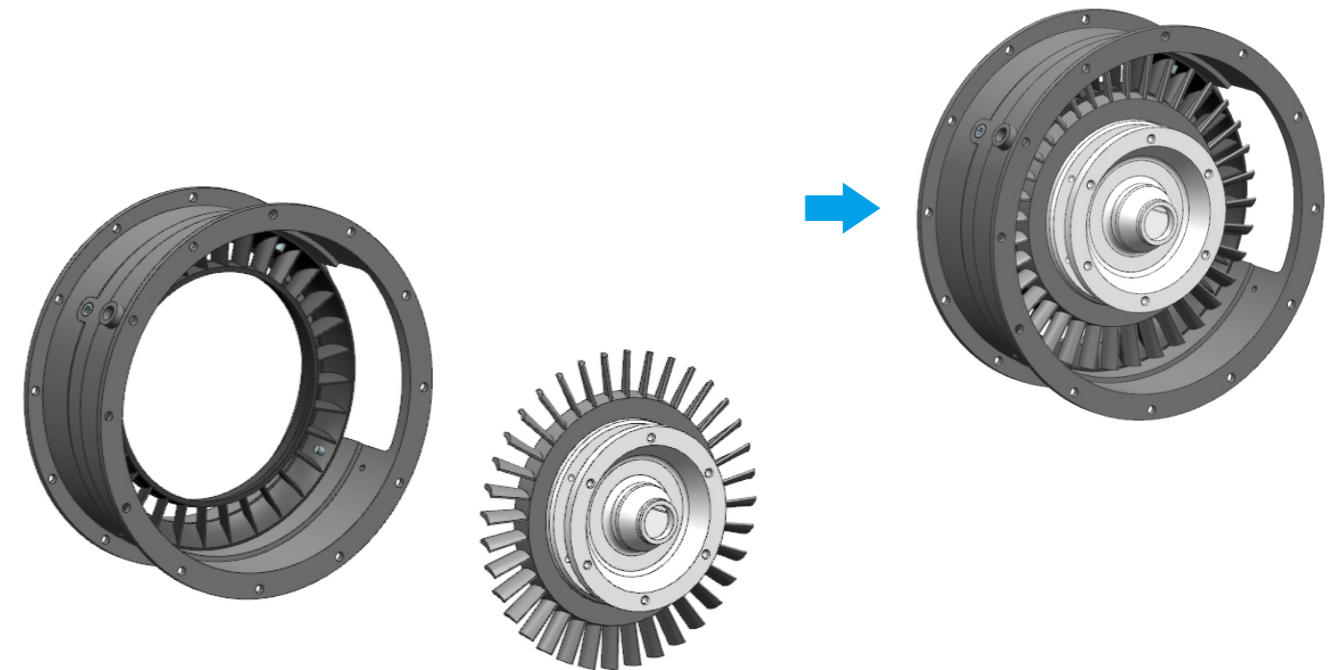
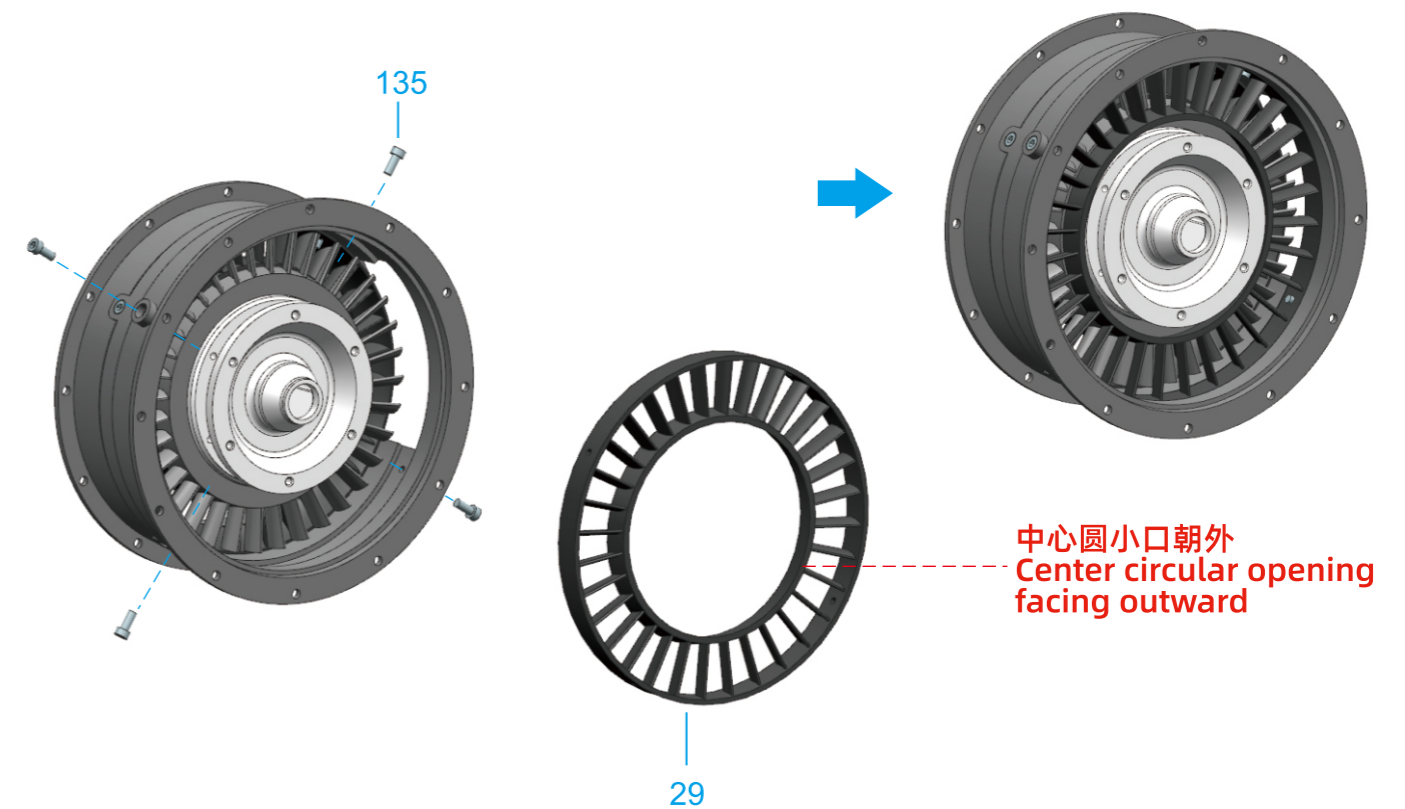


## 7.2、组装高压涡轮后盘 Assemble the high-pressure turbine rear plate

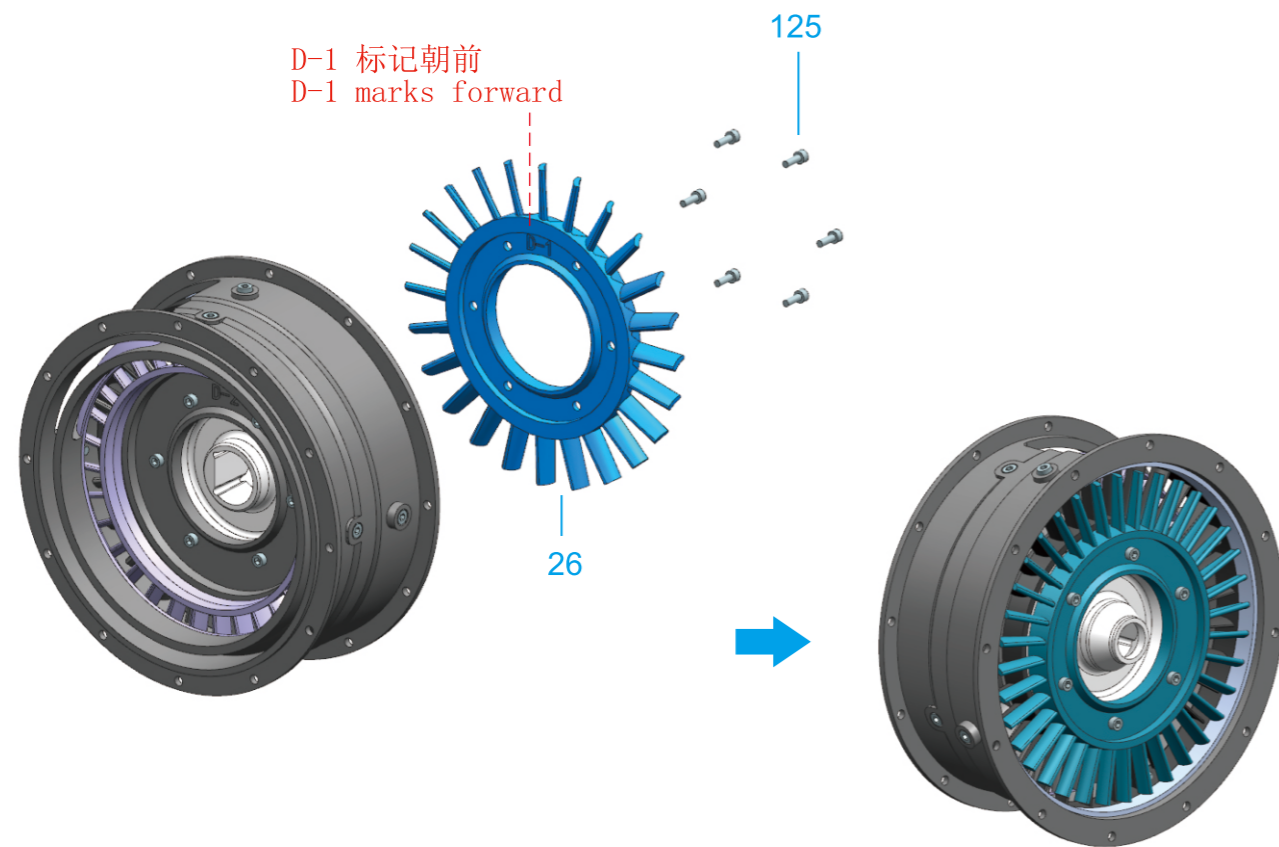


## 7.3、组装高压涡轮轴承 Assembling high-pressure turbine bearings



八、组装低压涡轮总成 **Assemble the low-pressure turbine assembly**8.1、组装一级涡轮静子 **Assemble the first stage turbine stator**8.2、组装低压涡轮转子固定盘 **Assemble the low-pressure turbine rotor mounting plate**8.3、组装一级低压涡轮转子 **Assemble the first stage low-pressure turbine rotor**8.4、组装二级低压涡轮静子 **Assemble the second stage low-pressure turbine stator**

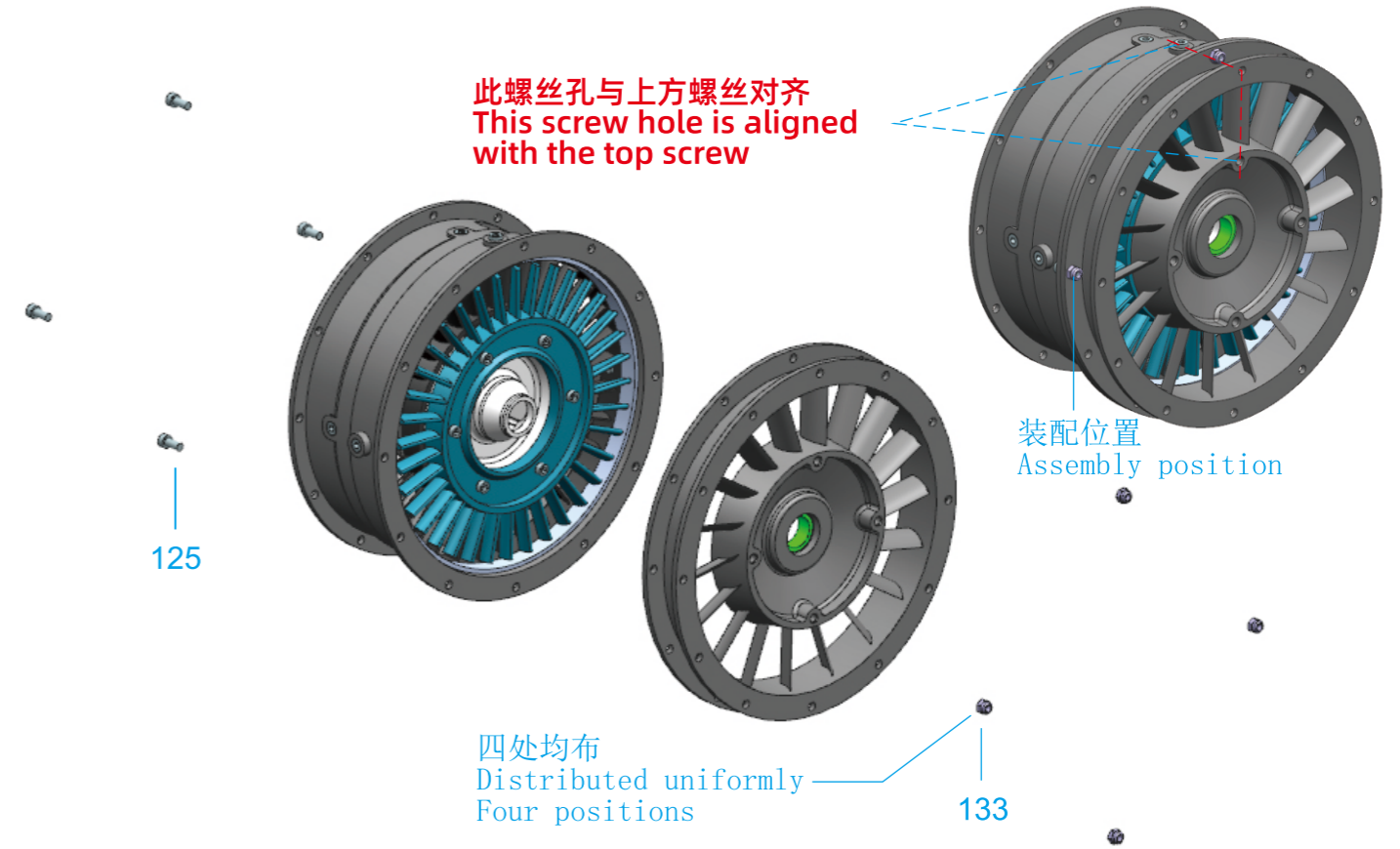
## 8.5、组装二级低压涡轮转子 Assemble the second stage low-pressure turbine rotor



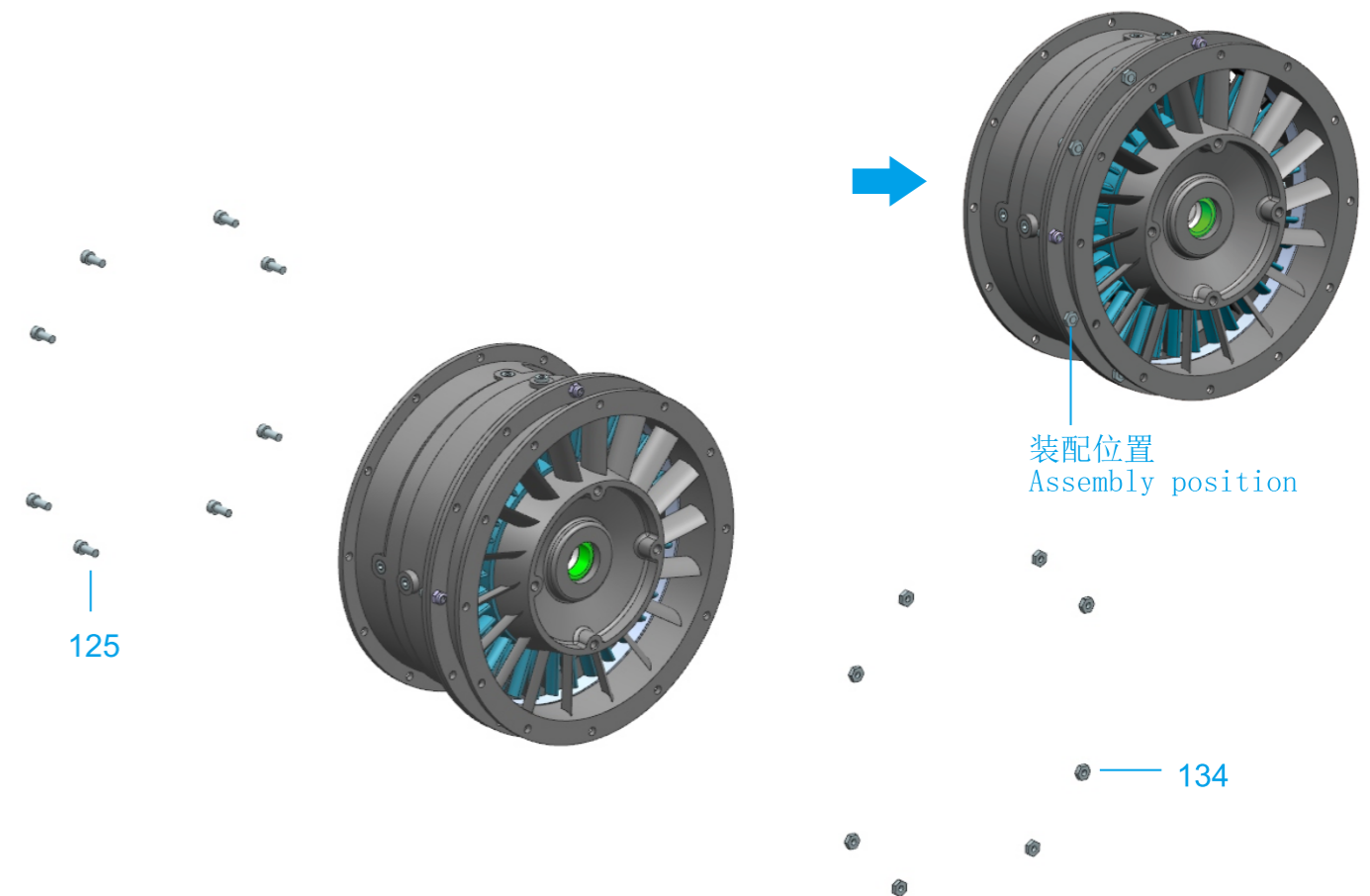
## 8.6、组装后支撑机匣轴承 Assemble and support the casing bearings



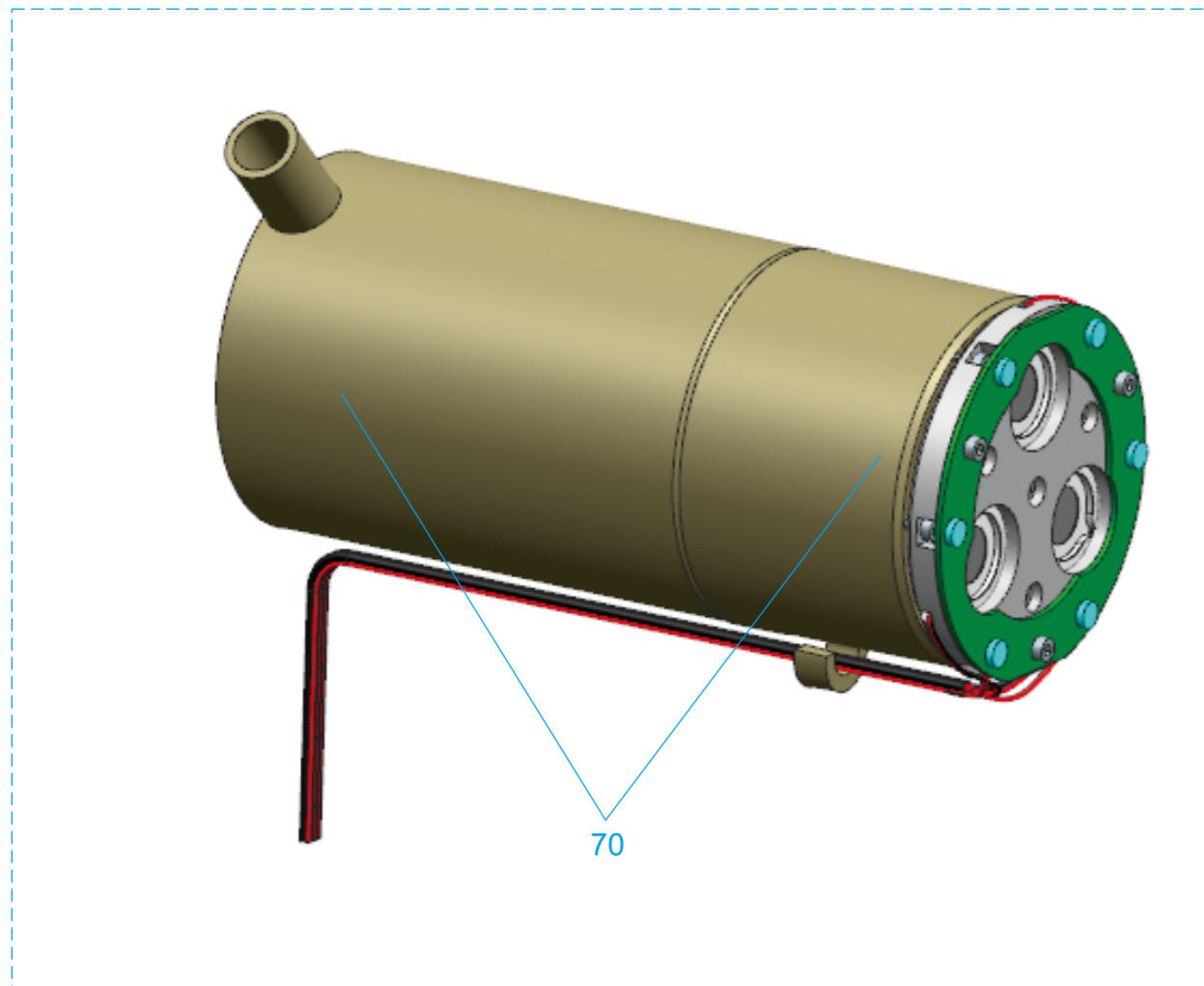
## 8.7、组装涡轮总成防松螺丝 Assemble the anti loosening screws of the turbine assembly



## 8.8、组装涡轮总成标准螺丝 Assemble the standard screws of the turbine assembly



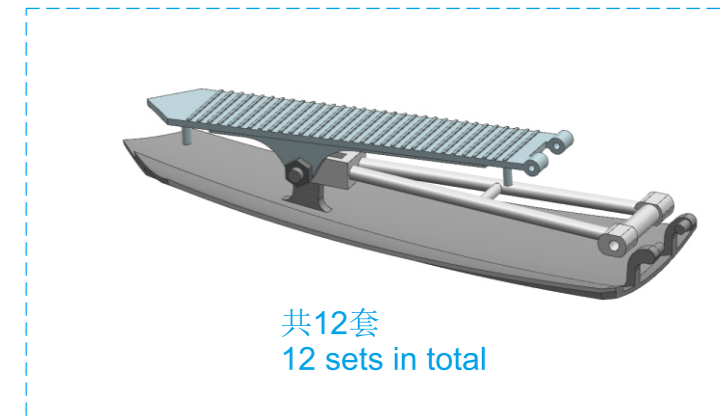
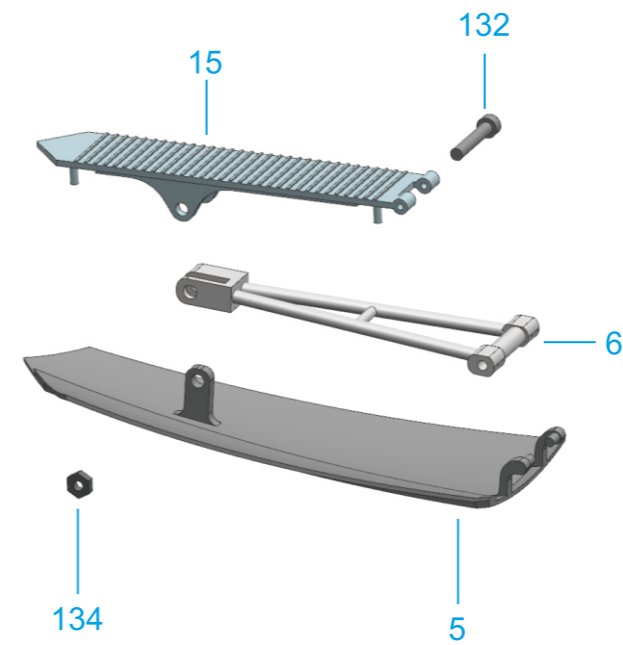
## 九、雾化器组件总成 Nebulizer assembly



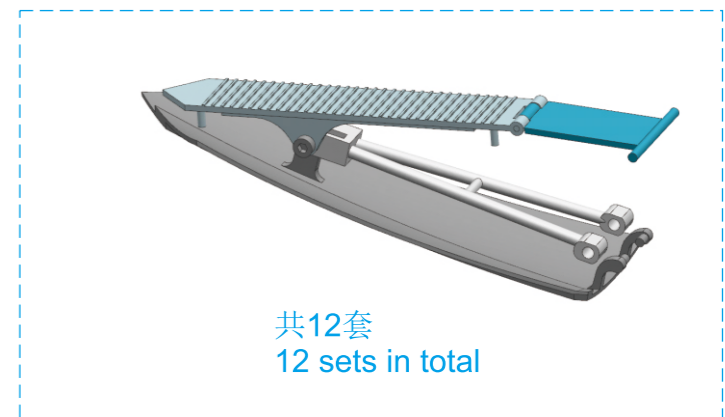
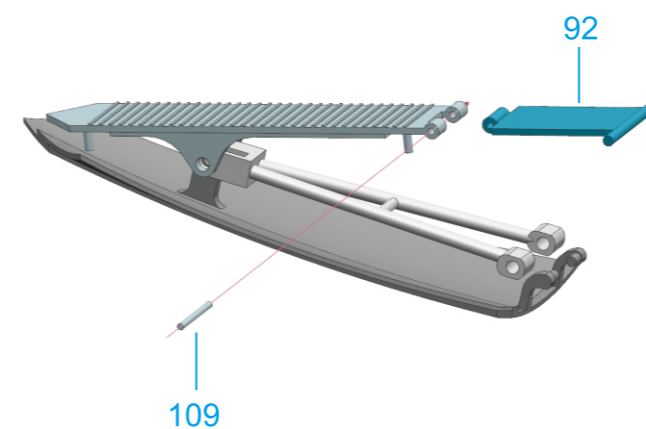
**请勿随意拆散雾化器总成组件。  
内藏水箱，避免水箱的水溢出，损坏电子元件。  
Do not disassemble the atomizer assembly at will.  
The water tank is stored in the tank to avoid water  
overflow and damage to electronic components.**

## 十、组装尾喷管组件 Assemble the tailpipe assembly

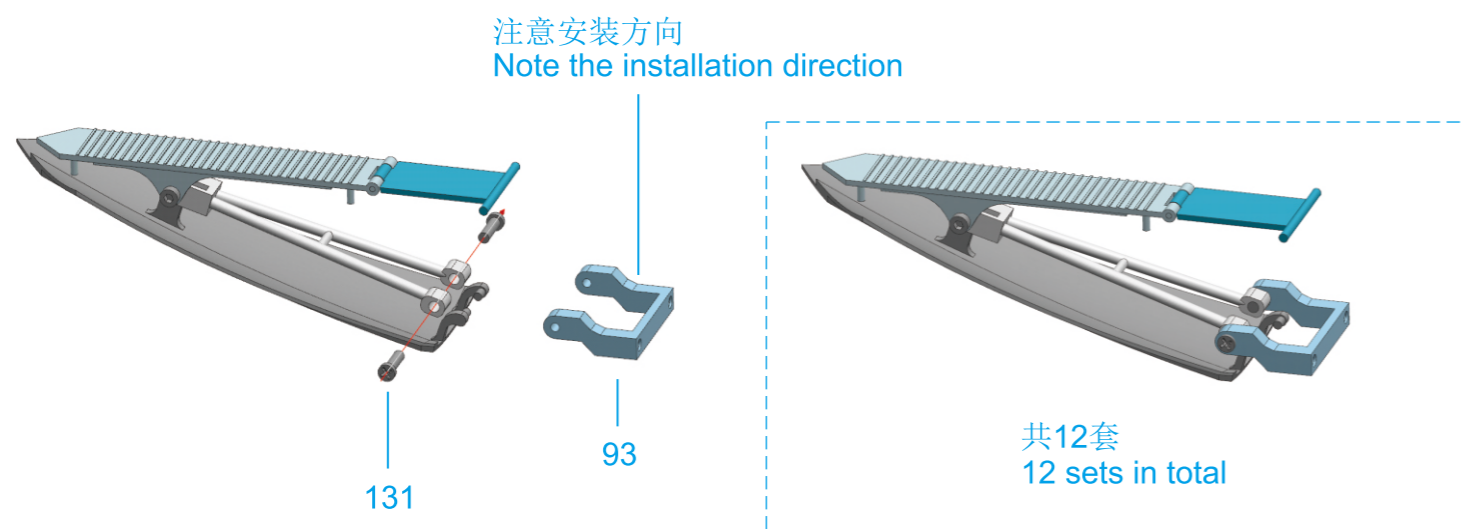
## 10.1、连接撑杆组件 Connecting strut components



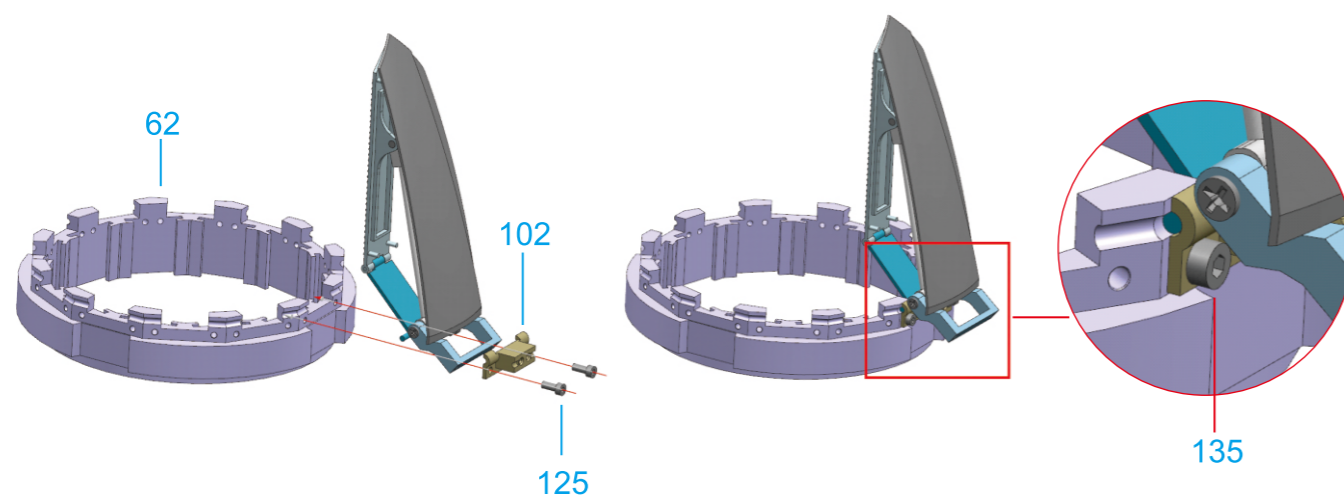
## 10.2、连接内板 Connect the inner board



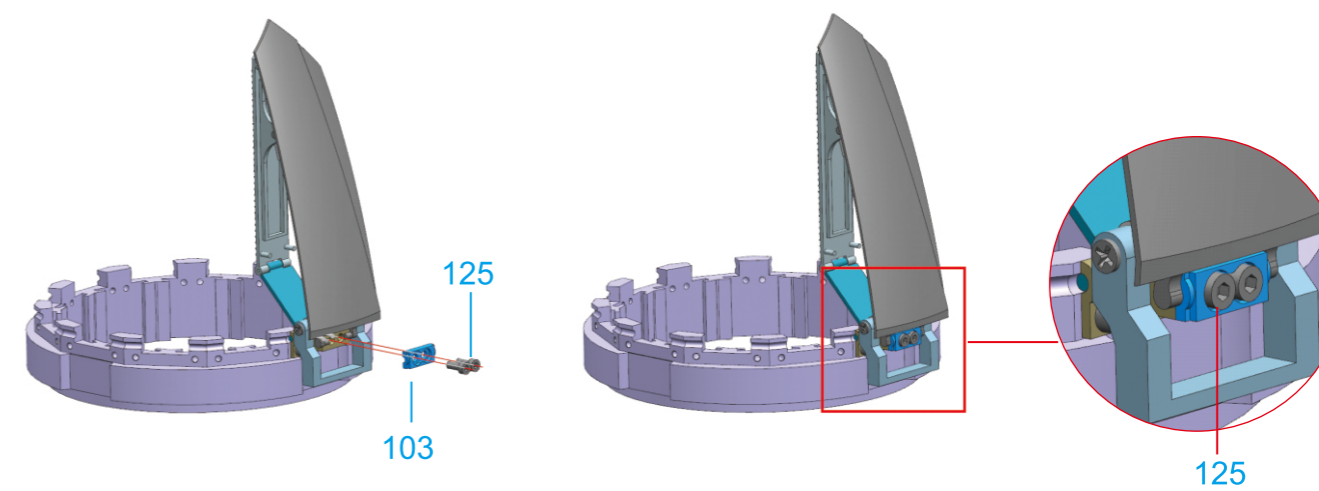
## 10.3、连接撑杆支架Connect the strut bracket



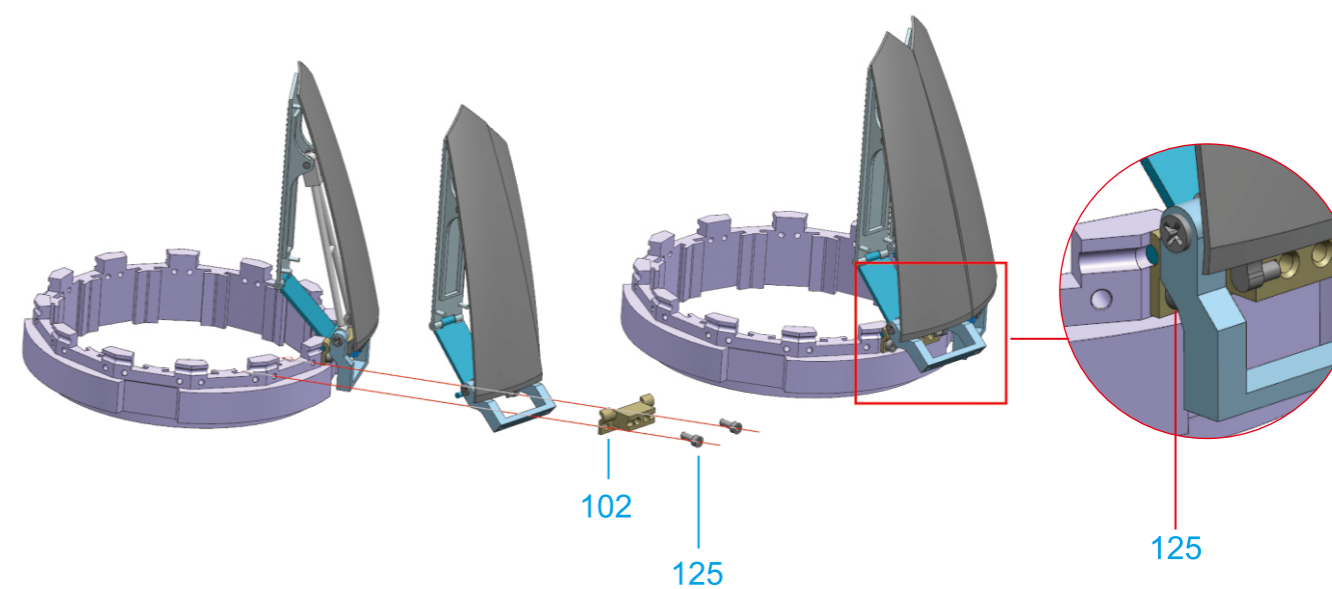
## 10.4、组装内板固定座Assemble the inner panel fixing seat



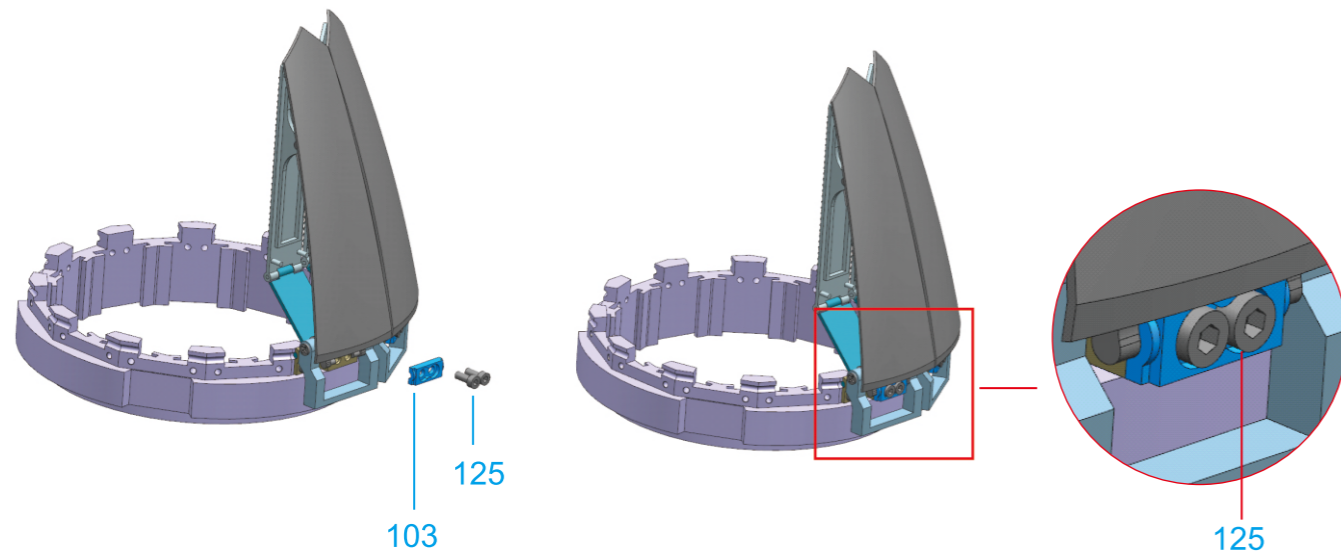
## 10.5、组装内板固定盖Assemble the inner panel fixing cover



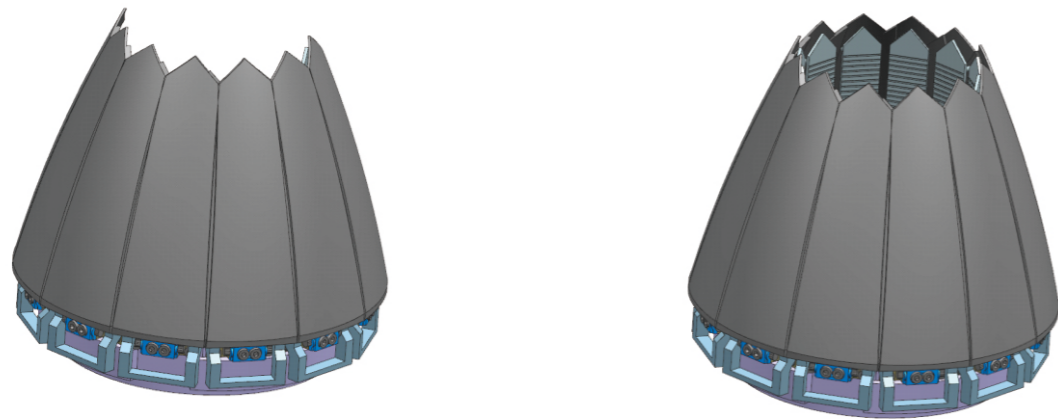
## 10.6、组装第二组撑杆组件Assemble the second set of strut components



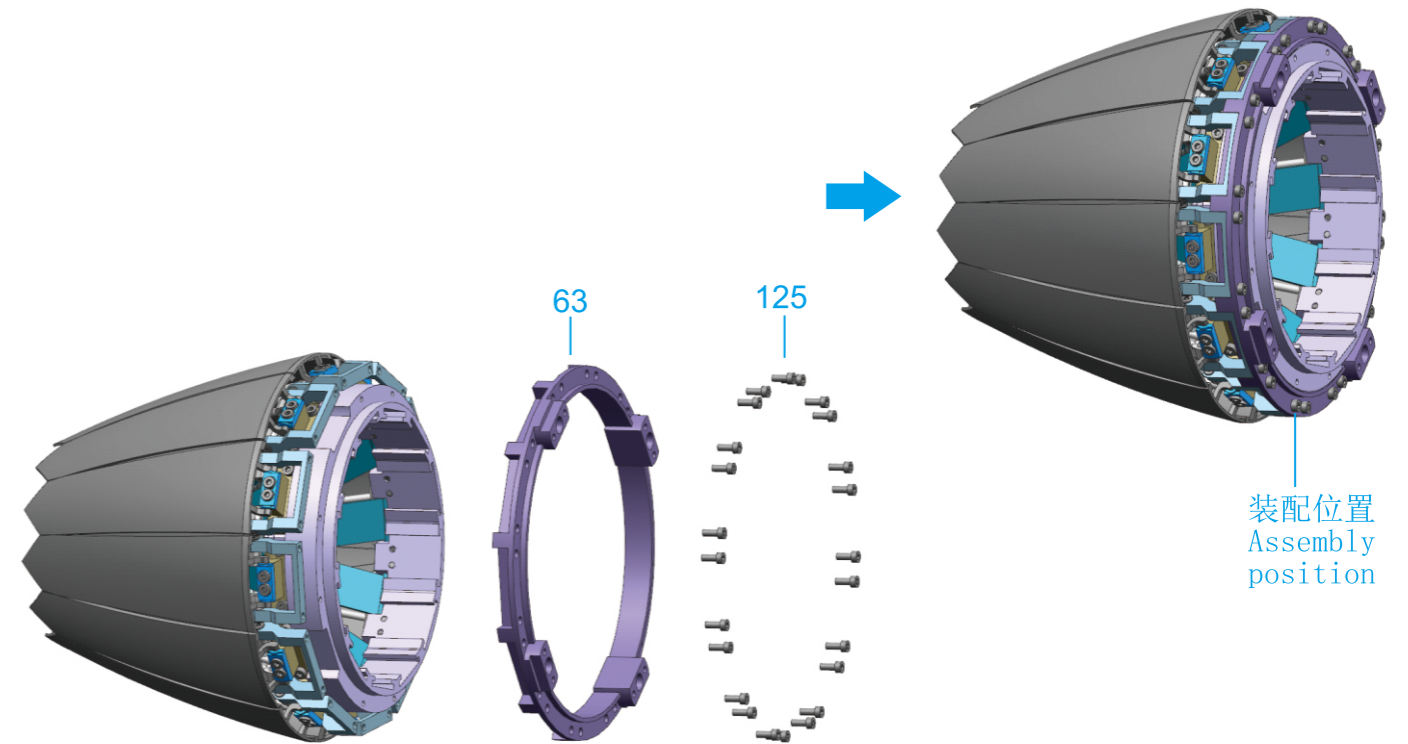
10.7、组装内板固定盖 Assemble the inner panel fixing cover



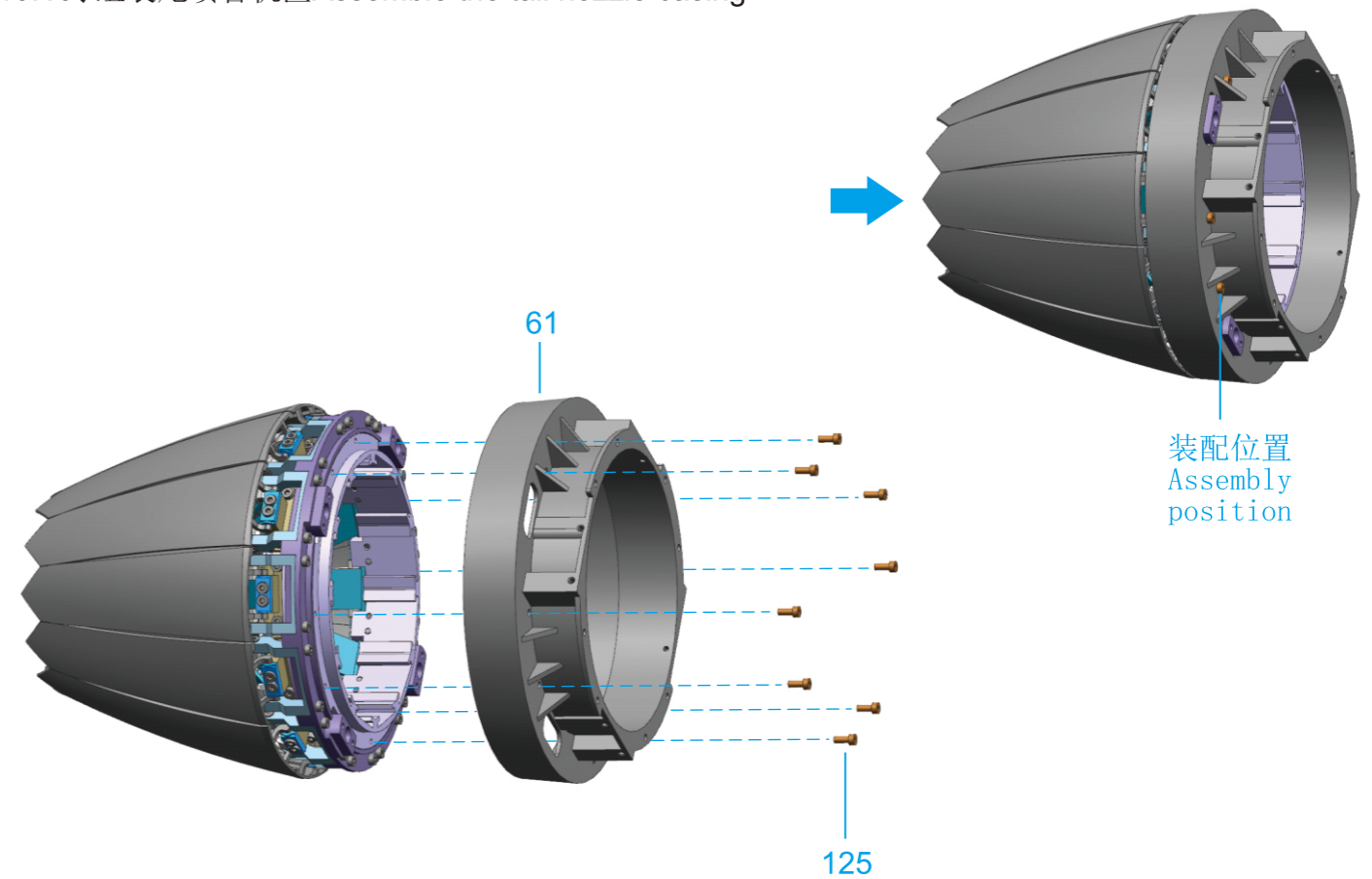
10.8、组装十二组撑杆组件 Assemble twelve sets of strut components



10.9、组装尾喷管推板 Assemble the tail nozzle push plate

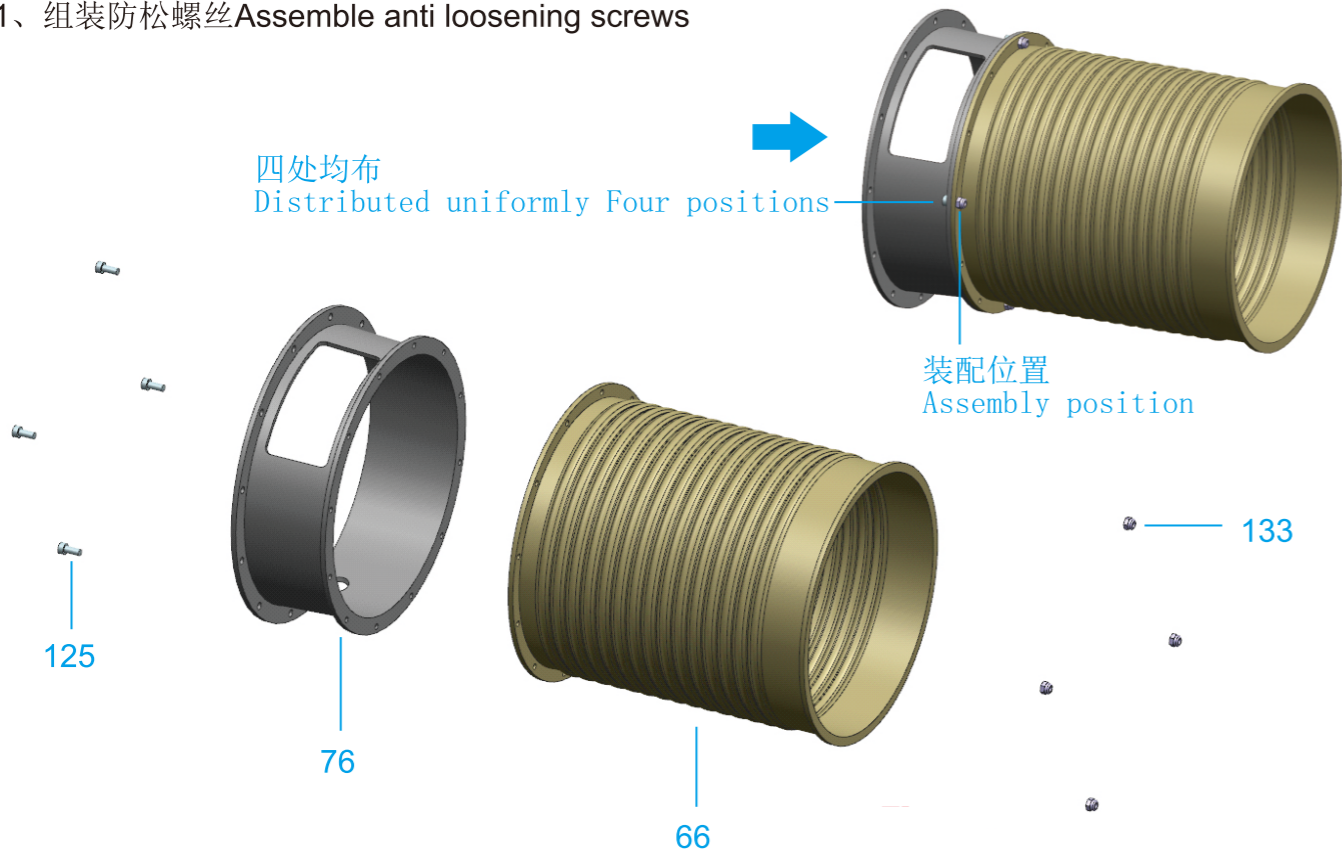


10.10、组装尾喷管机匣 Assemble the tail nozzle casing

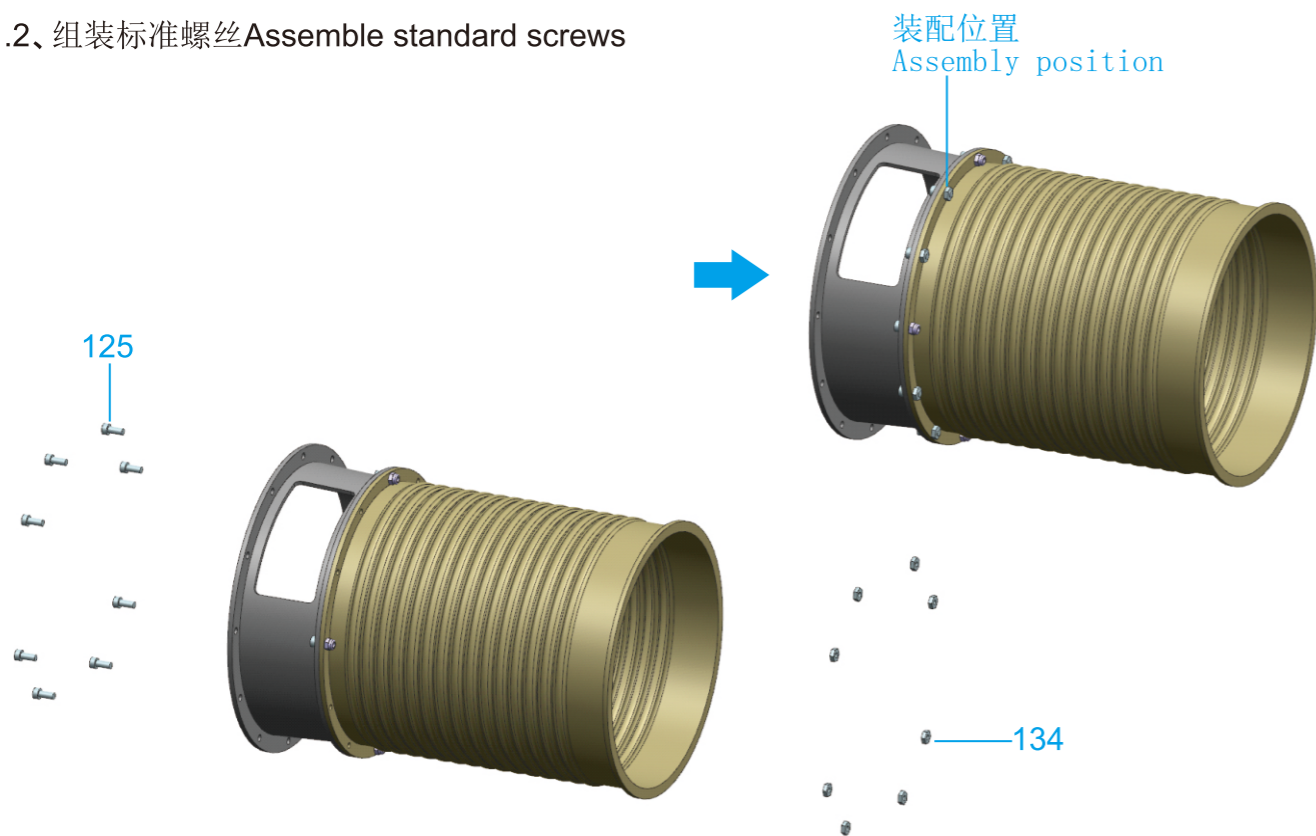


十一、加力喷管总成 **Enhanced nozzle assembly**

11.1、组装防松螺丝 **Assemble anti loosening screws**



11.2、组装标准螺丝 **Assemble standard screws**

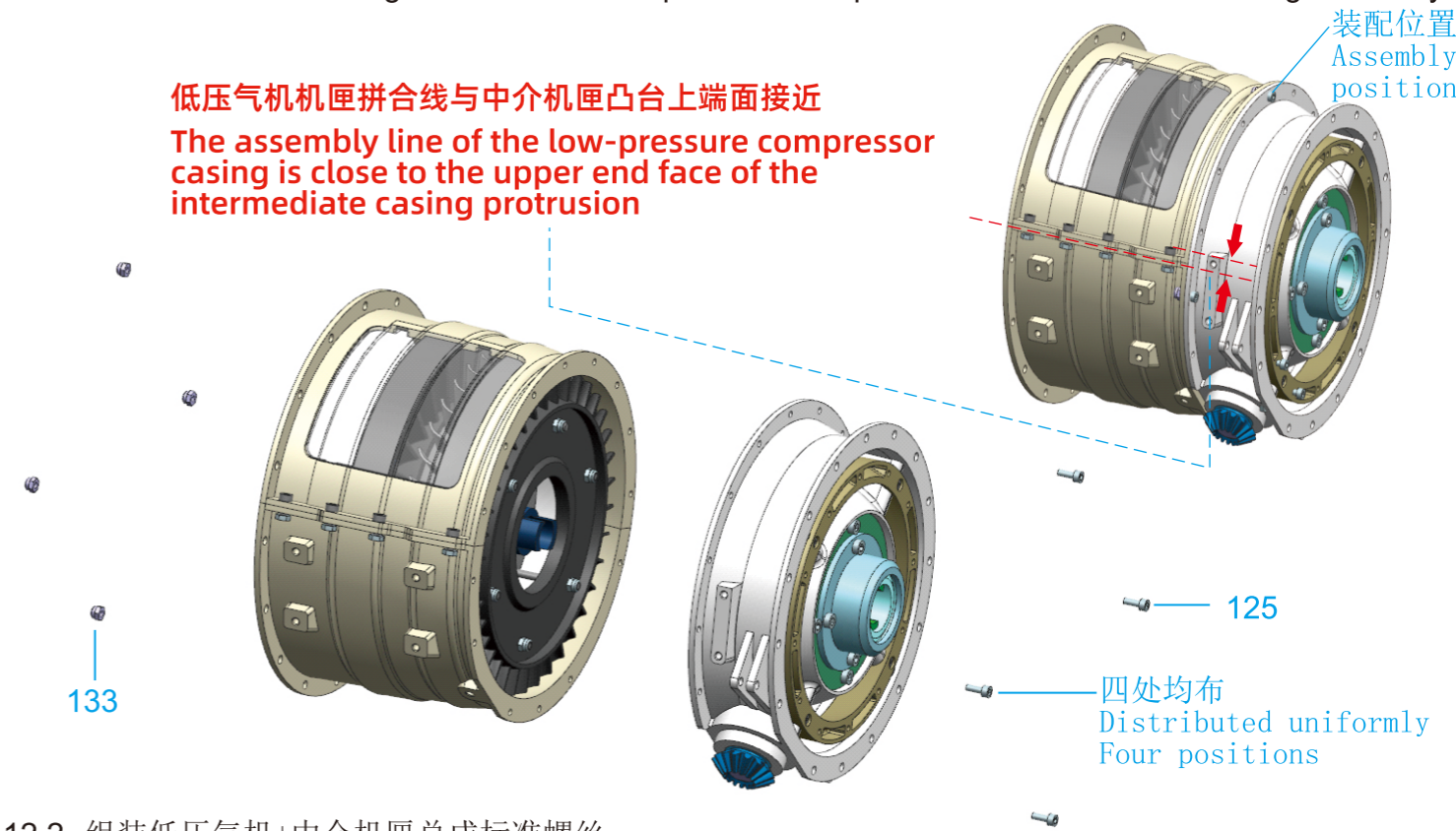


十二、组装各总成 **Assemble each assembly**

12.1、组装低压气机+中介机匣总成防松螺丝

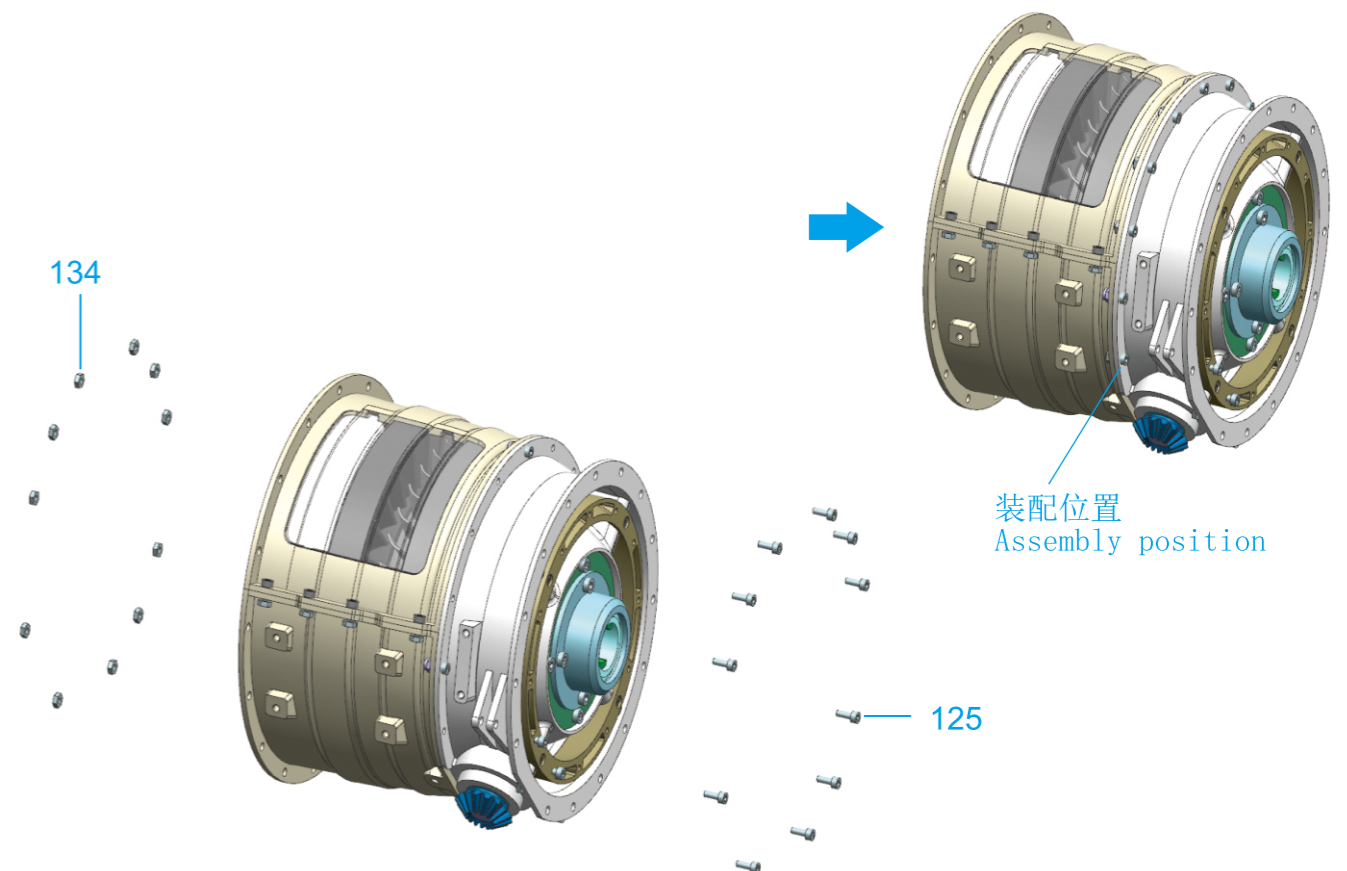
Assemble the anti loosening screws of the low-pressure compressor and intermediate casing assembly

低压气机机匣拼合线与中介机匣凸台上端面接近  
The assembly line of the low-pressure compressor casing is close to the upper end face of the intermediate casing protrusion

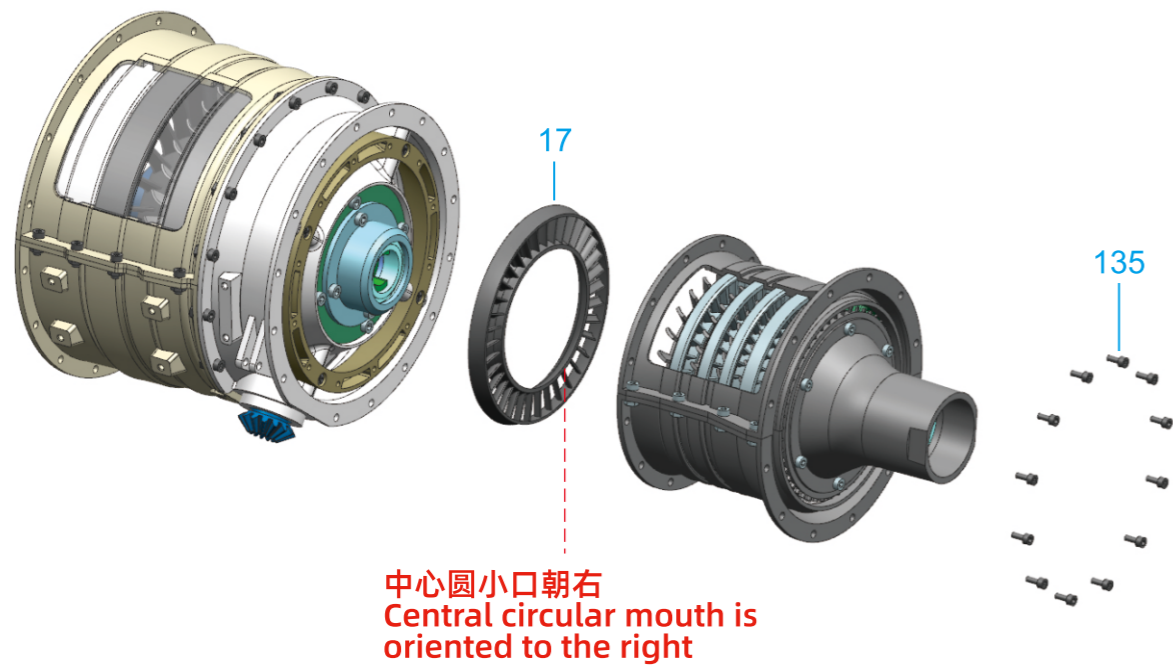


12.2、组装低压气机+中介机匣总成标准螺丝

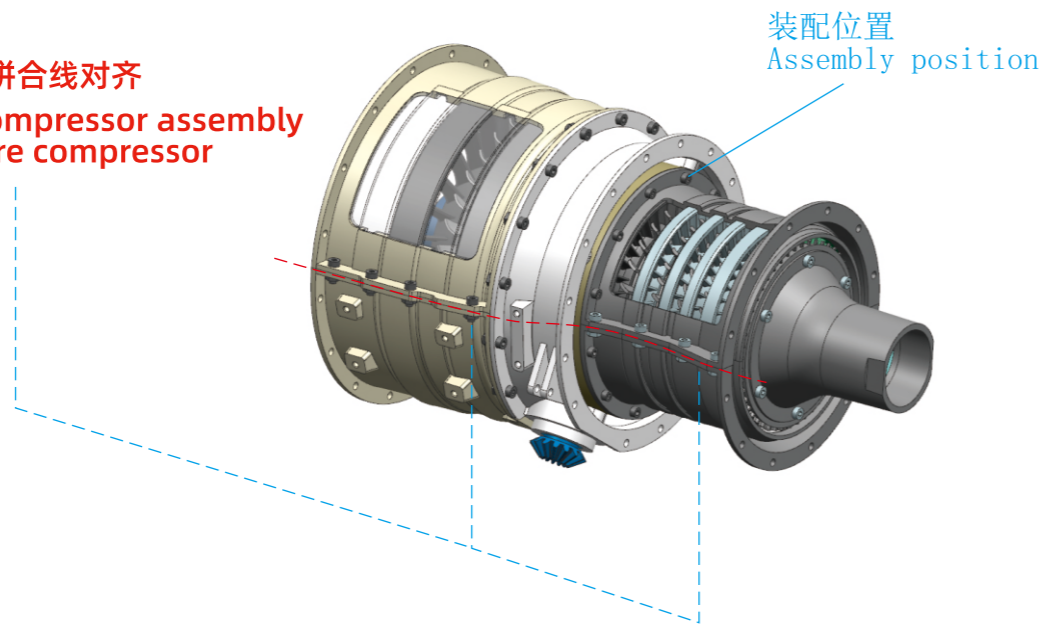
Assemble the low-pressure compressor and intermediate casing assembly with standard screws



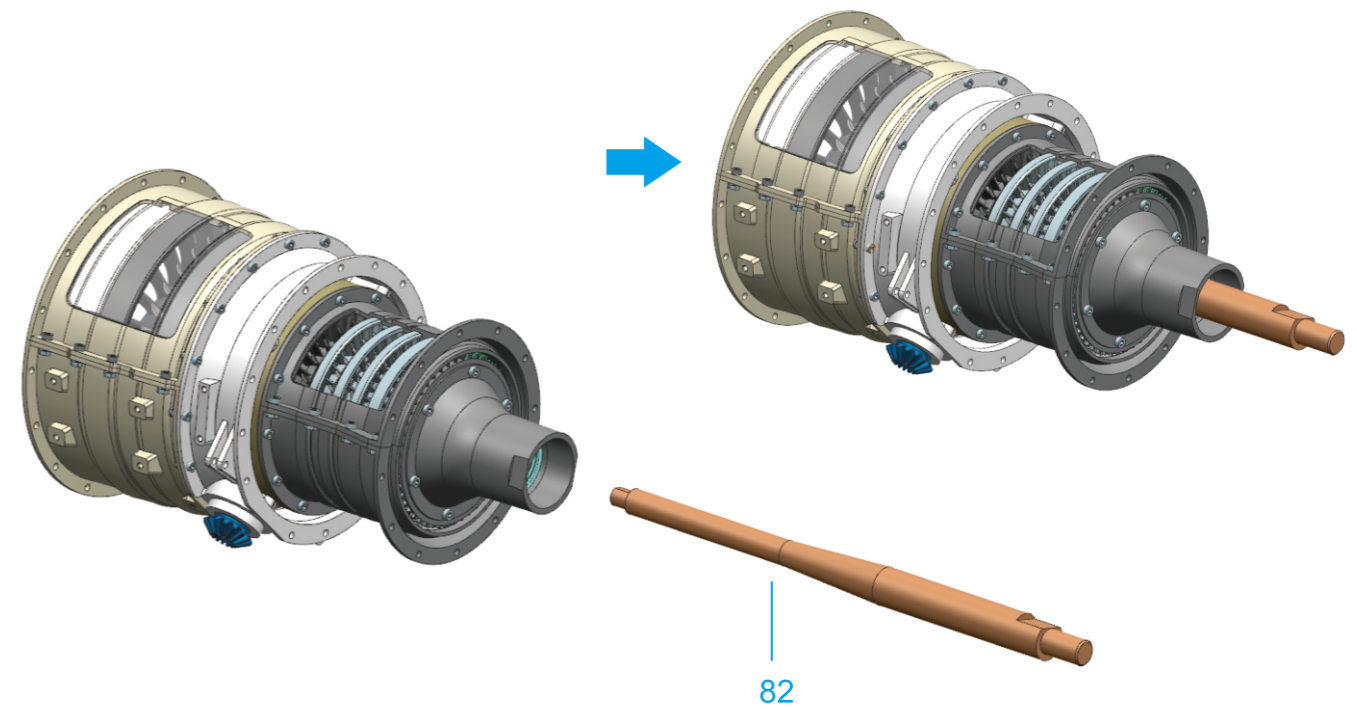
12.3、组装高压气机总成 Assemble the high-pressure compressor assembly



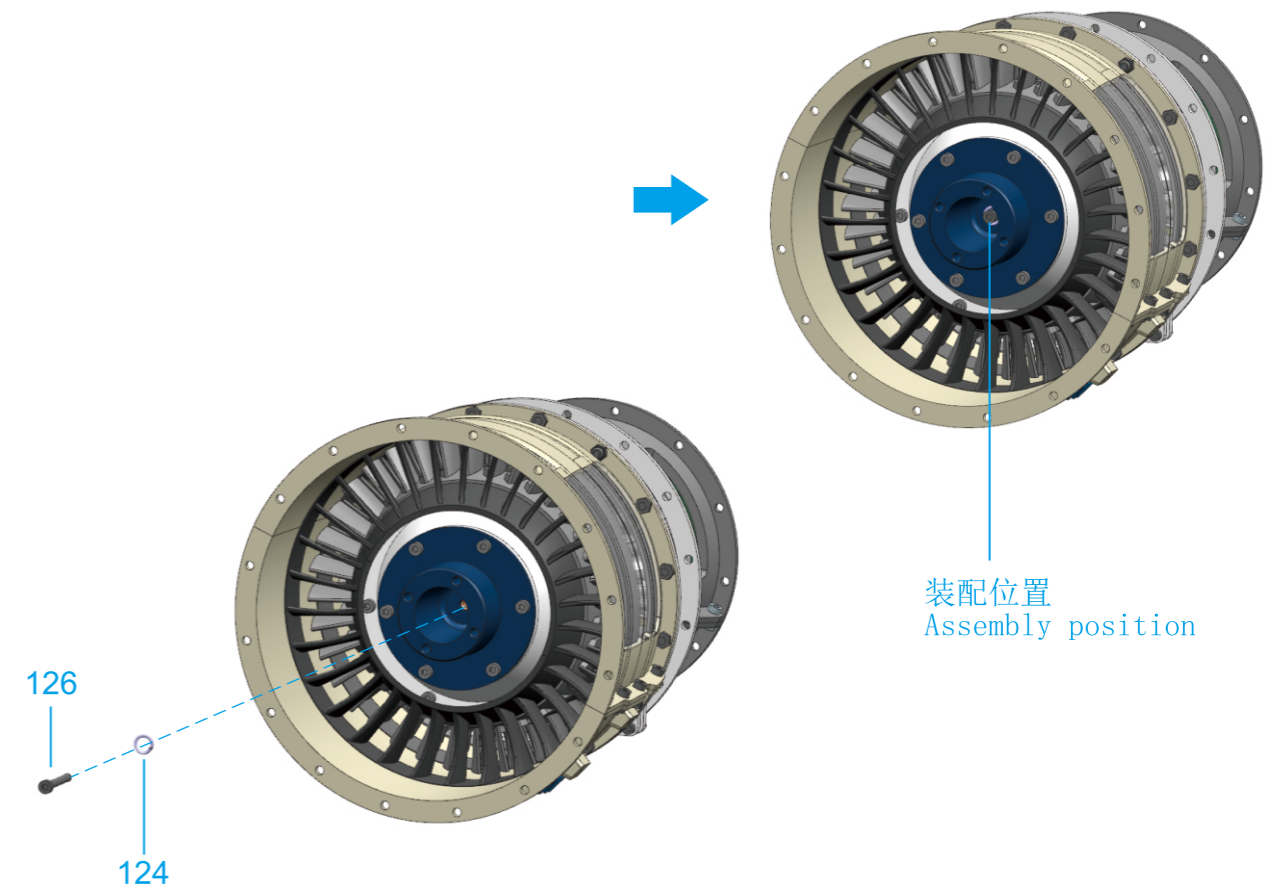
低压气机拼合线与高压气机拼合线对齐  
Align the low-pressure compressor assembly line with the high-pressure compressor assembly line



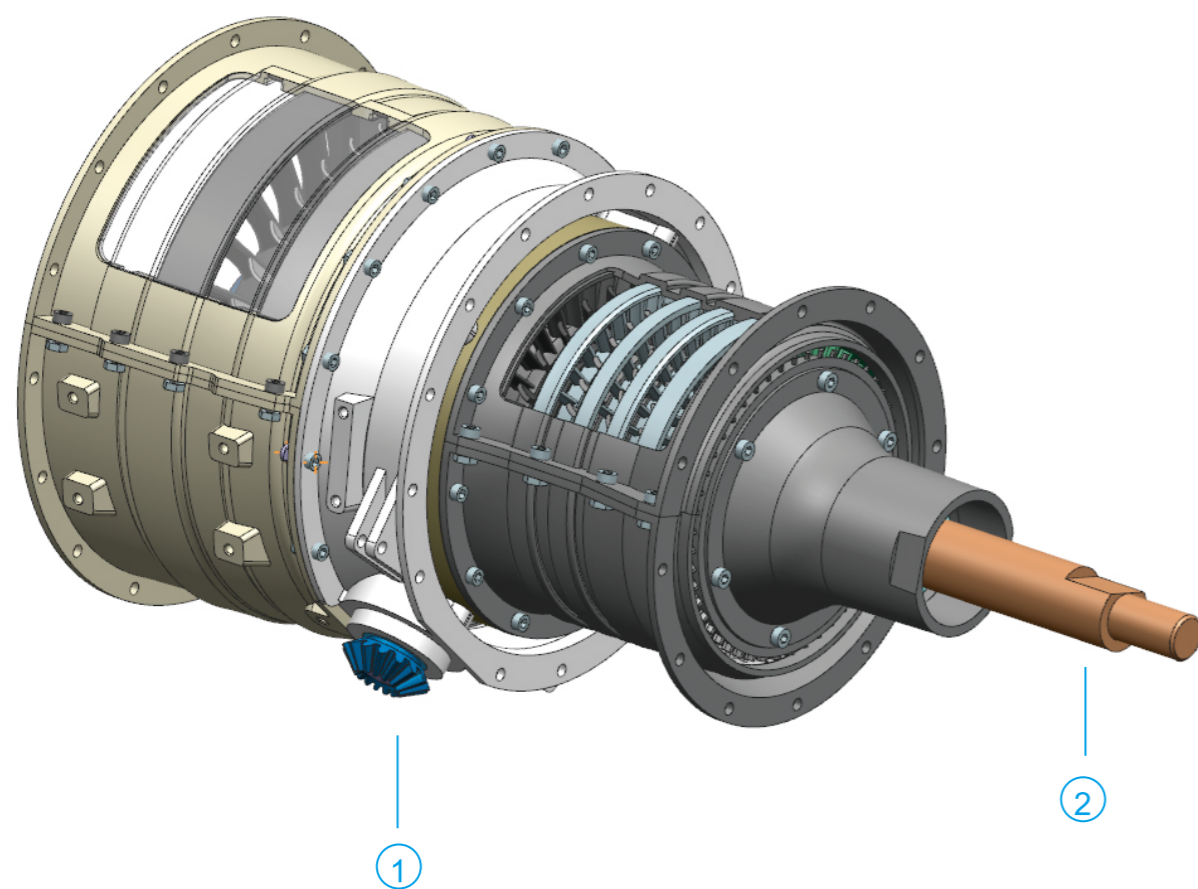
12.4、组装中心轴 Assemble the central axis



12.5、组装中心轴螺丝 Assemble the central axis screw

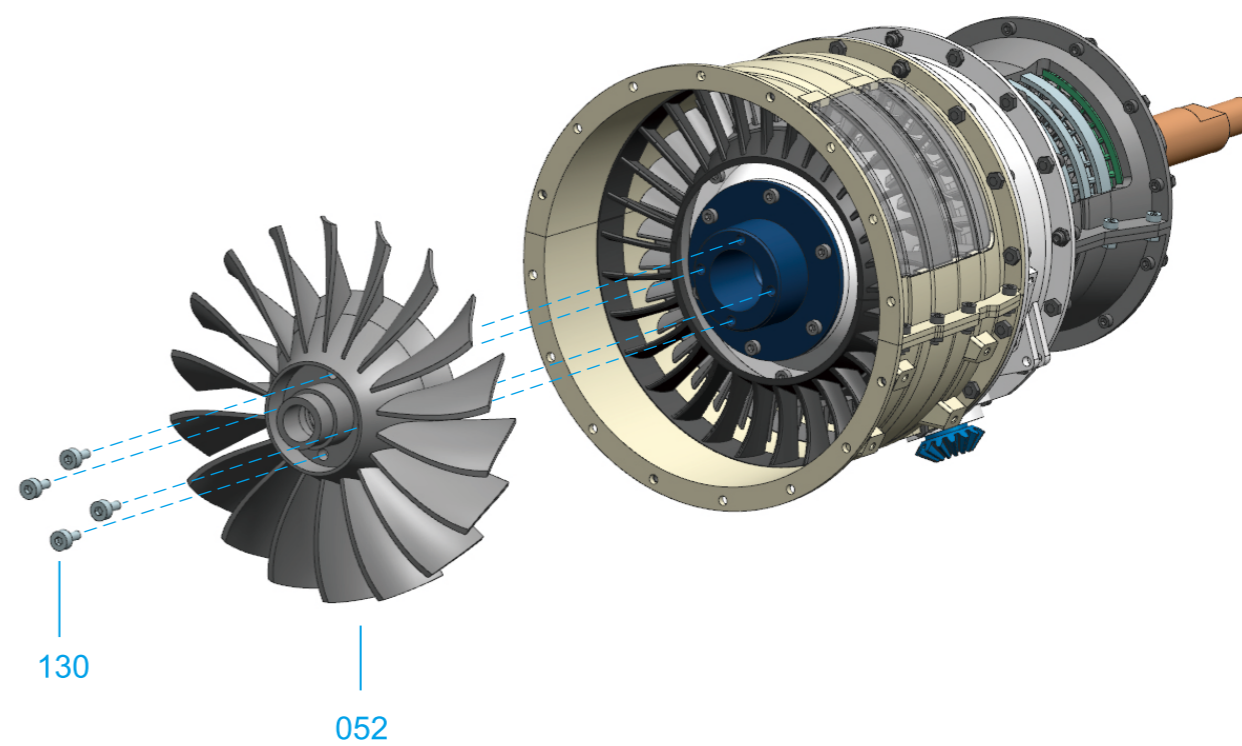


## 12.6、测试Test



- 1、转动锥齿轮  
2、观察中心轴是否转动  
1. Rotating bevel gear  
2. Observe whether the central axis rotates

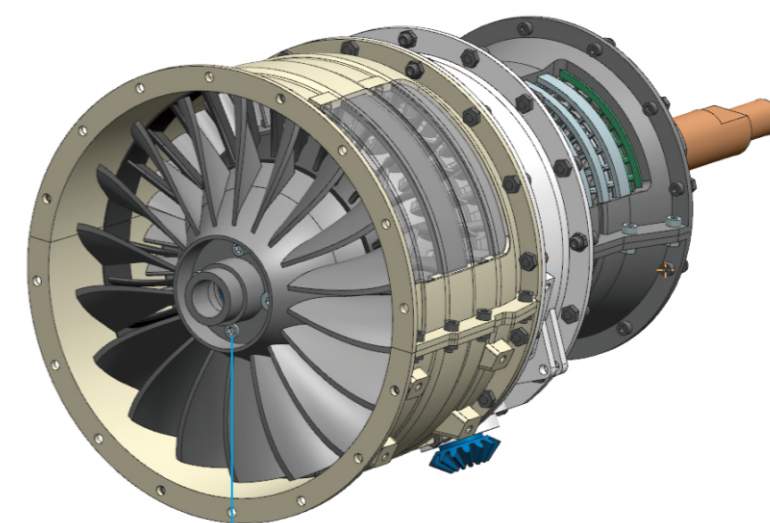
## 12.7、组装风扇Assemble the fan



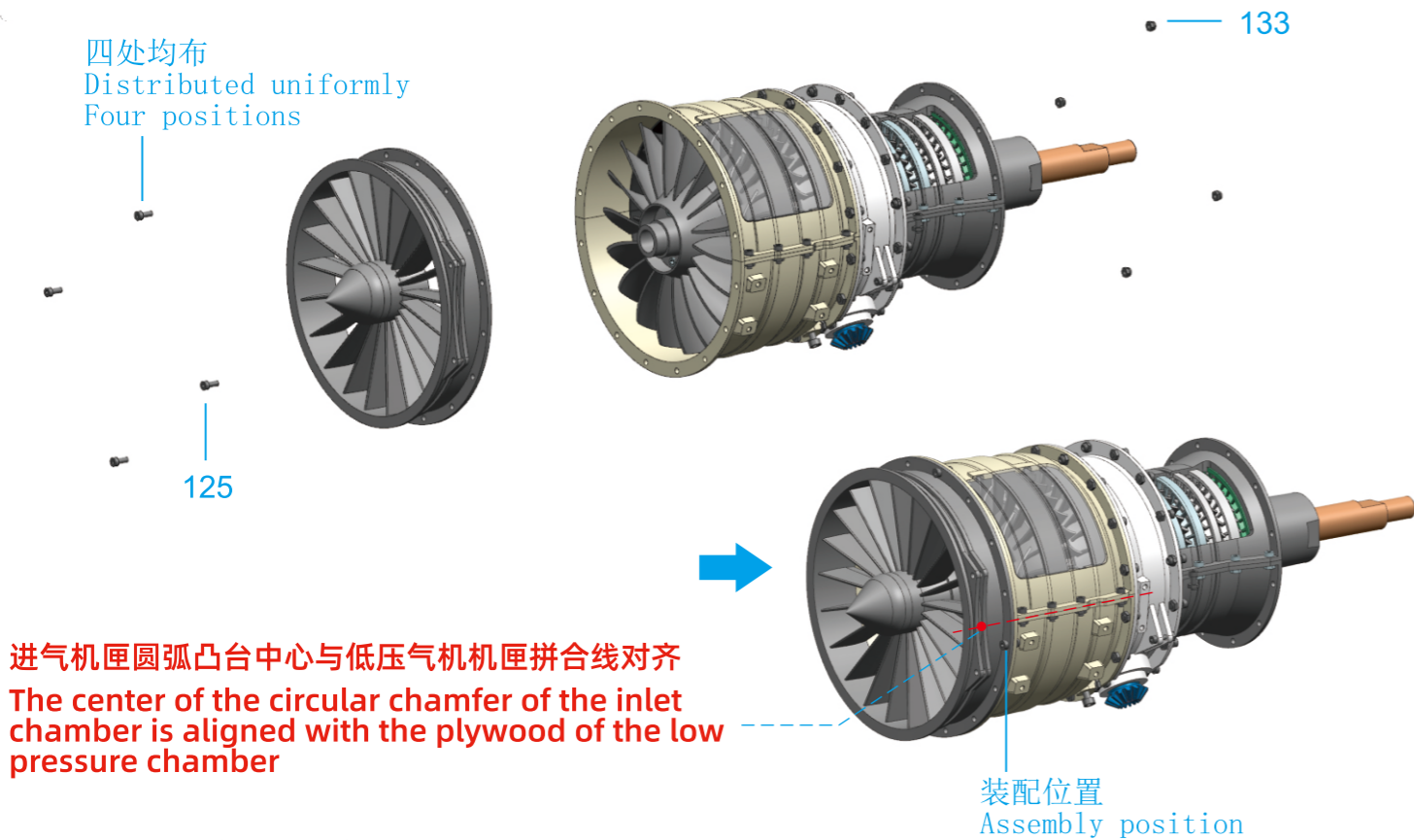
052

130

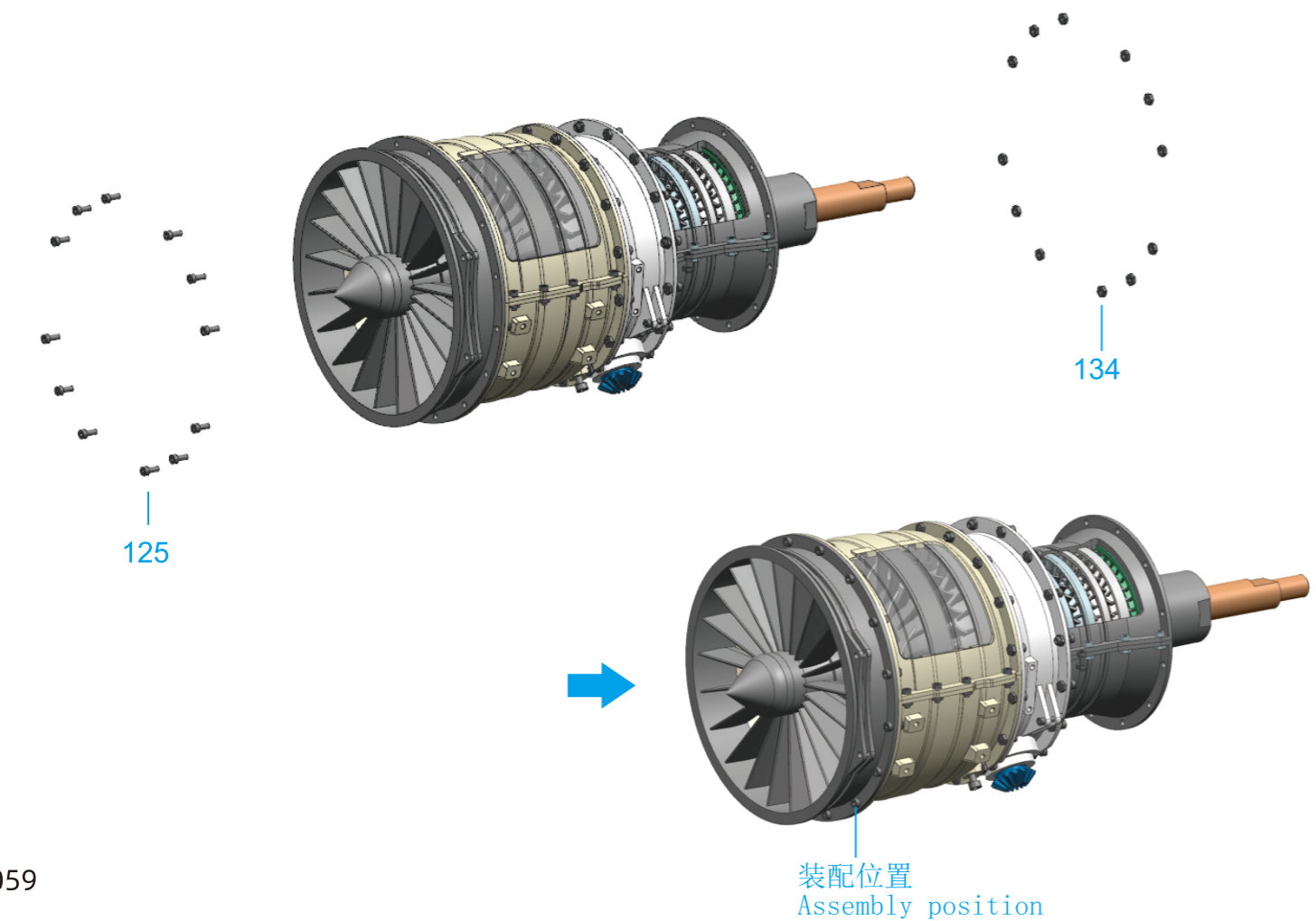
装配位置  
Assembly position



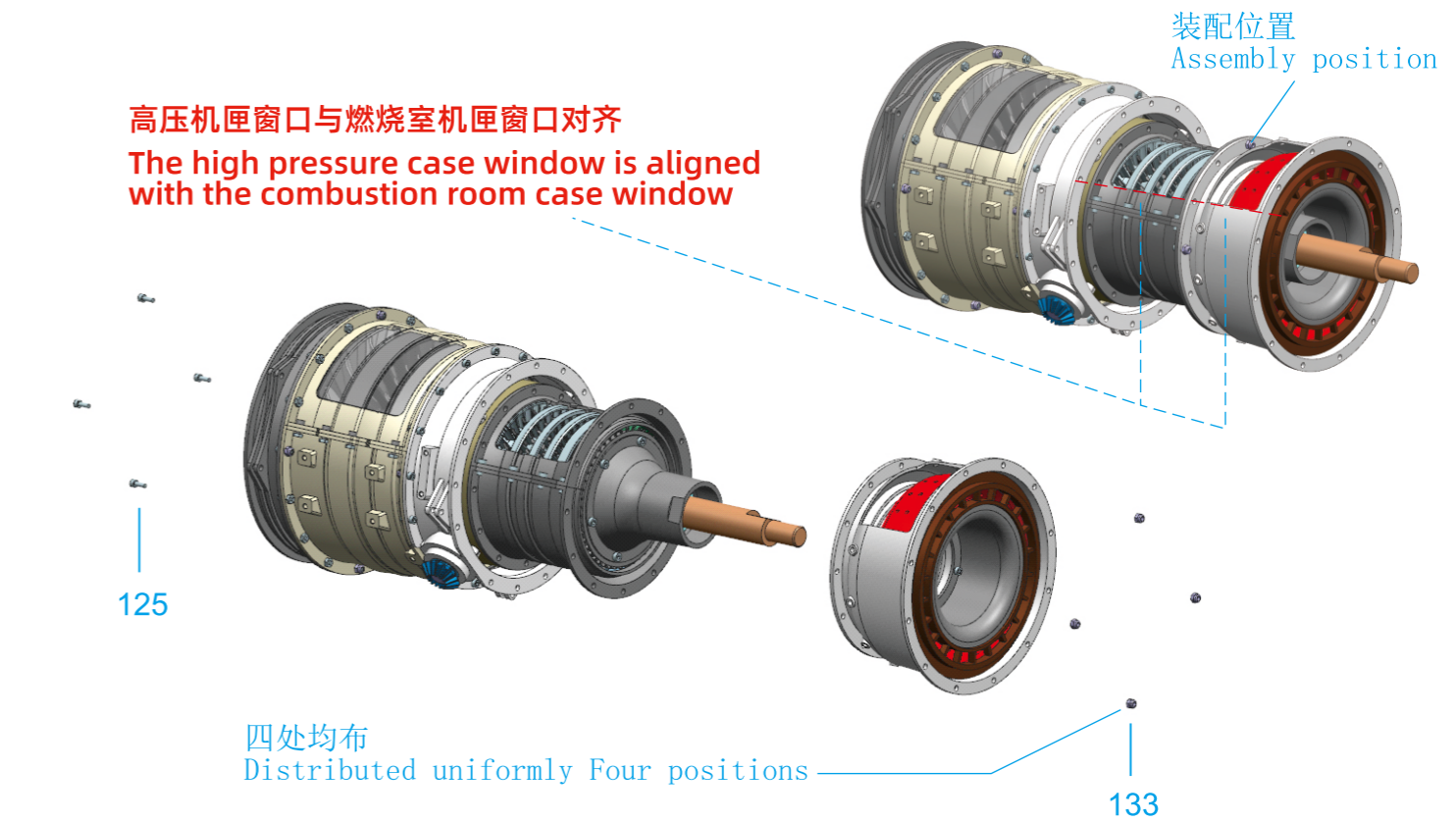
12.8、组装进气机匣组件防松螺丝 Assemble the anti loosening screws of the intake gearbox assembly



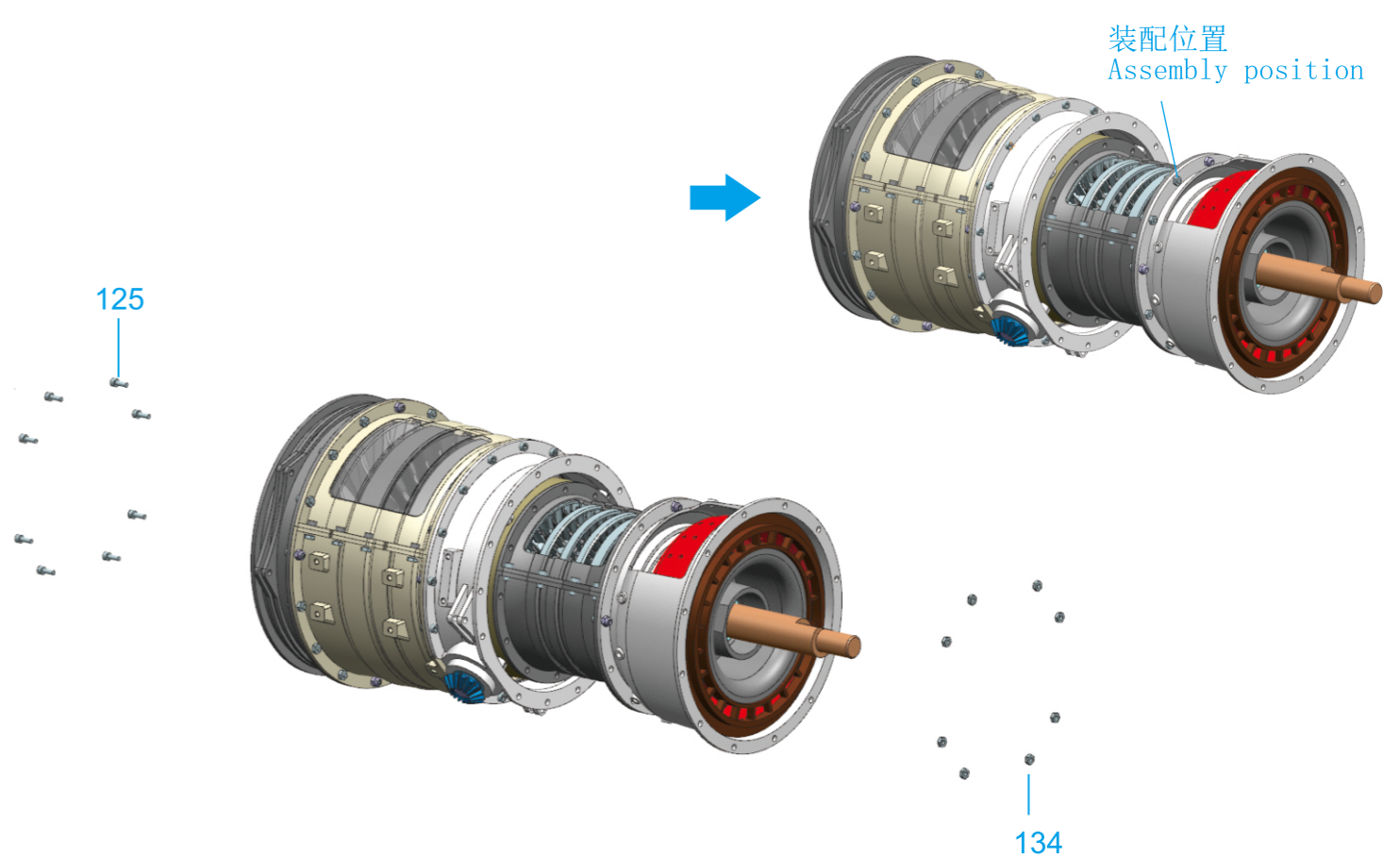
12.9、组装进气机匣组件标准螺丝 Assemble the standard screws of the intake gearbox assembly



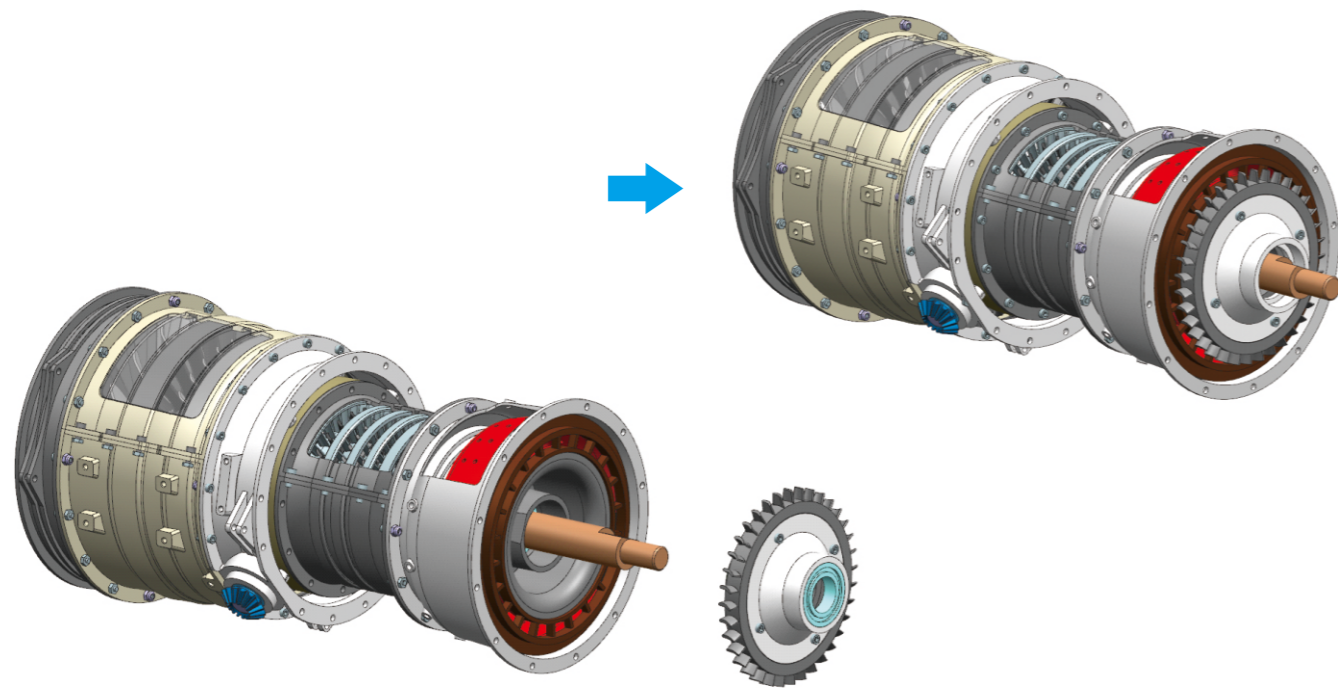
12.10、组装燃烧室总成防松螺丝 Assemble the anti loosening screws of the combustion chamber assembly



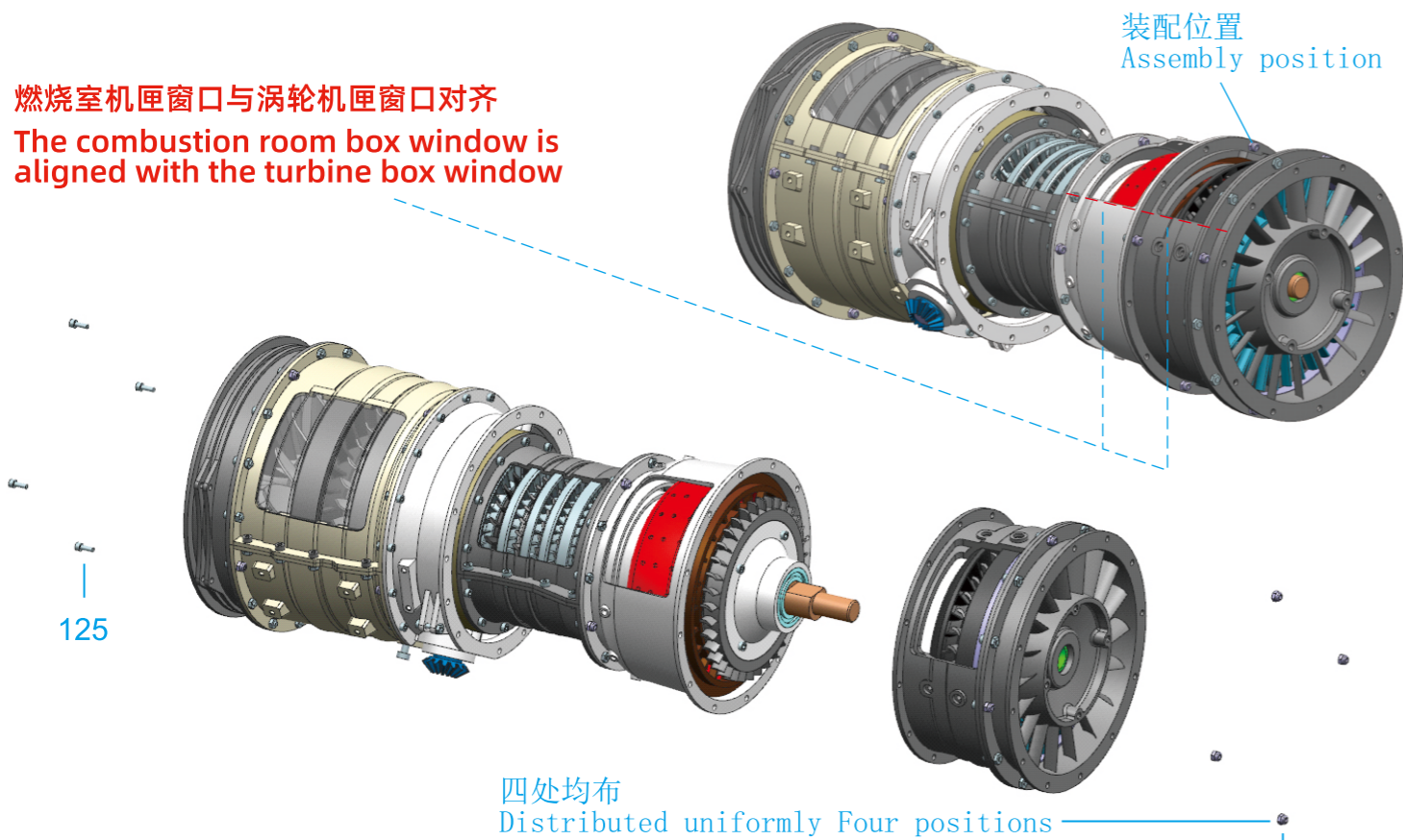
12.11、组装燃烧室总成标准螺丝 Assemble standard screws for combustion chamber assembly



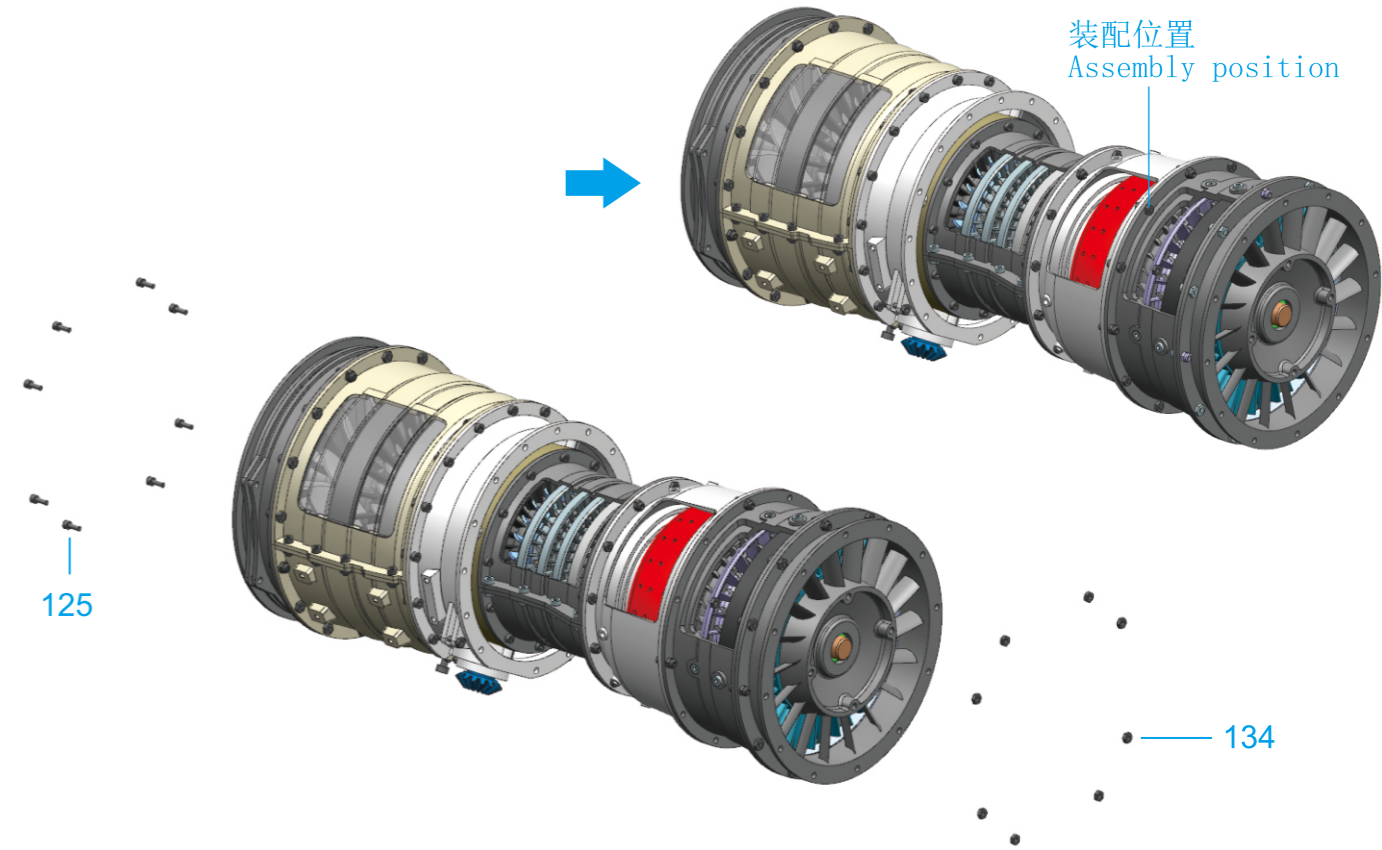
12.12、组装高压涡轮总成 Assemble the high-pressure turbine assembly



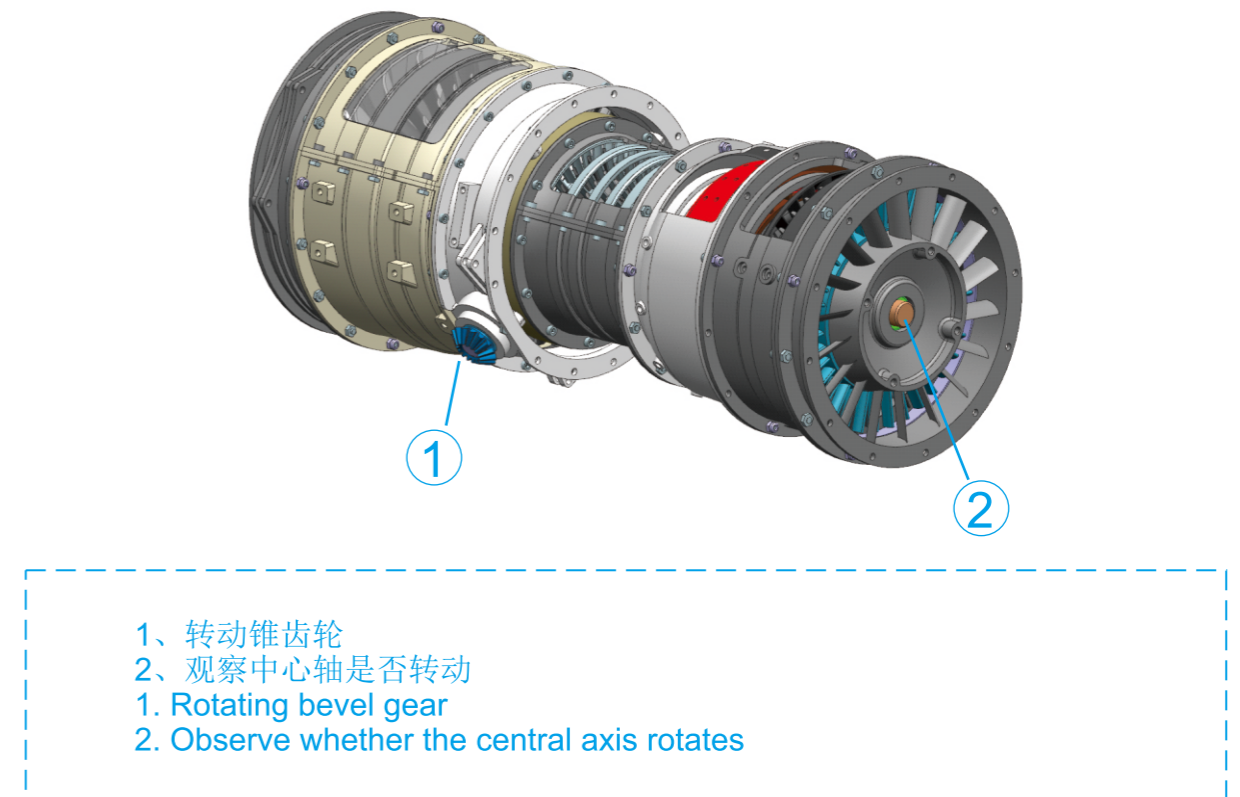
12.13、组装低压涡轮总成防松螺丝 Assemble the anti loosening screws of the low-pressure turbine assembly



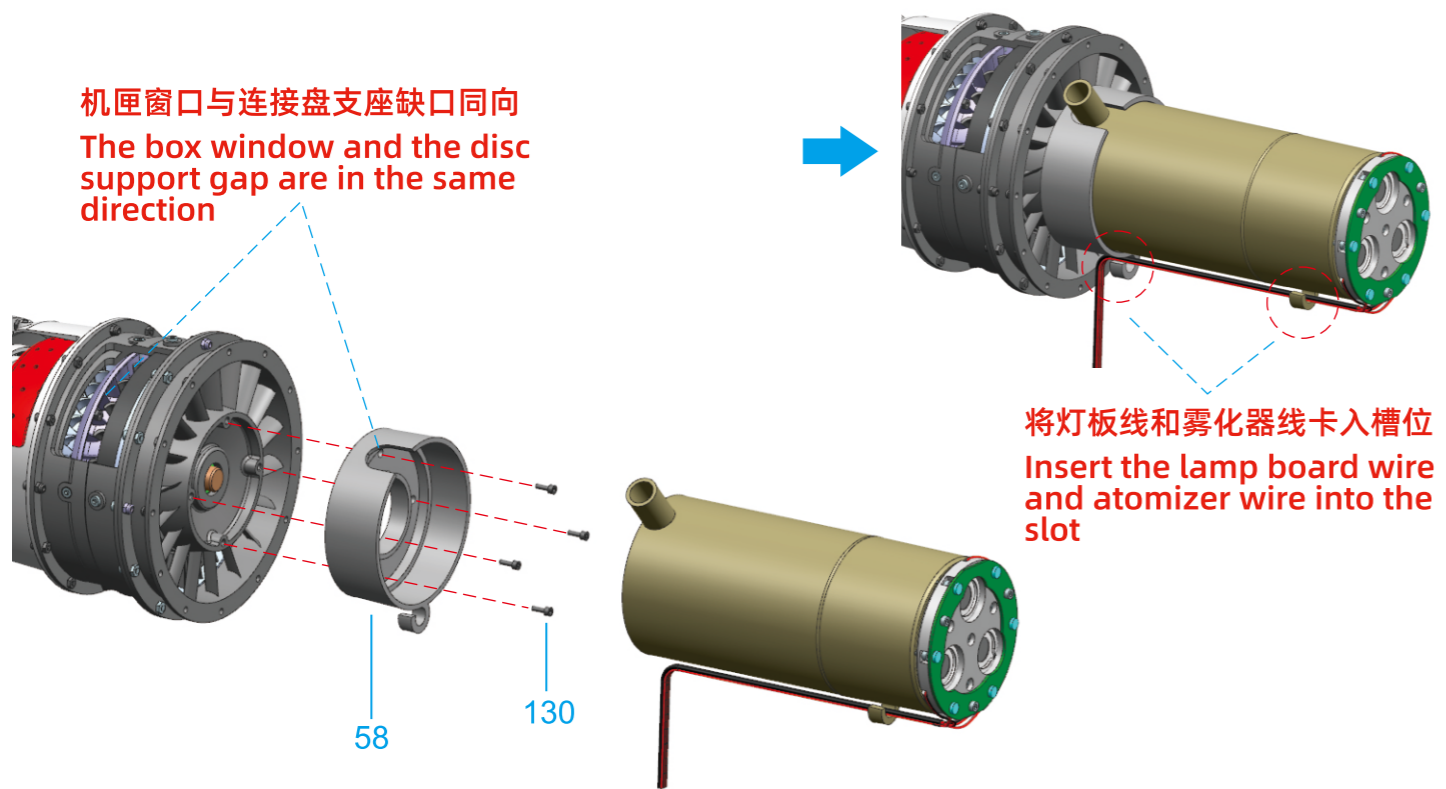
12.14、组装低压涡轮总成标准螺丝 Assemble standard screws for low pressure turbine assembly



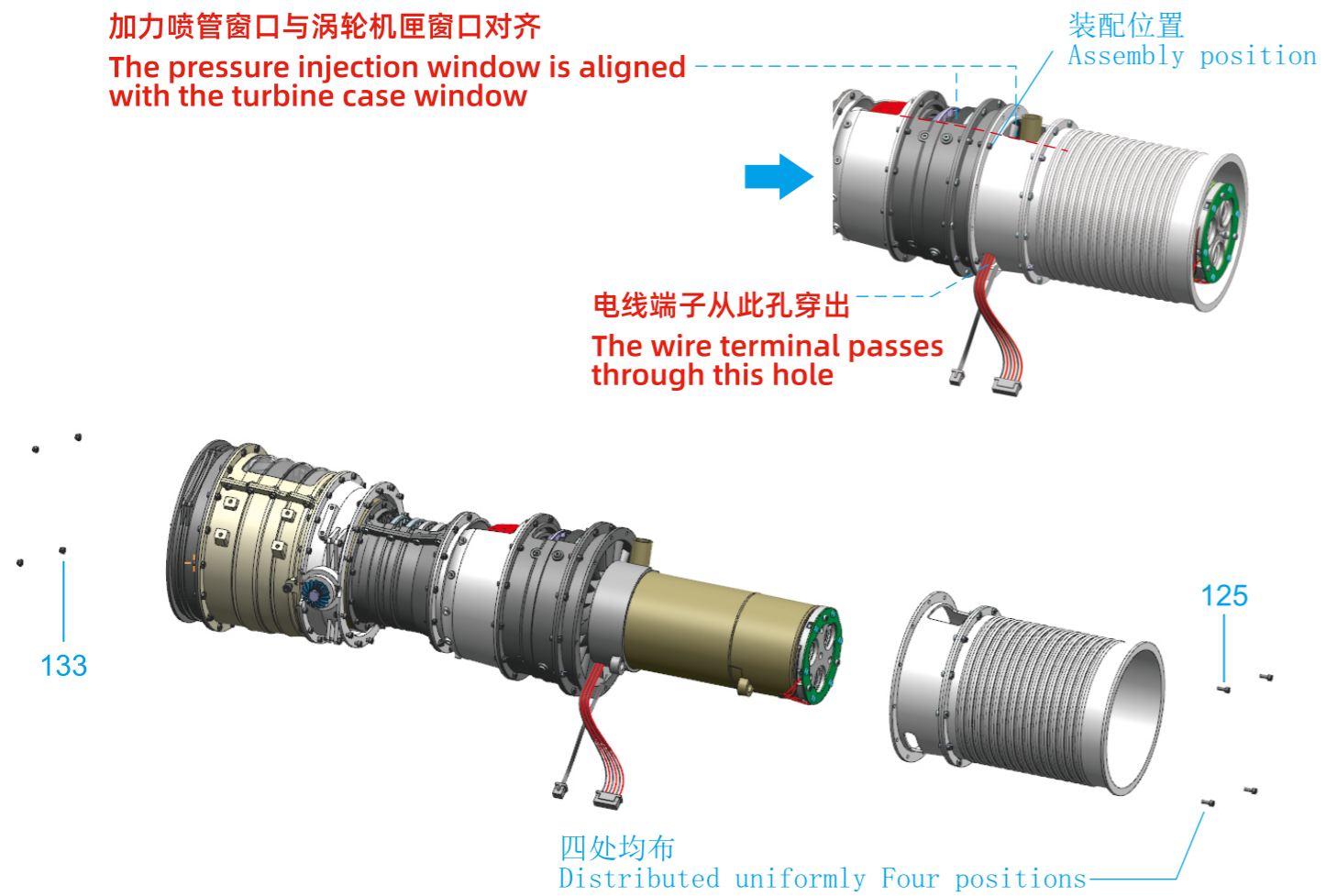
12.15、测试 Test



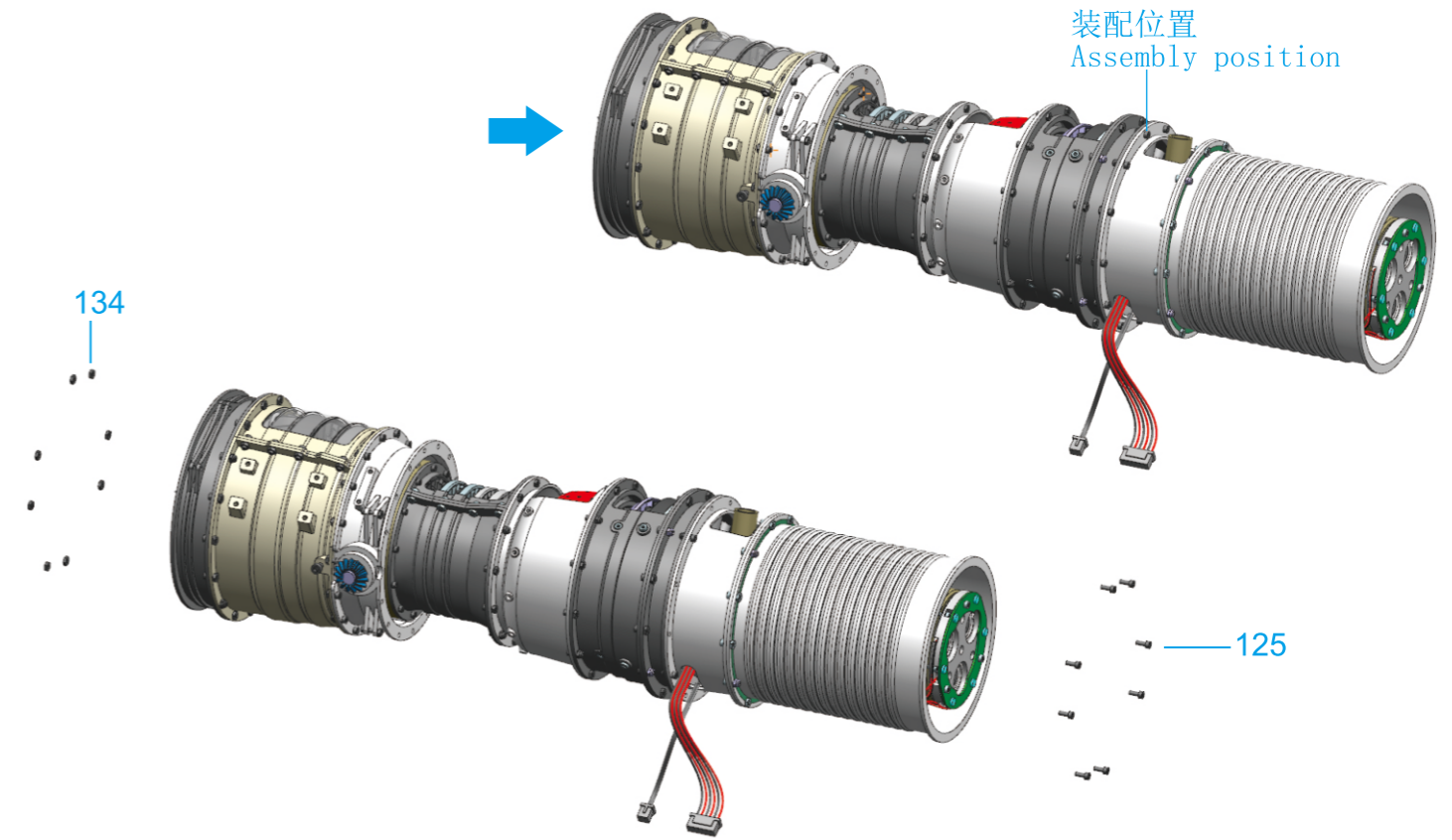
12.16、组装喷雾总成 Assembly of spray assembly



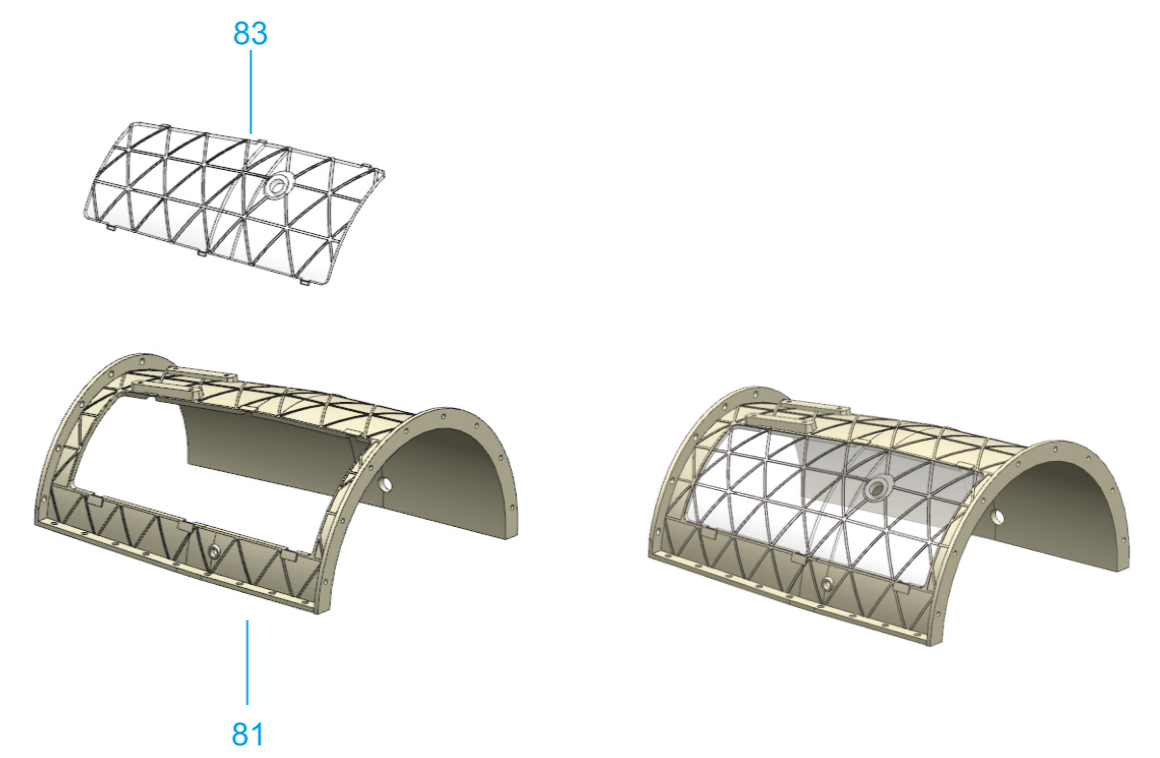
12.17、组装加力喷管总成防松螺丝 Assemble the anti loosening screw of the booster nozzle assembly



12.18、组装加力喷管总成标准螺丝 Assemble the standard screw of the booster nozzle assembly

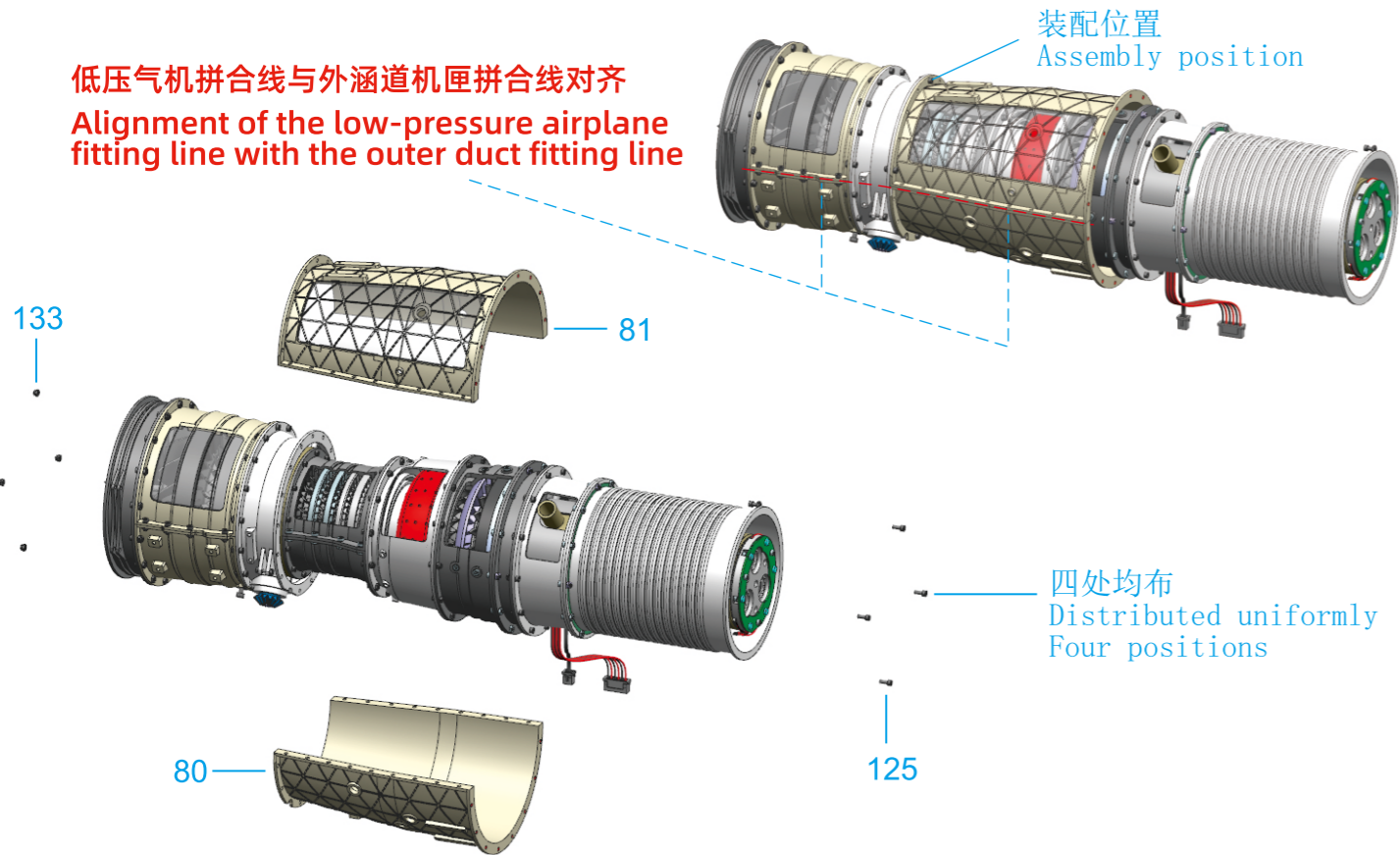


12.19、组装外涵道窗板 Assemble the external culvert window panel



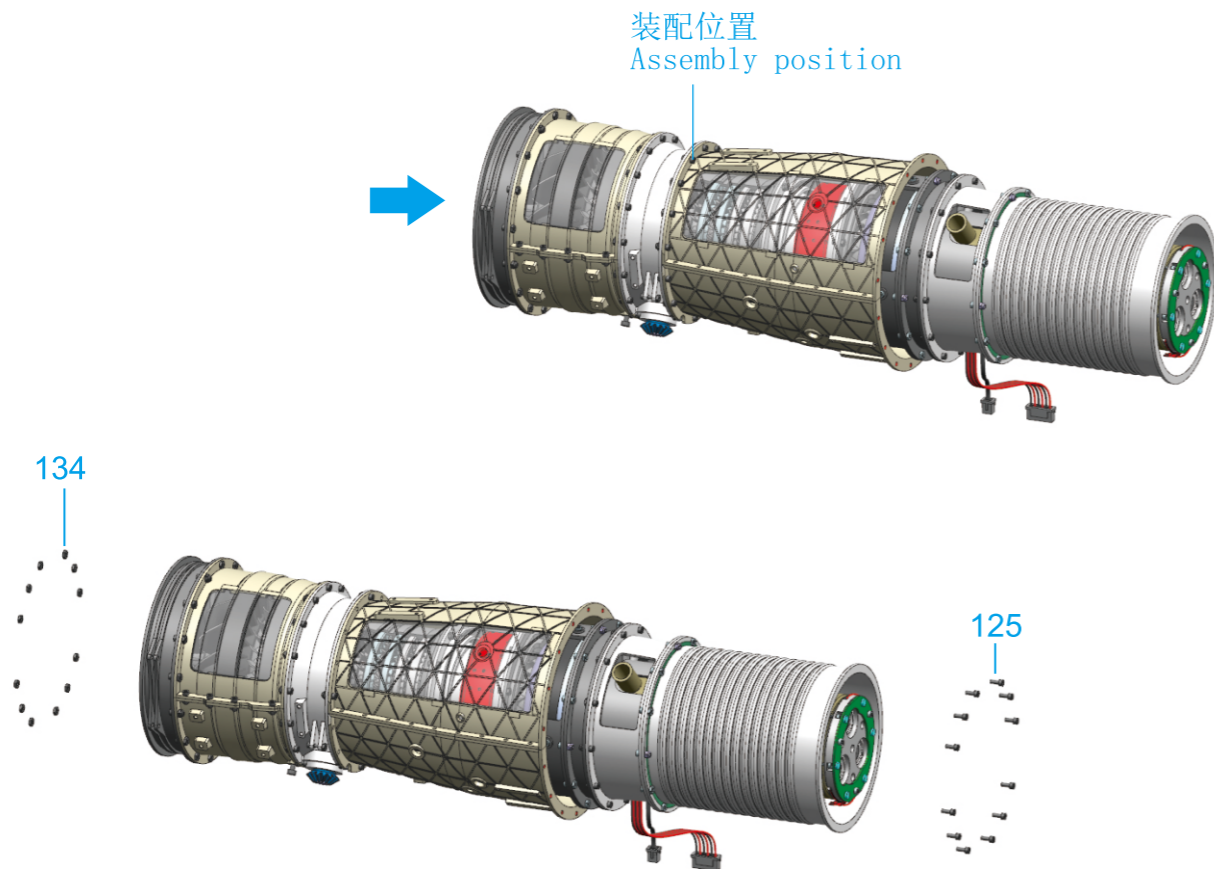
12.20、组装外涵道机匣防松螺丝 Assemble the anti loosening screws of the culvert casing

低压气机拼合线与外涵道机匣拼合线对齐  
Alignment of the low-pressure airplane fitting line with the outer duct fitting line



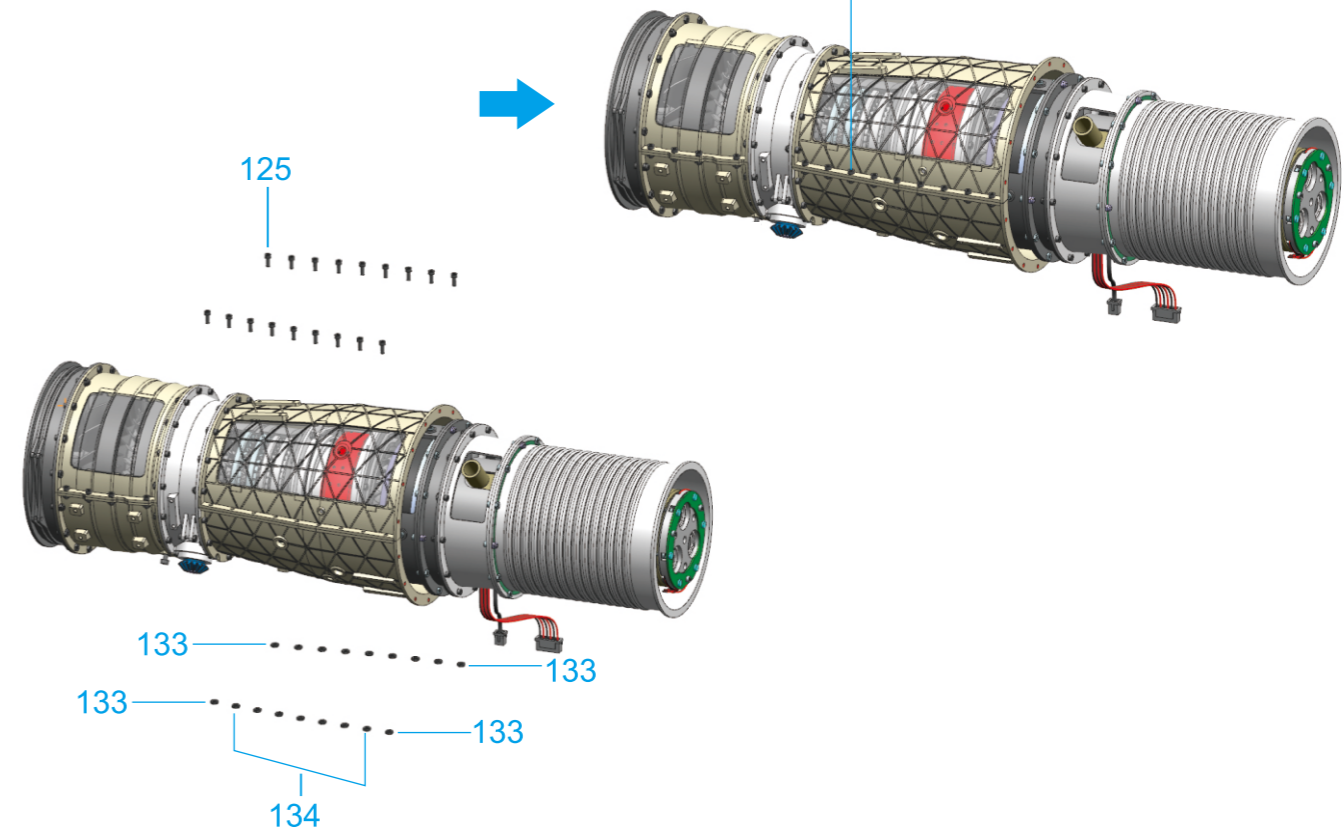
12.21、组装外涵道机匣标准螺丝 Assemble the standard screws for the culvert casing

装配位置  
Assembly position



12.22、组装机匣螺丝 Assemble the casing screws

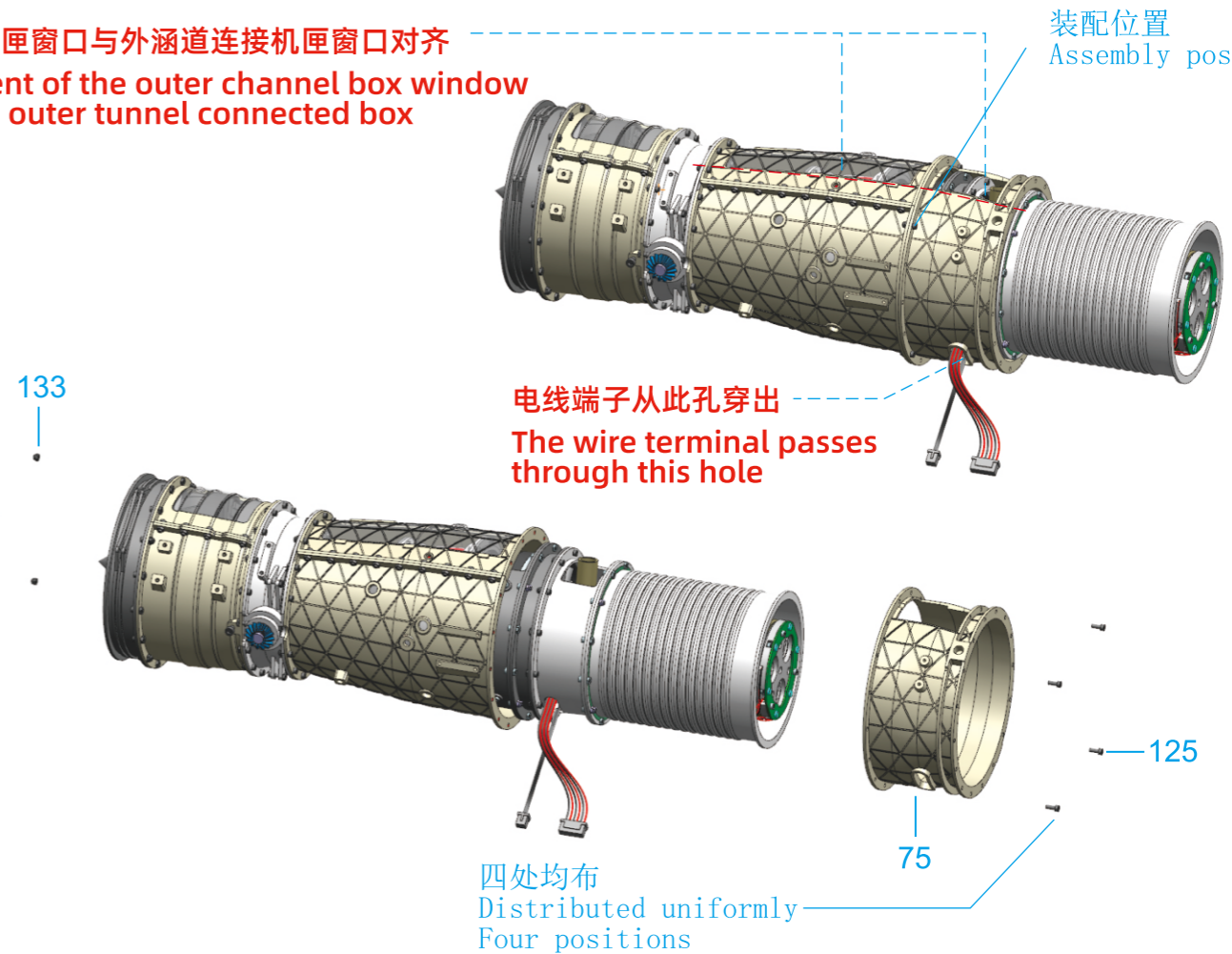
装配位置  
Assembly position



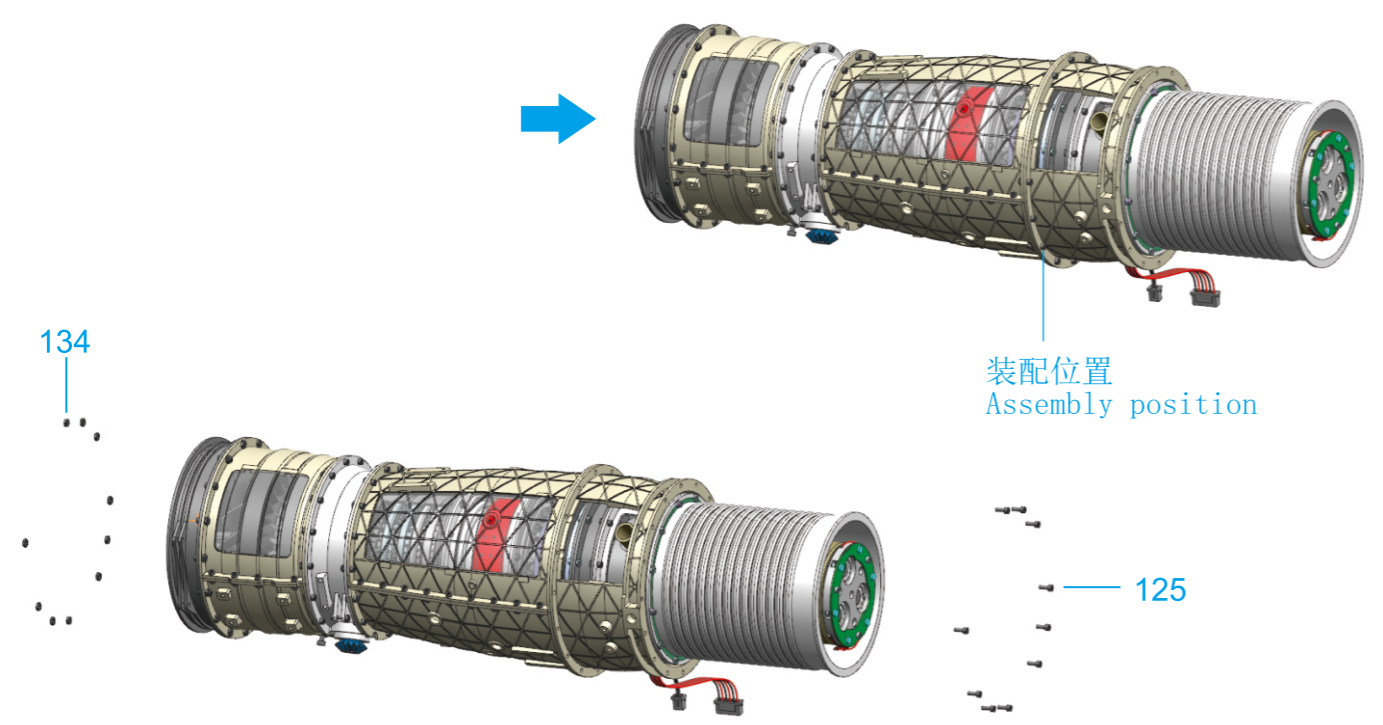
12.23、组装外涵道连接机匣防松螺丝  
Assemble the anti loosening screws of the external culvert connection box

外涵道机匣窗口与外涵道连接机匣窗口对齐  
Alignment of the outer channel box window with the outer tunnel connected box window

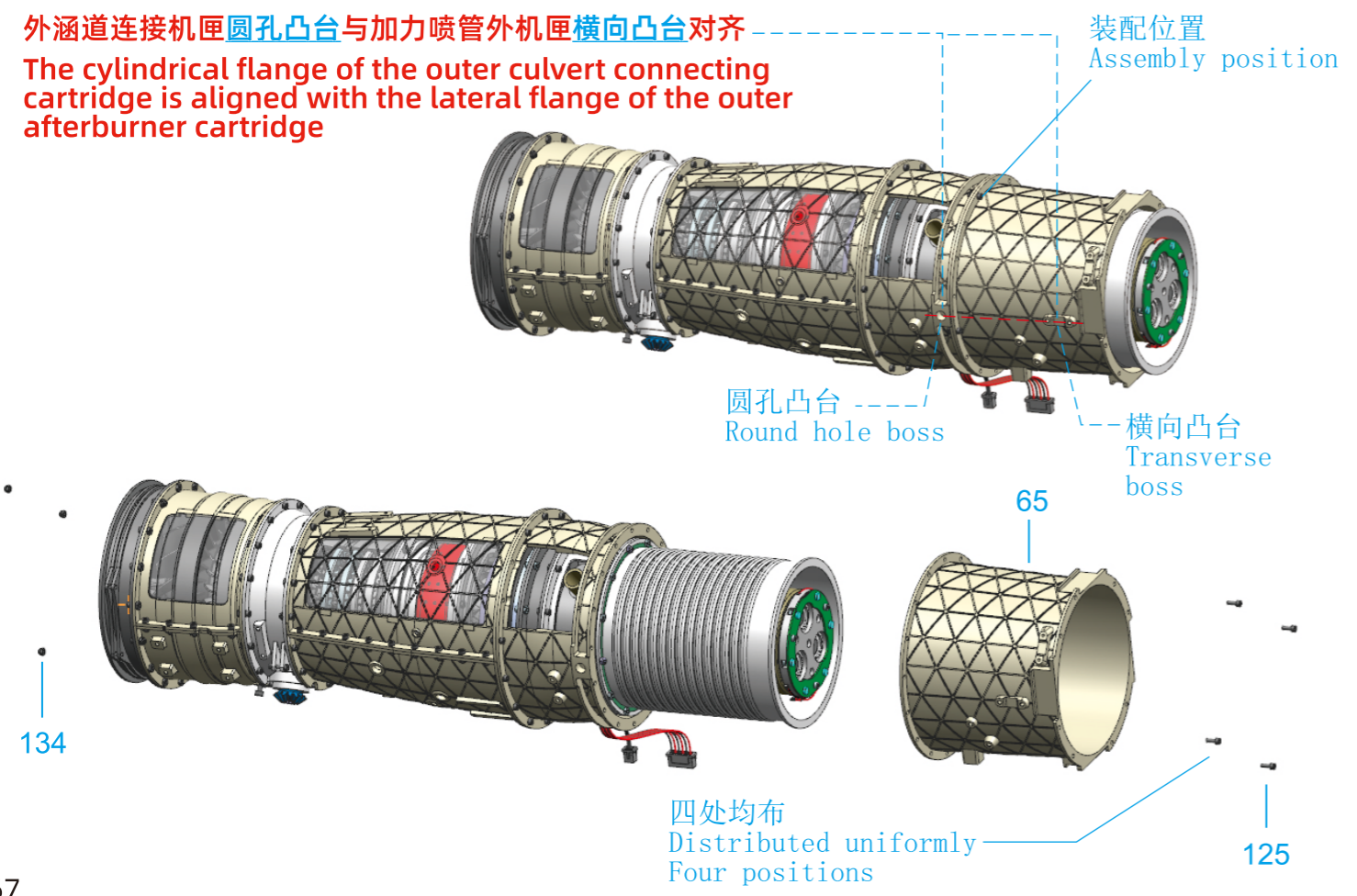
装配位置  
Assembly position



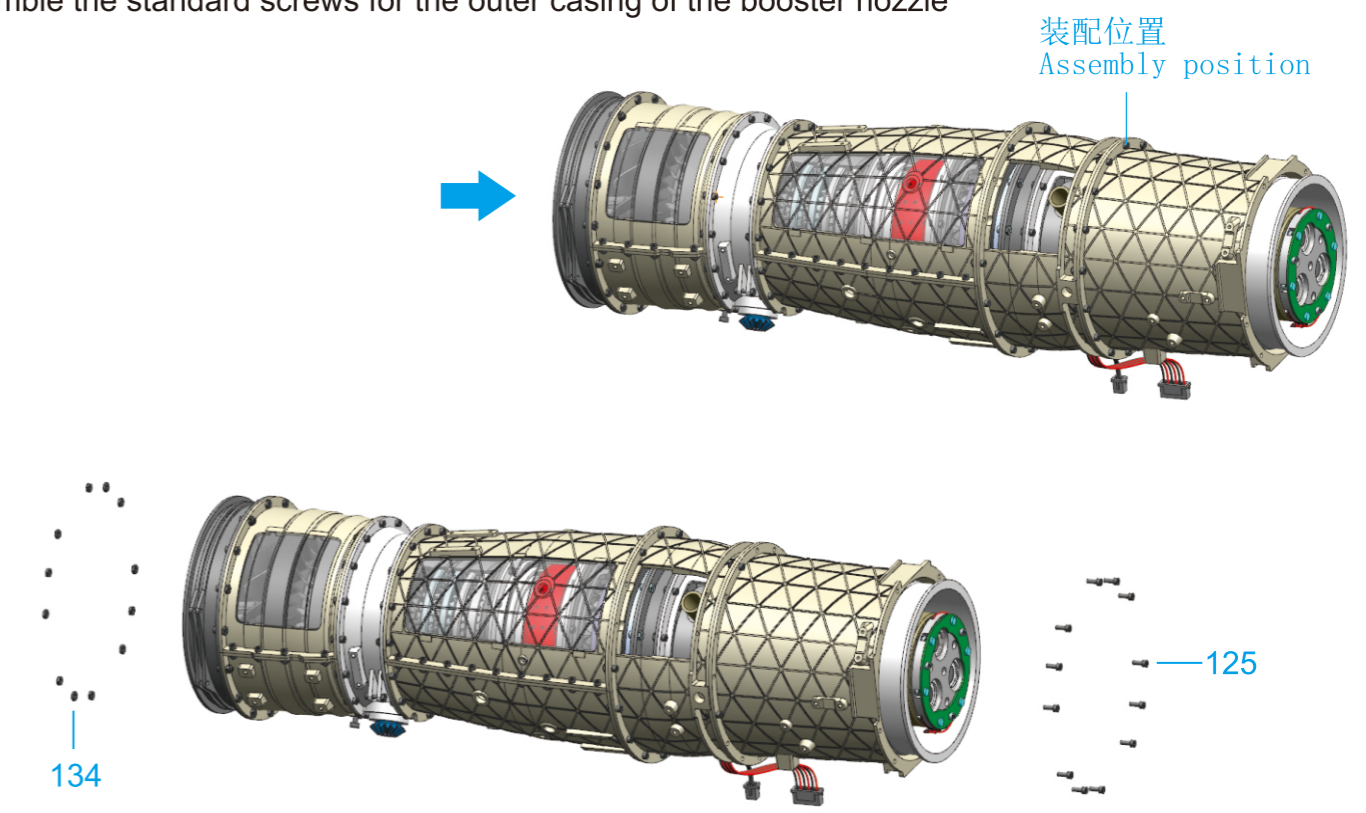
12.24、组装外涵道连接机匣标准螺丝  
Assemble the standard screws for connecting the casing of the external culvert



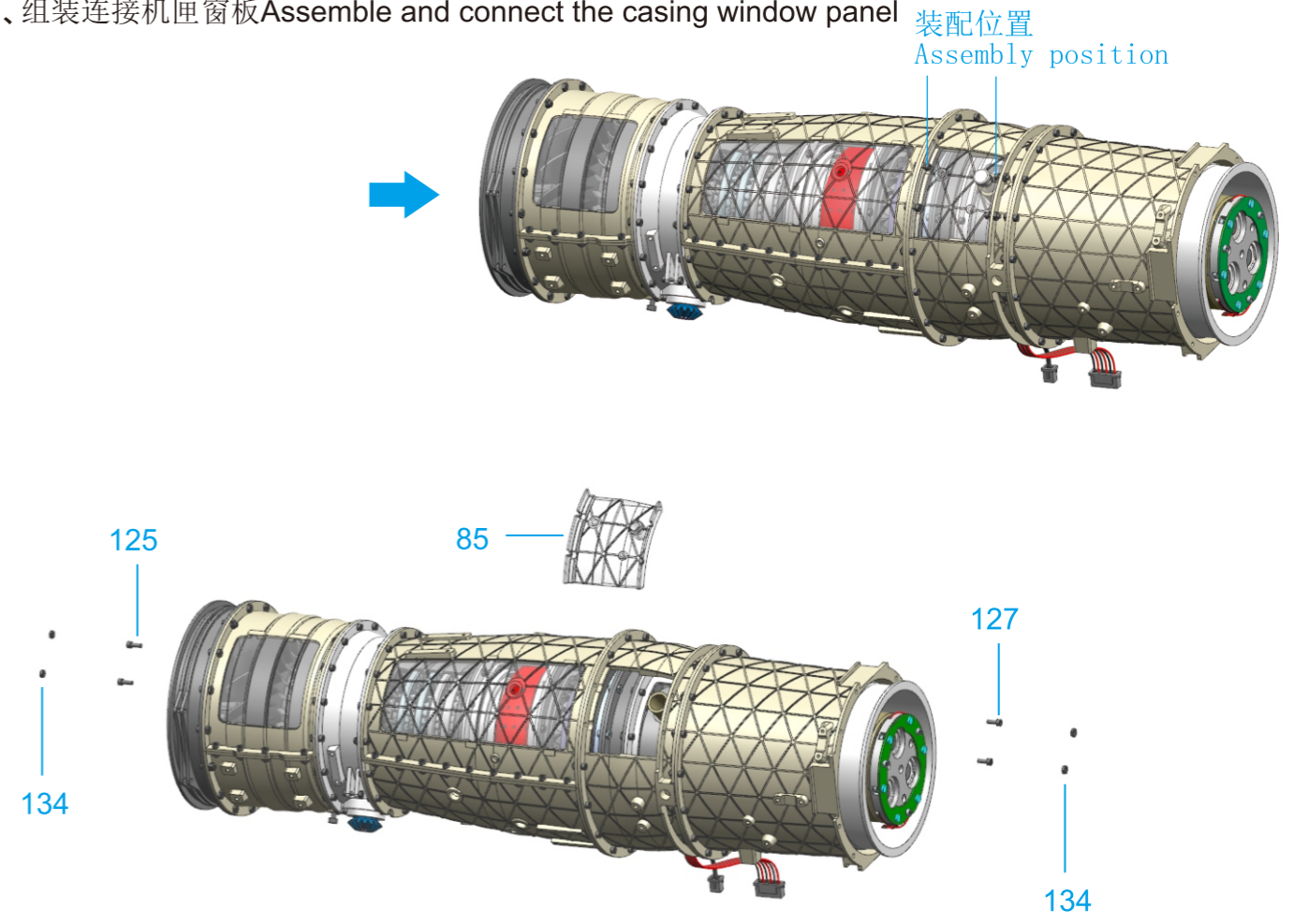
12.25、组装加力喷管外机匣防松螺丝  
Assemble the anti loosening screw of the outer casing of the booster nozzle



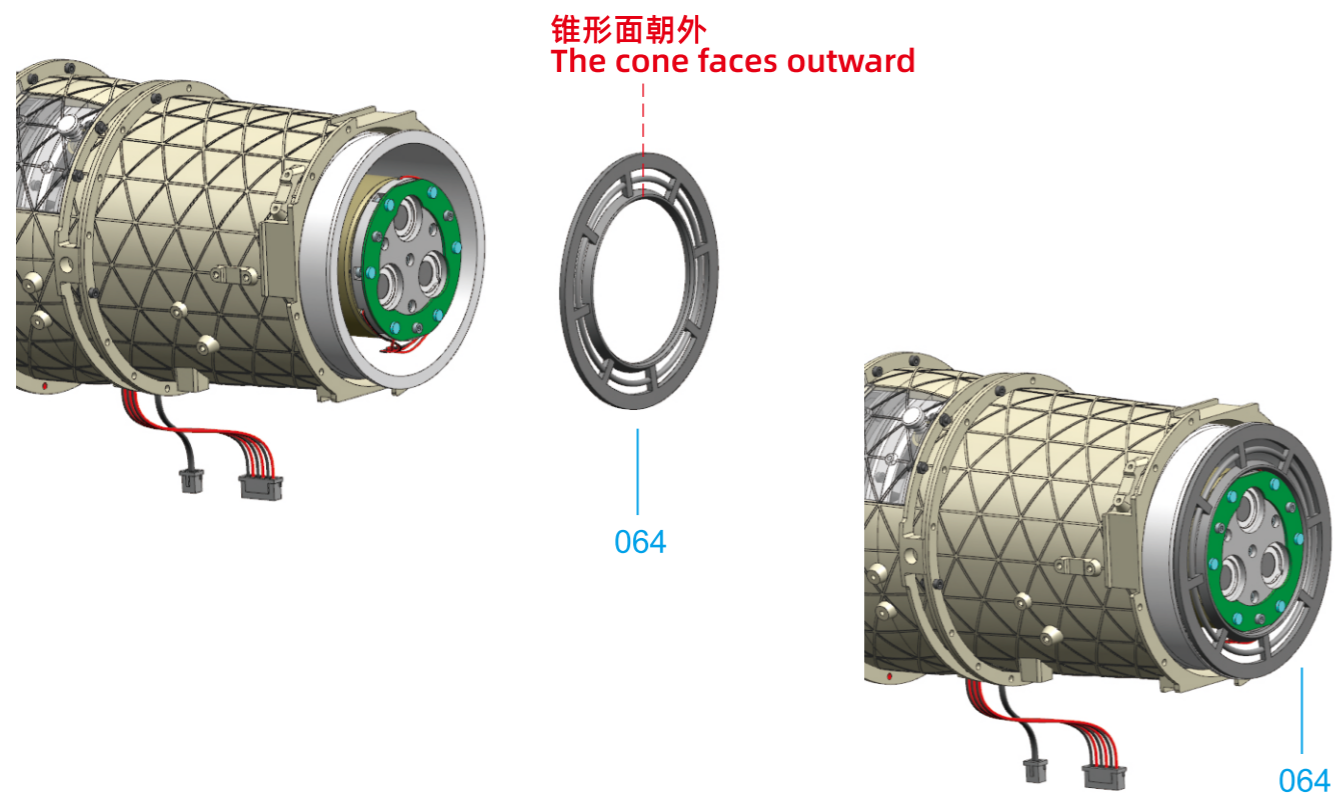
12.26、组装加力喷管外机匣标准螺丝  
Assemble the standard screws for the outer casing of the booster nozzle



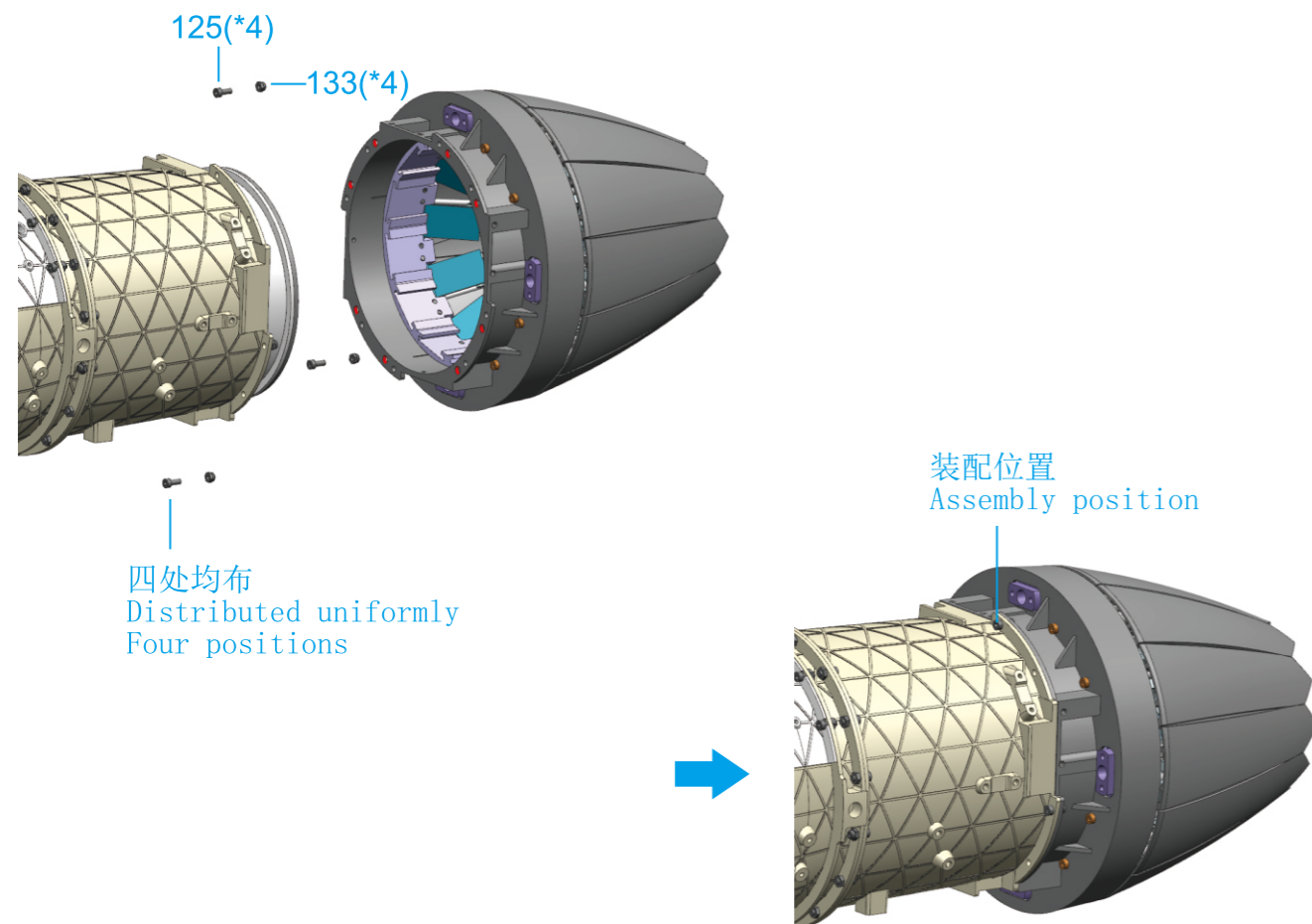
12.27、组装连接机匣窗板  
Assemble and connect the casing window panel



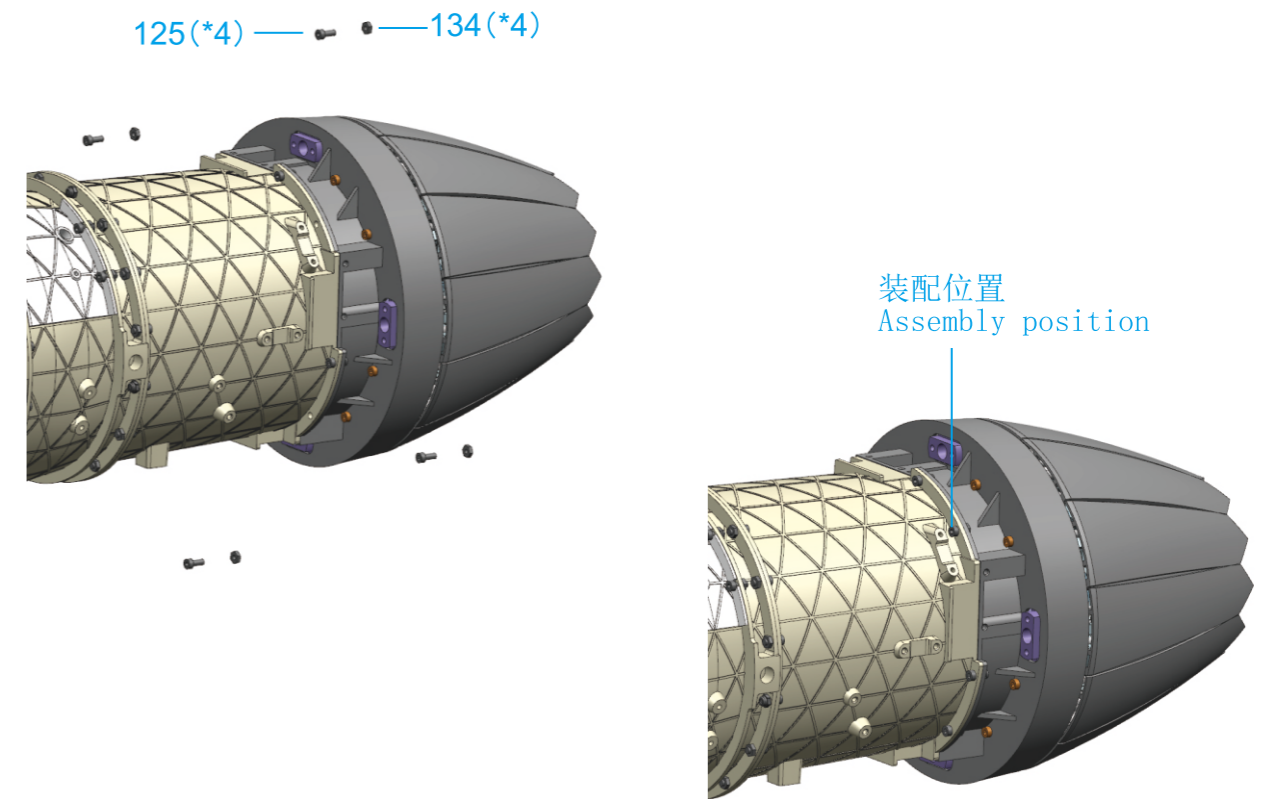
12.28、组装火焰稳定器 Assemble flame stabilizer



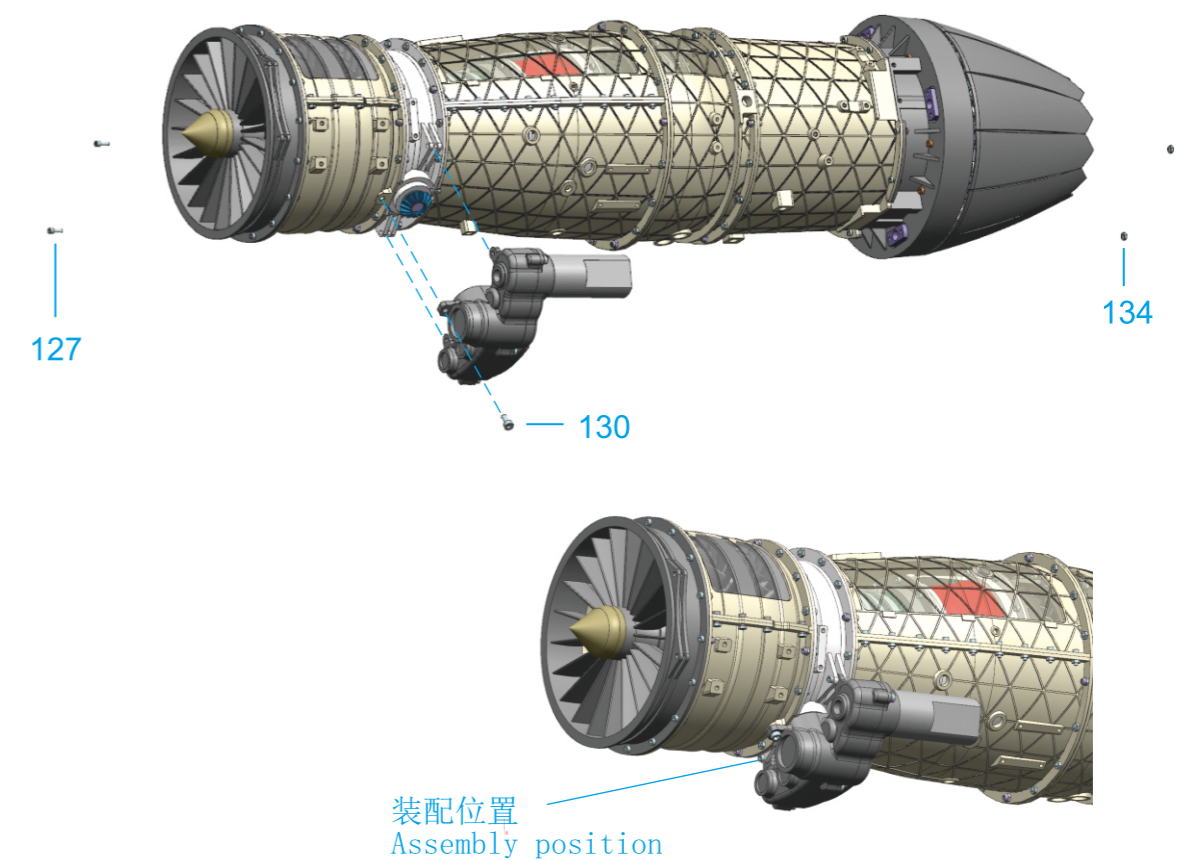
12.29、组装尾喷总成防松螺丝 Assemble the tail spray assembly anti loosening screw



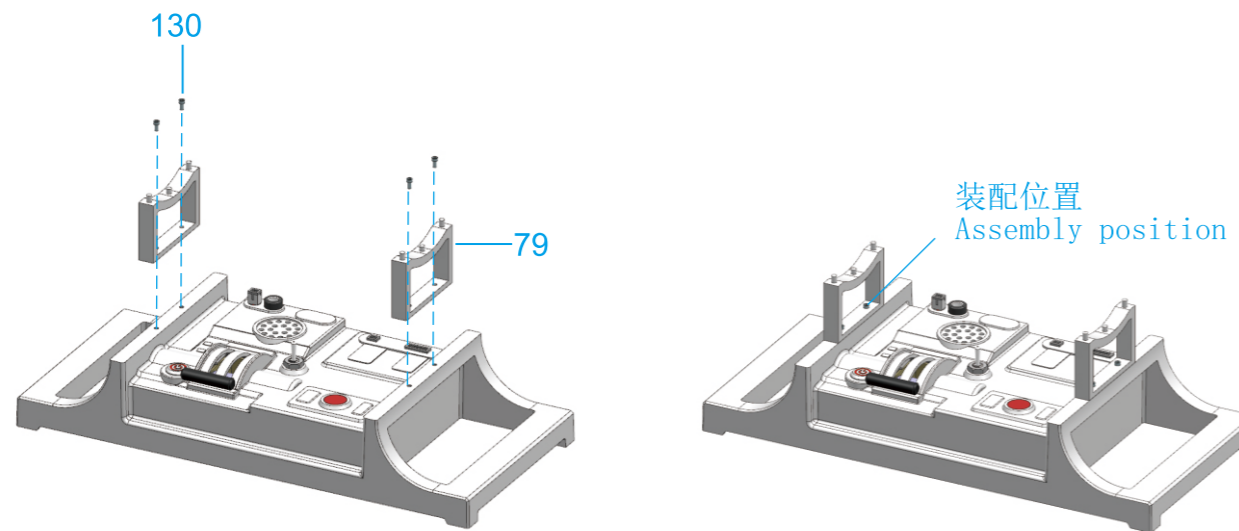
12.30、组装尾喷总成标准螺丝 Assemble the standard screws of the tail spray assembly



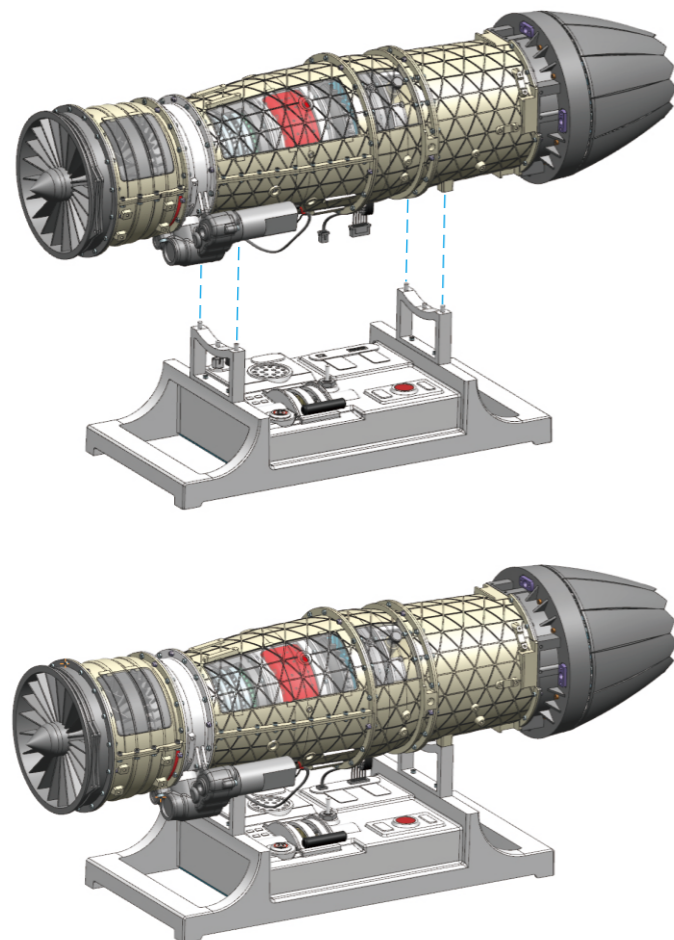
12.31、组装齿轮箱总成 Assemble the gearbox assembly



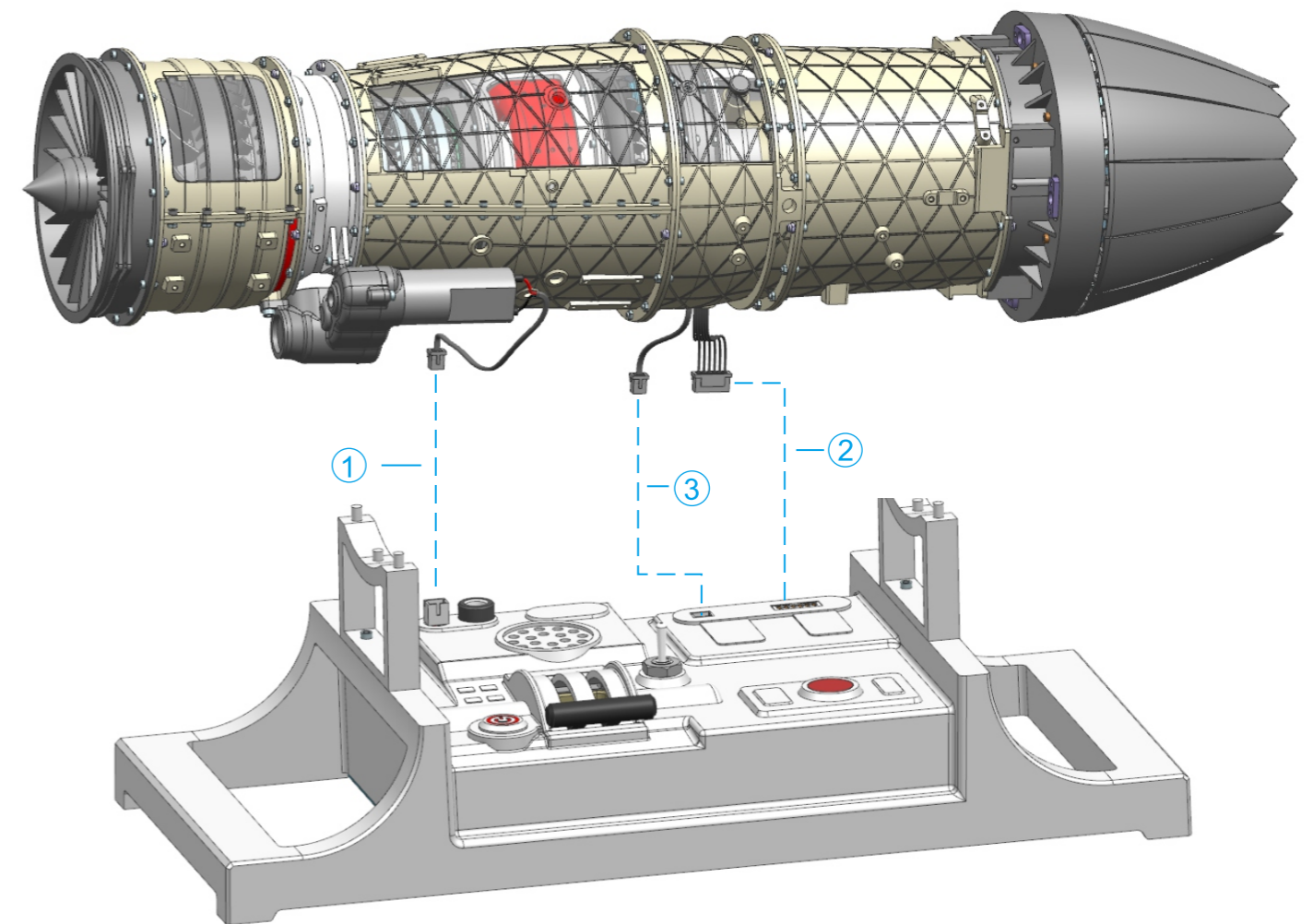
## 12.32、组装底座立柱Assemble the base column



## 12.33、组装底座Assemble the base

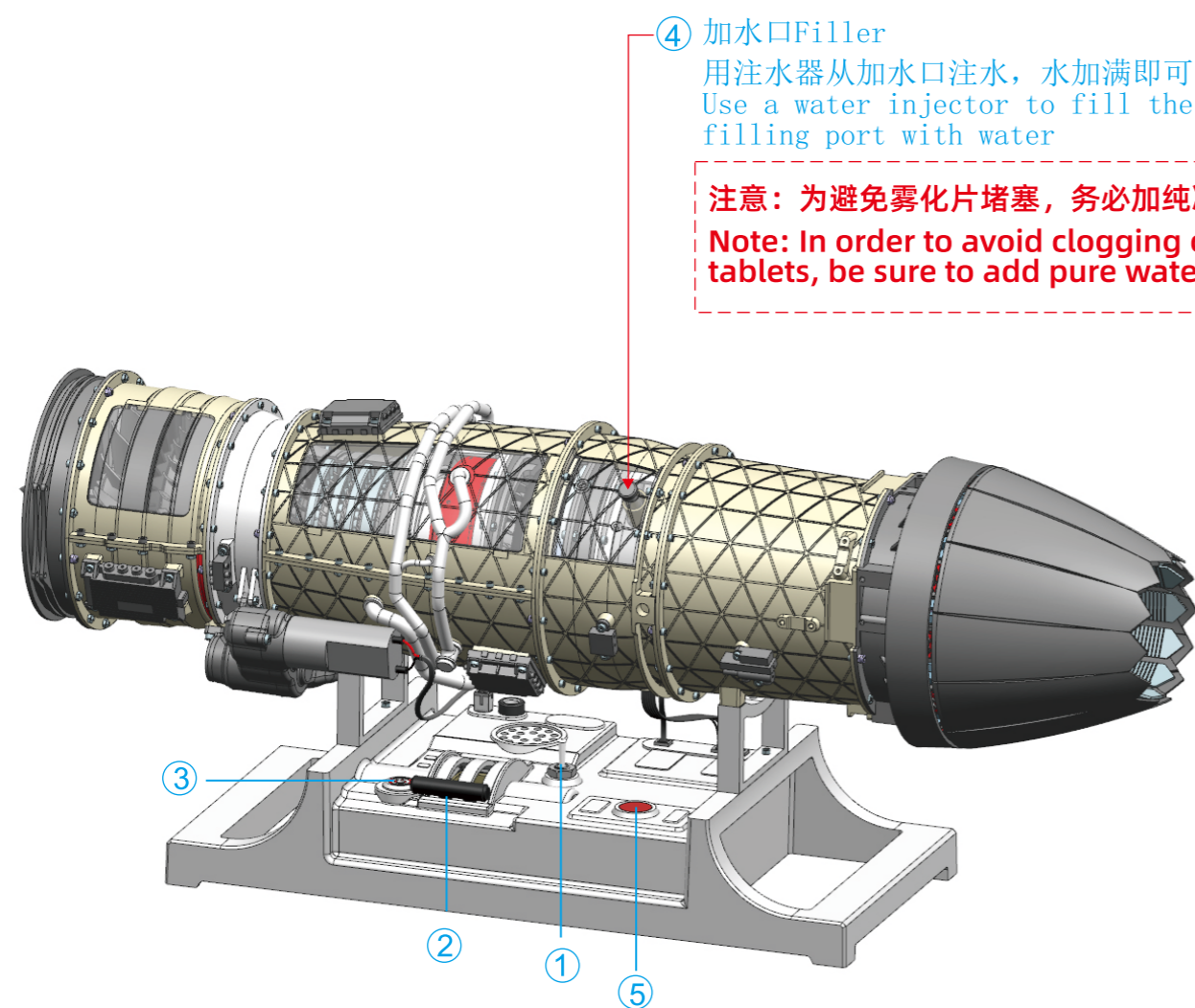


## 12.34、连接电线Connect the wires



- 1、连接电机线
- 2、连接雾化器线
- 3、连接灯板线
1. Connect the motor wires
2. Connect the atomizer cable
3. Connect the light board cable

## 12.35、测试Test



- ④ 加水口Filler  
用注水器从加水口注水，水加满即可  
Use a water injector to fill the filling port with water

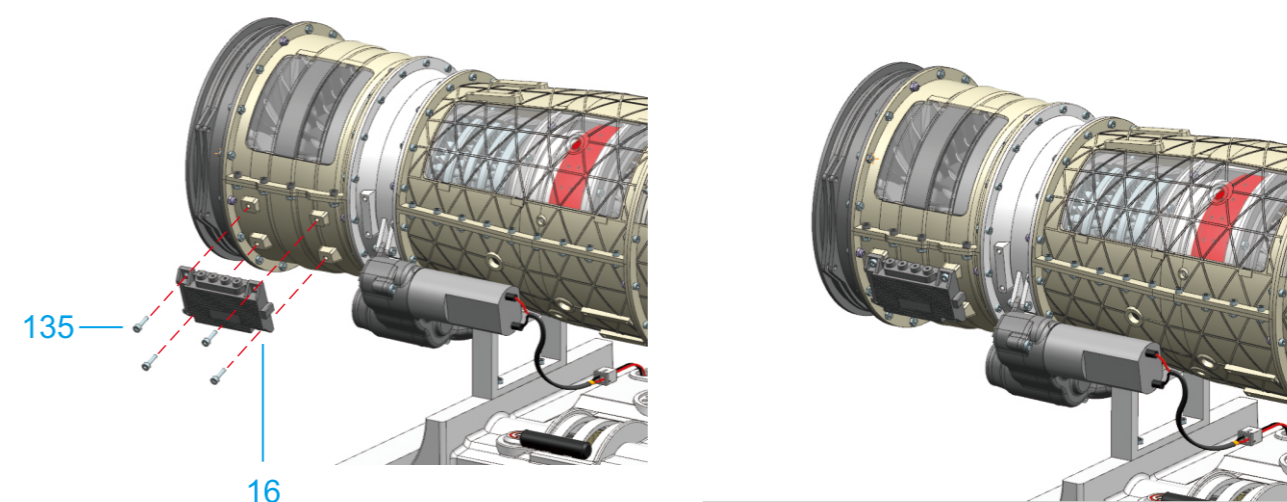
**注意：为避免雾化片堵塞，务必加纯净水。**  
**Note: In order to avoid clogging of atomizing tablets, be sure to add pure water.**

- 1、打开总开关（往前推使用电池供电，往后推使用5V直流供电，中间是停止）  
2、将推杆拉到最低位  
3、打开声音开关  
4、加水  
5、打开雾化器开关（按一次是1档，灯亮起并且有喷雾，按二次是2档，喷雾量增大）  
1. Open the main switch (push forward to use battery power, push back to use 5V DC power, stop in the middle)  
2. Pull the push rod to the lowest position  
3. Turn on the sound switch  
4. Add water  
5. Turn on the atomizer switch (press once for 1 gear, the light is on and there is spray, press twice for 2 gear, the spray amount increases)

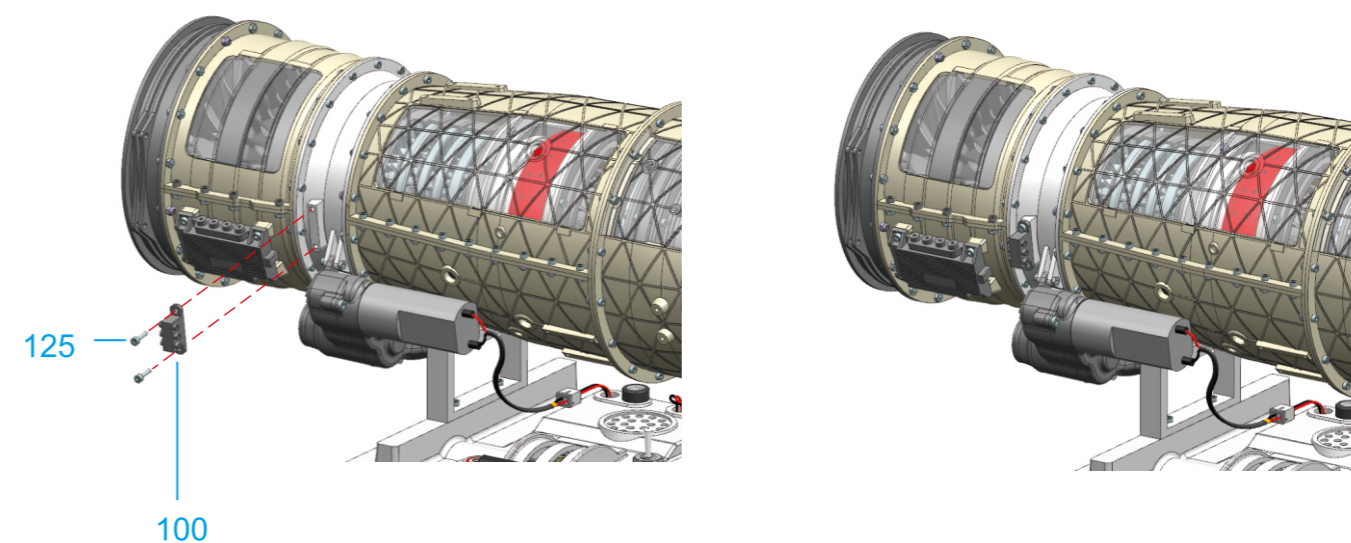
观察各功能是否齐全  
Observe whether all functions are complete

## 十三、组装发动机附件 Assemble engine accessories

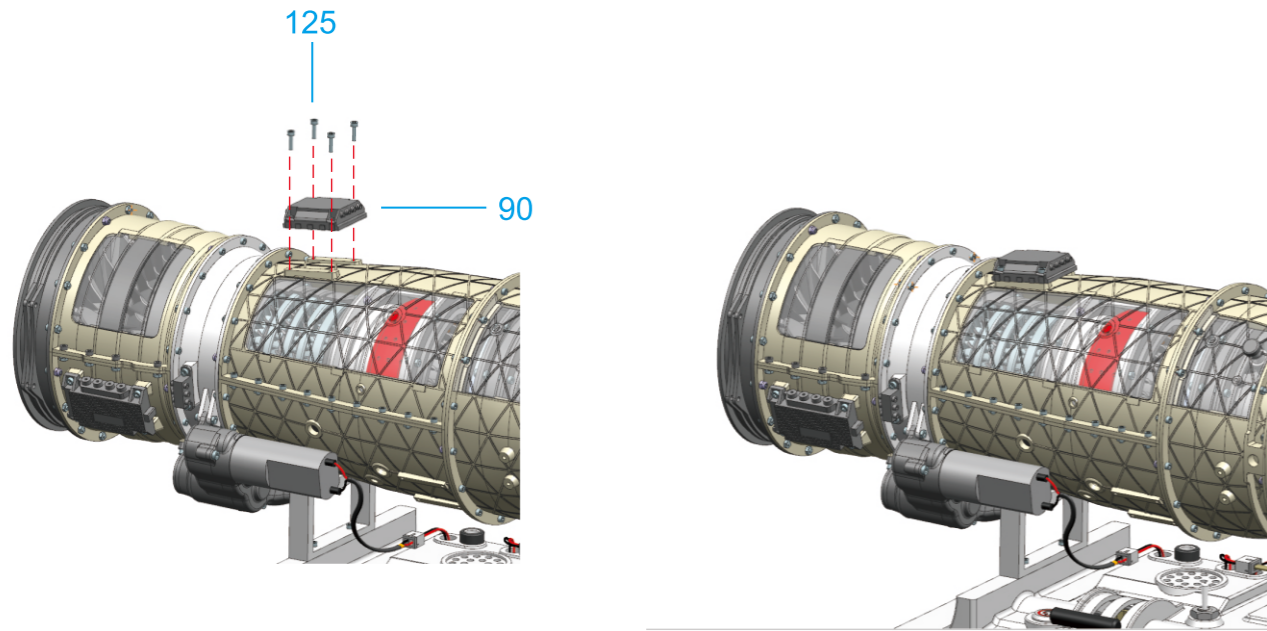
## 13.1、组装电控箱1 Assemble electrical control box 1



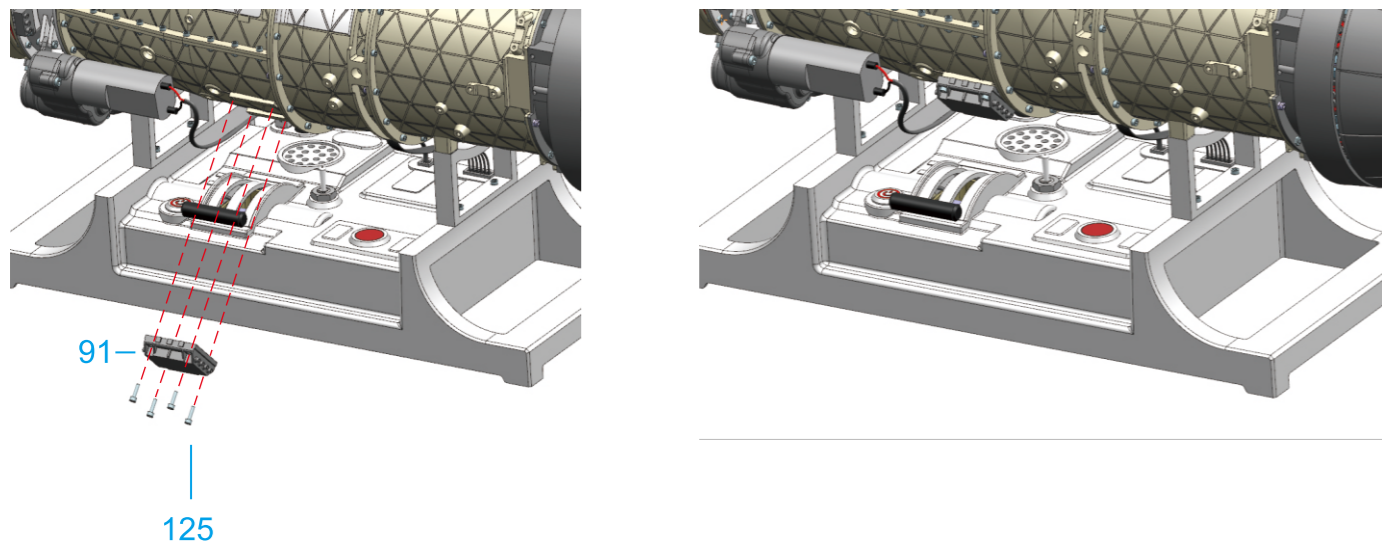
## 13.2、组装连接阀 Assemble the connecting valve



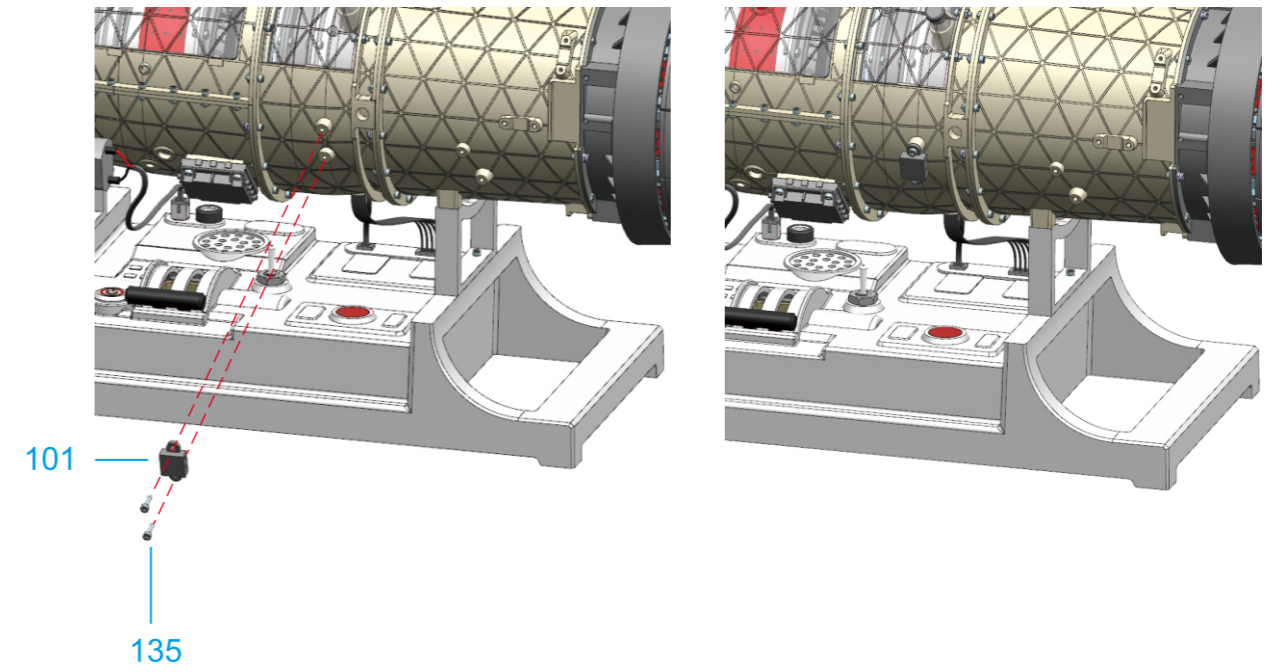
13.3、组装电控箱2 Assemble electrical control box 2



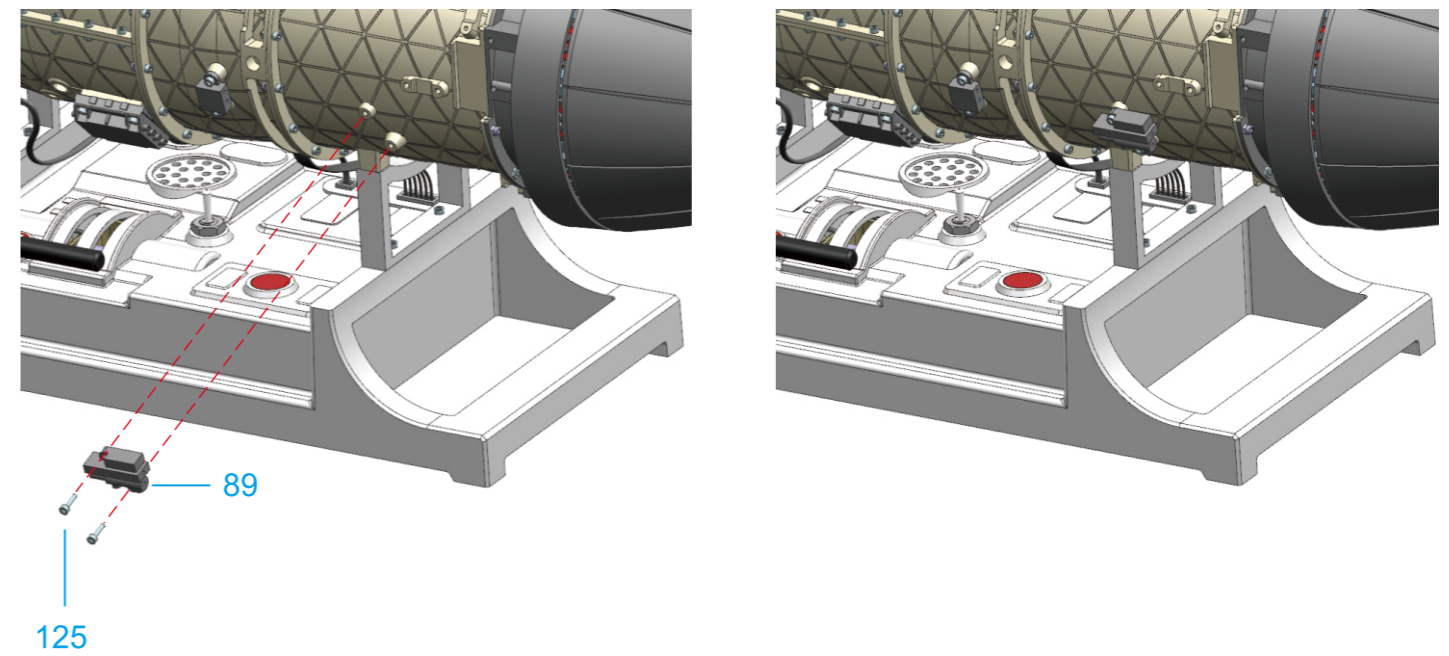
13.4、组装电控箱3 Assemble electrical control box 3



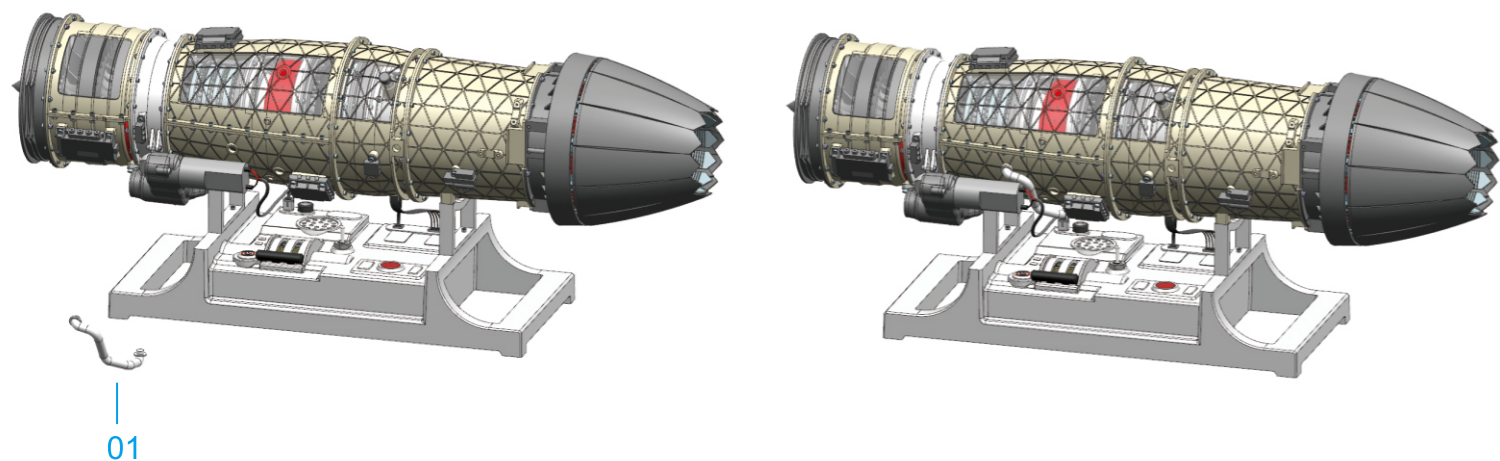
13.5、组装控制阀 Assemble control valve



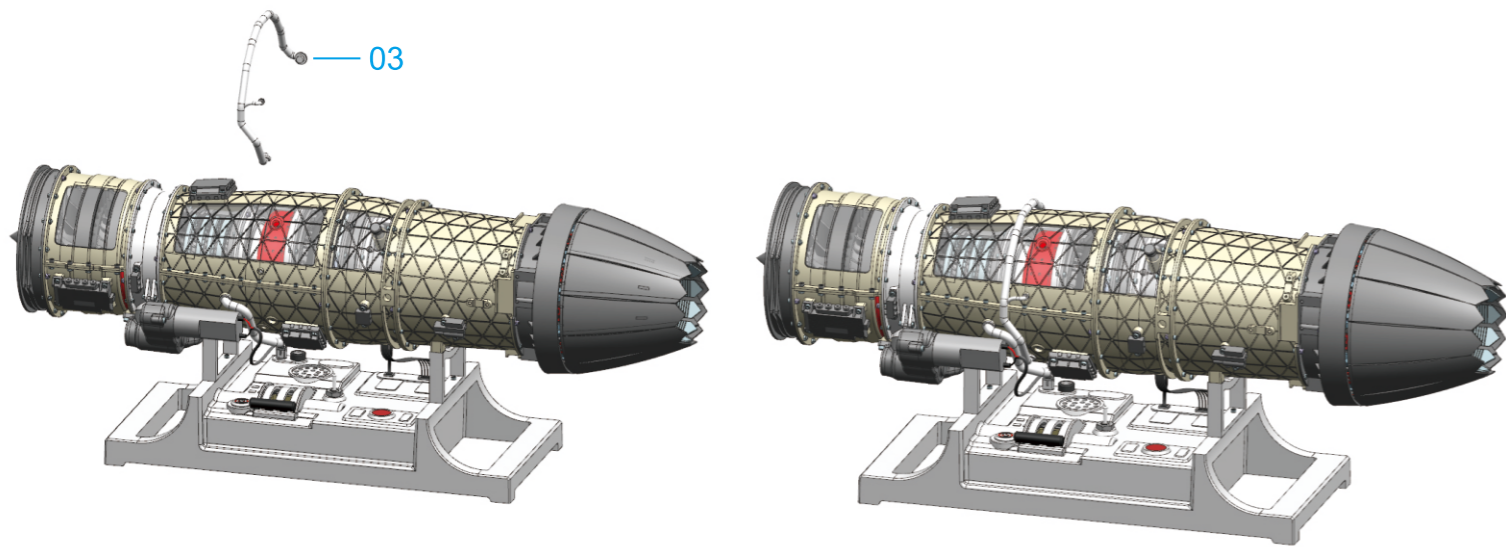
13.6、组装分流阀 Assemble the Diversion valve



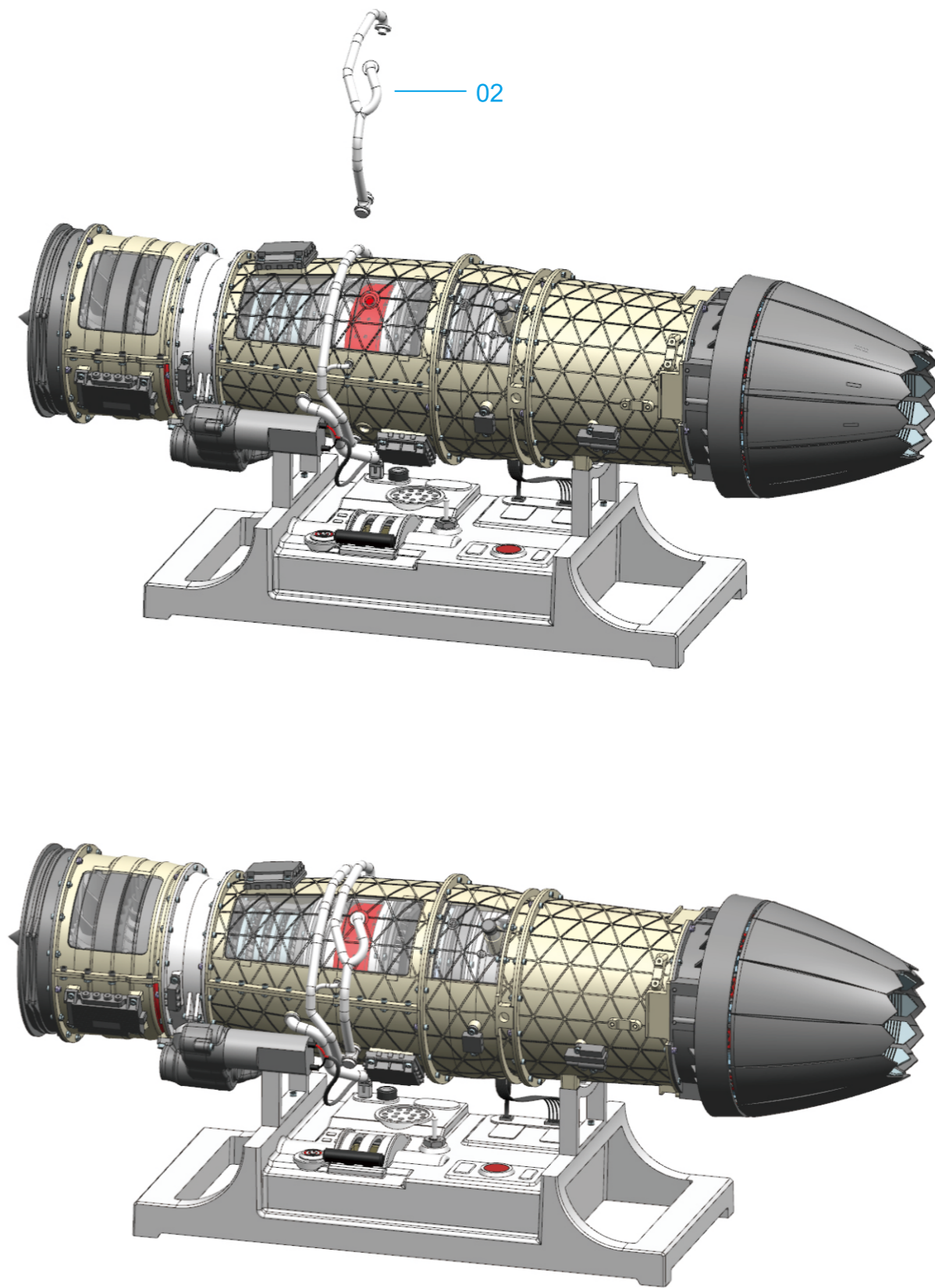
13.7、组装管路1 Assemble pipeline 1



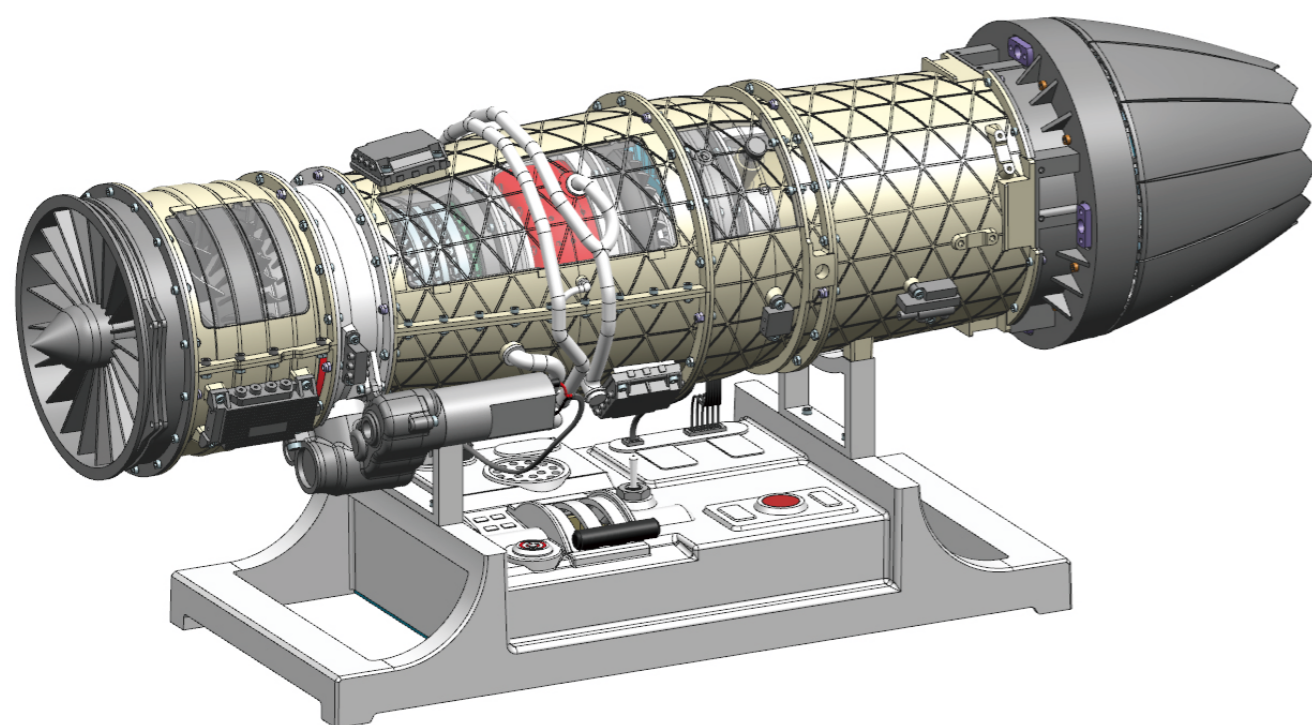
13.8、组装管路3 Assemble pipeline 3



13.9、组装管路2 Assemble pipeline 2



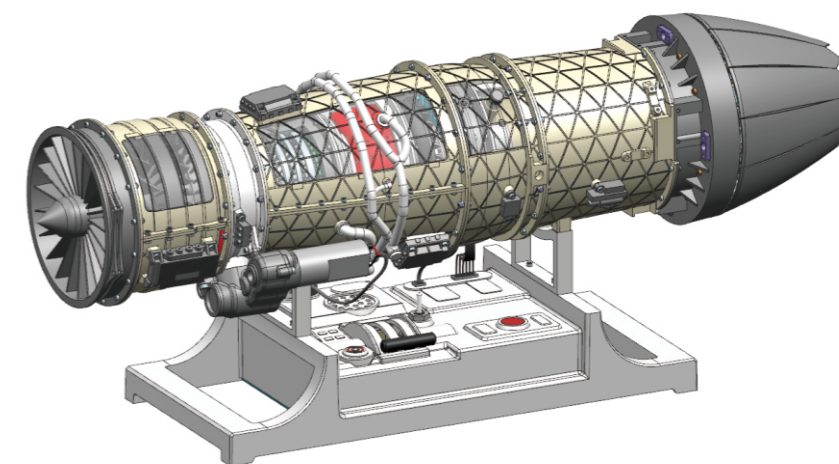
组装完成Assembly completed



## 产品基本信息

### 一、产品参数

品名称:双轴小涵道比涡扇发动机  
 产品型号:DM135  
 主要材料:铝合金+锌合金+不锈钢  
 充电电压:直流5V  
 电池容量:800mAh  
 组装难度:V级  
 产品标准:GB/T9254-2008  
           GB/T17626.2-2006  
 质检:A



### 二、产品介绍

- 1.土星工匠师系列产品为金属机构组装模型。主要材料选用铝合金表面阳极氧化，产品结构采用真实的工业结构；
- 2.使用各种工具组装零件，安装工序及方法接近实际工业要求；
- 3.该系列产品主要用来提高用户的动手能力、专注力，培养严谨讲秩序的习惯；
- 4.认识各种工业机器，学习各种工业结构，提高用户的探究及创新力。

### 三、组装要求

- 1.组装前要认真阅读《标准件组装基础知识》，学会基本的标准件组装方法和工具使用；
- 2.要求组装时桌面整洁，防止丢失零件或错装。组装严谨有序，看图仔细，避免组装错误；
- 3.注意说明书中的提示语，注意零件的安装方向，防止理解错误。注意检测环节的要求；
- 4.摩擦部位尽量使用润滑油，防止运转时卡死。紧固螺丝必须安装到底，防止零件松动；
- 5.组装完成后要调试装配间隙及松紧度，有疑问可查询本公司相关网站或微信公众号；
- 6.鼓励在成人看护及确保安全的情况下，使用锉刀、砂纸等简单去材料工具，优化零件；
- 7.鼓励用户在没有安全隐患的情况下，将模型进行零部件修改或总体改装，及具备改装能力。
- 8.说明书后面附零件表，用户可根据列表拆散模型并重新装入盒中；
- 9.如果零件有丢失，可向我公司咨询或采购(土星官方网店)；
- 10.模型结构可能持续优化，如有说明书内容与实物不符，请参考公司最新组装资讯；
- 11.本产品长期不使用可能会造成电池失效、润滑油干枯、产品间隙沉积灰尘等造成产品无法运行的，请更换电池或拆除零件进行清洗。

## 一、安全须知

- 1.请仔细阅读本手册中的内容，以确保您能够正面且安全的使用本产品；
- 2.该系列产品为工业级别金属机构模型，因此组装和使用该模型需要一定的安全意识，提高安全意识也是该模型的作用之一；
- 3.本模型适合16岁以上的用户使用，相关安全事项仔细阅读本说明提示；
- 4.严禁让儿童或宠物吞咬本产品或其备件，以免造其伤害；
- 5.合理使用组装工具，严格按说明书组装零件，避免强装硬拆，防止划伤。严禁工具或零件尖角部位离眼睛太近，以免挫身体；
- 6.本模型主要由金属零件组成，具有一定的硬度和重量，请妥善放置，避免产品及配件受到强烈冲击和震动，以免砸伤身体或损坏本产品；
- 7.机械运动时，请不要将手指或身体其它部位放入零件运动范围内，避免压伤；
- 8.电线接头须按说明书指示标记连接，避免错接引起电路短路或失灵；
- 9.电池充放电及放置方法请按要求进行，电池停用3个月以上建议更换电池；
- 10.请勿以任何形式强行阻碍零件运转，如需关闭请直接关闭电源即可；
- 11.如对模型进行改装，请留意相关零件参数，避免使用大功率电器动力零件或装置，导致意外；
- 12.请按说明书正确使用本产品的零件，切勿做其它用途。

## 二、电池和充电注意事项

- 1.本产品配备专用充电线，用户自备电源适配器，其输出DC电压需5V，其输出DC电流不小于1000mA;禁止使用高于6V的适配器给产品充电；
- 2.充电前请确保触点干燥，无脏污，产品不使用或维修拆机时请不要充电；
- 3.不可将电池投入火中，也不能将其暴露在诸如日照、火烤或类似过热的环境中，以免电池漏液、过热、爆裂或起火；
- 4.如果电池更换不当会有爆炸危险，只能用同样类型或等效型电池来更换；
- 5.本产品配备的锂电池，严禁拆卸、挤压、加热或燃烧电池，严禁使用尖锐物、螺丝刀等触碰、撬电池，以上操作可能会引起电池起火或燃烧；
- 6.如果电池在使用、充电或保存过程中有温度过高、变色、起鼓、漏液等异常现象，请停止使用并更换新电池，以免造成安全问题；
- 7.充电时，由于电池温度会升高，请不要将电池和易燃物放在一起(如:床头、衣物、书本等)，以免引发火灾；
- 8.请勿在高温、潮湿等环境中充电，温度以0至35摄氏度为宜;湿度应在65%以下，产品设计使用最高环境温度为45摄氏度；
- 9.为减少儿童触电危险，请在家长或其他监护人的指导下操作。

## 三、产品声明

- 1.使用本产品前，请您仔细阅读并遵守本手册中的各种说明及警示。对于不正确使用或不遵守本产品相关说明使用所造成的后果，本公司概不负责；
- 2.本产品适合于16岁以上用户使用。因使用本产品年龄偏小或将产品给对本产品相关安全要求不熟悉者使用，造成的安全问题本公司概不负责；
- 3.本产品是工业机构模型，仅作为学习和体验使用。不得将产品作为其它用途使用，否则本公司不承担任何责任；
- 4.本公司在不断提高、完善产品的设计和使用功能，如说明书所载内容与实际产品的内容略有不同，恕无法另行通知，敬请谅解。因此任何以本说明的数据、图片或文字描述为依据的索赔要求将不予受理；
- 5.本着不断完善，持续发展的原则，本公司保留在不预先通知的情况下，对本手册中描述的任何产品细节进行修改和改进的权利；
- 6.产品说明书中的图片用于指导用户操作，仅供参考，具体请以实物为准；
- 7.在使用法律允许的最大限度内，在任何情况下，本公司与其供应商均不对任何特殊、偶然、附带、或间接损失承担责任，无论该损失由何种原因引起；

本手册中含有重要信息，请保留备用。

## General information about product

### I、Product Parameters Production

Product Name: Small Bypass Turbofan Engine

Product Model: DM135

Materials: Aluminum alloy+zinc alloy  
+stainless steel

Charging Voltage: 5V DC

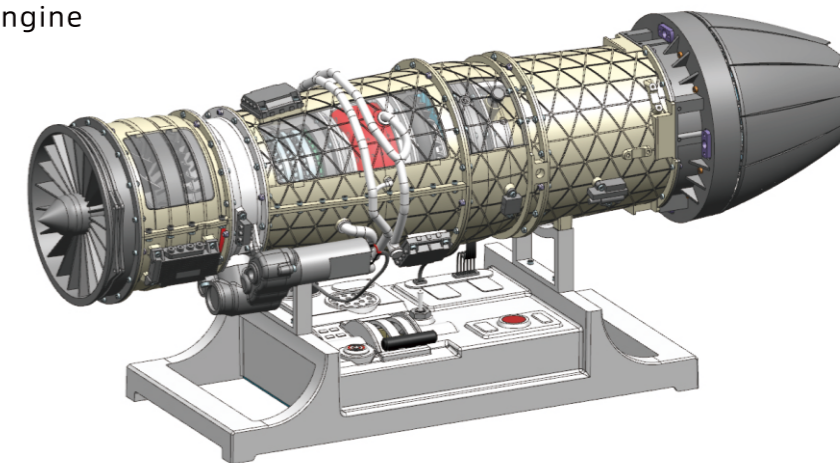
Battery Capacity: 800mAh

Assembly Difficulty: Level V

Product Standard: GB/T9254-2008

GB/T17626.2-2006

Quality Control: A



### II. Product description

1. Teching Craftsman series of products are metal structure assembly models. Its primary material is aluminum alloy with anodized surface and the product structure is a real industrial structure;
2. Assemble parts using various tools with the installation procedures and methods substantially compliant with practical industrial requirements;
3. This series of products are principally designed to improve users' hands-on ability and concentration, and to develop habits of "preciseness and stress on discipline";
4. Learn about various industrial machines, and study various industrial structures to improve user's capability of research and innovation.

### III. Assembly Requirements

1. Be sure to read the Basics of Standard Parts Assembly carefully to master basic standard parts assembly procedure and the usage of tools before assembly;
2. The table shall be kept tidy and clean during assembly to prevent parts being lost or incorrectly assembled. Assemble parts in a rigorous and orderly fashion, view the diagrams carefully, and avoid incorrect assembly;
3. Pay attention to the prompt text in instruction manual, carefully view the part installation orientation, and avoid incorrect comprehension. Pay attention to the requirements on testing;
4. Lubricating oil shall be applied to friction areas to the greatest extent to prevent jamming during operation. Fastening screws must be thoroughly mounted to prevent looseness of parts;
5. If you have any doubt when adjusting any assembly clearance or tightness after the completion of assembly, please refer to our website or WeChat public account;
6. Users are encouraged to optimize the parts using material removing tools like files and sand paper with adult care where the personal safety is guaranteed.

7. Users are encouraged to perform part modification or overall modification of model without potential safety hazard so as to develop modification capability as soon as possible;
8. The user may disassemble this model and put it in the package again according to the parts list attached hereto;
9. If any part is lost, please inquire of or purchase it from us (Teching official online store);
10. The model structure is subject to continual improvement. If the reobject differs from the instruction manual, please refer to our latest assembly information;
11. Once the product fails to function due to battery failure, lubricating oil shortage or dust accumulation in product gaps because it is left unused for long, it's advisable to change the battery or disassemble and clean its parts.

## Precautions

### I. Safety Instruction

1. Please read this manual carefully so that you are in a position to use this product correctly and safely;
2. This series of products are industrial-level metal models, so its assembly and use requires certain safety awareness; improvement of safety awareness is also a function of the model;
3. This model is suitable for users aged 16 and over. Please read this manual carefully for relevant safety information;
4. Strictly prohibit children or pets swallowing or biting this product or its spare parts, since this may cause injury/damage;
5. Use assembly tools rationally, assemble the parts in strict conformity with the instruction manual, and avoid forcible handling to avoid scratches; keep sharp points of tools or parts away from the eyes to avoid contusions.
6. This model is made up of metallic parts mainly, and has a certain level of hardness and a certain weight; please place it properly to avoid bodily injuries; protect the products and accessories against intense shock and vibration so as to avoid personal injury and product damage;
7. During mechanical movement, do not put a finger or any other part of the body within the movement range to avoid contusions;
8. Wire connectors must be connected according to the marks specified in the instruction manual to avoid short-circuit or failure arising from wrong connection;
9. Charge, discharge and place the battery as required; it is advised to replace the battery when it has not been used for 3 months or more;
10. Do not prevent any part from running forcibly in any form; to do this, turn off the power directly;
11. To refit this model, please pay attention to the relevant part parameters, and avoid using any high-power electric part or device that may result in an accident;
12. Please use parts of this product properly as per instruction manual. Don't use them for other purposes.

### II. Battery and charging precautions

1. This product is delivered with dedicated charging cable. Users shall use their own power adapters; output DC voltage: 5V; output DC current >1000mA;
2. Please make sure the contact is dry and free of dirt before charging. Please don't charge the battery if the product is not in use or is in repair
3. Don't put the battery in fire or have it exposed to sunlight, fire or similar excessively hot environment, since this may lead to leakage, excessively high temperature, bursting or ignition of battery;
4. If improper change of battery may cause explosion, the battery must be replaced with one of identical or equivalent type;

5. Never disassemble, squeeze, heat and set fire to the lithium battery delivered with this product, and never touch and pry the battery using any sharp object or screwdriver, etc., since this may cause the battery to ignite or burn;
6. In the case of excessively high temperature, discoloration, bulging, leakage and other anomalies during the use, charging or keeping of battery, please take it out of service and change it with a new one to avoid safety problem;
7. Since the battery temperature rises when it's being charged, please don't have the battery to come into contact with inflammables (e.g. bedside, clothing and books, etc.) since this may result in a fire;
8. Please don't charge the battery in a moist space with high temperature; the temperature is recommended to be 0-35°C, and the humidity shall not exceed 65%; the design max. ambient temperature for using the product is 45°C;
9. To alleviate the risk of electric shock, children are not allowed to use the product without the help of their parents or other custodians.



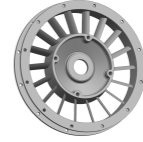
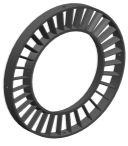




### III. Product Declaration



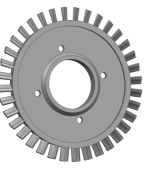
1. Please carefully read and observe various instructions and warnings in this manual before using this product. Our company shall not be held responsible for any consequence of failure to properly use this product or observe related operating instructions;
  2. This product is suitable for users aged 16 and over. Our company shall not be held responsible for any safety problem arising from the use of this product by too young users or users who are not familiar with relevant safety requirements;
  3. As a model in industrial structure, this product is designed exclusively for learning and experience. Do not use this product for other purposes; otherwise, we will assume no responsibility for any consequence thereof.
  4. We have been improving the design and operation features of our product, so separate notice will not be given for slight difference between instruction manual and actual product. Hence, any claim for compensation filed based on the data, pictures or text of this instruction manual will be rejected;
  5. For constant improvement and sustainable development, our company reserves the right to modify and improve any product detail given in this manual without prior notice;
  6. The pictures in instruction manual guide users for operation, and are thus for indication only; the real product shall prevail;
  7. Our company and its suppliers shall not be held responsible for any special, incidental, collateral or indirect loss in any case to the greatest extent the law permits, regardless of its cause;
- Please keep this manual properly since it contains important information.**

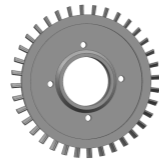
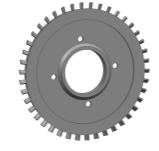

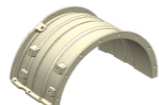

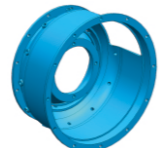


序号 Serial Number	零件图片 Parts pictures	品名 Product Name	用量 Dosage
01		管路1 Pipeline 1	1
02		管路2 Pipeline 2	1
03		管路3 Pipeline 3	1
04		进气锥 spinner	1
05		尾喷口外板 Tail nozzle outer plate	12
06		尾喷口撑杆 Tail nozzle strut	12
07		传动轴 transmission shaft	1
08		电机 electric machinery	1

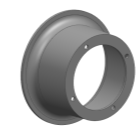
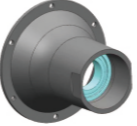

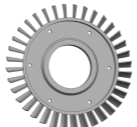
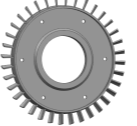


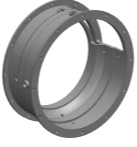
序号 Serial Number	零件图片 Parts pictures	品名 Product Name	用量 Dosage
09		进气机匣 Intake gearbox	1
11		高压涡轮前盘 High pressure turbine front plate	1
12		低压涡轮连接盘 Low pressure turbine connection plate	1
13		高压转子连接环 High pressure rotor connecting ring	4
14		3号轴承座 Bearing seat No. 3	1
15		尾喷口内板1 Tail nozzle inner plate 1	12
16		电控箱1 Electric control box 1	1
17		一级高压静子 First level high-voltage stator	1

序号 Serial Number	零件图片 Parts pictures	品名 Product Name	用量 Dosage
18		三级高压静子 Third level high-voltage stator	2
19		低压转子连接环 Low pressure rotor connecting ring	1
20		四级高压静子 Fourth level high-voltage stator	2
21		高压气机前盘 Front plate of high-pressure compressor	1
22		高压涡轮后盘 High pressure turbine rear plate	1
23		五级高压静子 Five level high-voltage stator	2
24		一级高压转子 First stage high-pressure rotor	1
25		一级低压涡轮转子 First stage low-pressure turbine rotor	1


序号 Serial Number	零件图片 Parts pictures	品名 Product Name	用量 Dosage
26		二级低压涡轮转子 Secondary low-pressure turbine rotor	1
27		高压涡轮转子 High pressure turbine rotor	1
28		后支撑机匣 Rear support receiver	1
29		二级涡轮静子 Secondary turbine stator	1
30		高压涡轮静子 High pressure turbine stator	1
31		六级高压静子 Six level high-voltage stator	2
32		二级高压静子 Secondary high voltage stator	2
33		中介机匣 Intermediary receiver	1

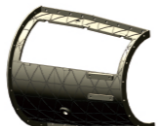

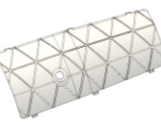
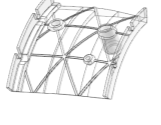
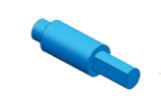
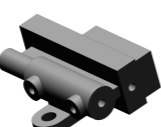
序号 Serial Number	零件图片 Parts pictures	品名 Product Name	用量 Dosage
34		分流环 Diversion ring	1
35		一级低压涡轮静子 First stage low-pressure turbine stator	2
36		小锥齿轮座 Small bevel gear seat	1
37		一级低压静子 First level low-voltage stator	2
38		二级低压静子 Secondary low-voltage stator	2
39		中介整流静子 Intermediary Rectification Jingzi	1
40		二级高压转子 Secondary high-pressure rotor	1
41		三级高压转子 Three stage high-pressure rotor	1

序号 Serial Number	零件图片 Parts pictures	品名 Product Name	用量 Dosage
42		四级高压转子 Four stage high-pressure rotor	1
43		五级高压转子 Five stage high-pressure rotor	1
44		六级高压转子 Six stage high-pressure rotor	1
45		低压气机下机匣 Lower casing of low-pressure compressor	1
46		低压气机上机匣 Low pressure compressor upper casing	1
47		燃烧室外机匣 Combustion outdoor casing	1
48		燃烧室外壳 Combustion chamber casing	1
49		燃烧室内壳 Combustion chamber inner shell	1

序号 Serial Number	零件图片 Parts pictures	品名 Product Name	用量 Dosage
50		燃烧室内机匣 Combustion chamber casing	1
51		高压气机后盘 High pressure compressor rear plate	1
52		风扇 Fan	1
53		一级低压转子 Primary low-pressure rotor	1
54		二级低压转子 Secondary low-pressure rotor	1
55		齿轮箱体 Gearbox body	1
56		齿轮箱盖 Gearbox cover	1
57		涡轮机匣 Turbine casing	1

序号 Serial Number	零件图片 Parts pictures	品名 Product Name	用量 Dosage
58		喷雾连接盘 Spray connection plate	1
59		中心轴前段 Front section of central axis	1
60		低压气机前盘 Low pressure compressor front plate	1
61		尾喷口机匣 Tail nozzle receiver	1
62		尾喷口基座 Tail nozzle base	1
63		尾喷口推板 Tail nozzle push plate	1
64		火焰稳定器 Flame stabilizer	1
65		加力喷管外机匣 Enhanced nozzle outer casing	1

序号 Serial Number	零件图片 Parts pictures	品名 Product Name	用量 Dosage
66		加力喷管外机匣 Enhanced nozzle outer casing	1
70		雾化器总成 Nebulizer assembly	1
75		外涵道连接机匣 External culvert connecting the receiver	1
76		加力喷管前段 Front section of the booster nozzle	1
77		高压气机下机匣 Lower casing of high-pressure compressor	1
78		高压气机上机匣 Upper casing of high-pressure compressor	1
79		立柱 Column	2
80		外涵道下机匣 Underpass casing	1

序号 Serial Number	零件图片 Parts pictures	品名 Product Name	用量 Dosage
81		外涵道上机匣 Outer culvert upper box	1
82		中心轴 Central axis	1
83		外涵道窗板 External culvert window panel	1
84		低压机匣窗板 Low voltage casing window panel	1
85		连接机匣窗板 Connect the receiver window panel	1
87		锥齿轴 Cone gear shaft	1
88		过渡轴 Transition axis	1
89		分流阀 Diversion valve	1

序号 Serial Number	零件图片 Parts pictures	品名 Product Name	用量 Dosage
90		电控箱2 Electric control box 2	1
91		电控箱3 Electric control box 3	1
92		尾喷口内板2 Tail nozzle inner plate 2	12
93		撑杆支架 Support rod bracket	12
94		操作盒 Operation box	1
100		连接阀 Connecting valve	1
101		控制阀 control valve	1
102		内板固定座 Internal panel fixing seat	12

序号 Serial Number	零件图片 Parts pictures	品名 Product Name	用量 Dosage
103		内板固定盖 Internal panel fixed cover	12
104		中心锥齿轮 Central bevel gear	2
105		小锥齿轮 Small bevel gear	3
106		电机齿轮 Motor gear	2
107		过渡齿轮 Transition gear	1
108		齿轮定位套 Gear positioning sleeve	1
109		销钉 Pin Pin	12+3
110		轴承21*12*5 Bearings 21*12*5	8

序号 Serial Number	零件图片 Parts pictures	品名 Product Name	用量 Dosage	序号 Serial Number	零件图片 Parts pictures	品名 Product Name	用量 Dosage
111		轴承14*8*4 Bearings 14 * 8 * 4	1	129		M2*32 内六角螺钉 M2*32 Hexagon Socket Screws	4+2
112		轴承12*8*3.5 Bearings 12*8*3.5	4	130		M2.5*6 内六角螺钉 M2.5 *6 Hexagon Socket Screws	23+5
113		轴承8*4*3 Bearings 8*4*3	5	131		CM2*5平头螺钉 CM2*5 Flat head screws	30+5
124		M2.5弹垫 M2.5 Spring cushion	1+1	132		M2*12 内六角螺钉 M2 * 12 Hexagon Socket Screws	12+4
125		M2*6 内六角螺钉 M2*6 Hexagon Socket Screws	323+50	133		M2防松螺母 M2 anti loosening nut	64+20
126		M2.5*10 内六角螺钉 M2.5 *10 Hexagon Socket Screws	1+1	134		M2螺母 M2 Nut	137+30
127		M2*8 内六角螺钉 M2*8 Hexagon Socket Screws	2+2	135		M2*4内六角螺钉 M2*4 Hexagon socket screws	40+5
128		M2*20内六角螺钉 M2*20 Hexagon socket screws	4+2				