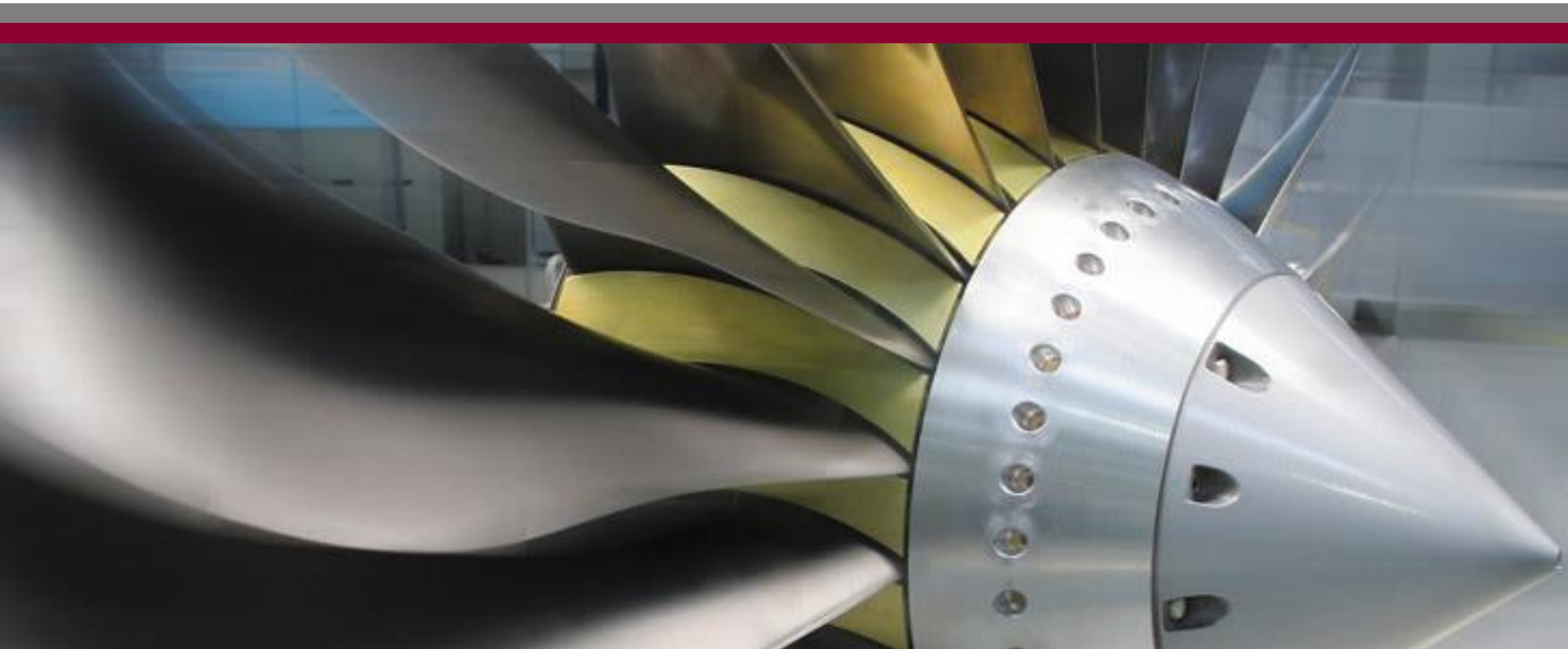


# Technological and manufacturing capabilities of United Engine Corporation



*United engine  
corporation*



**Joint-Stock Company “United Engine Corporation” (UEC)** is an integrated company specialized in design, development, production, sales and support of engines for military and civil aviation, space, industrial and marine application.

- ▶ UEC unites more than 85% of the industry assets in Russia
- ▶ Full production cycle of gas-turbine engines is put into practice
- ▶ A new organizational model based on the centers of excellence has been introduced in UEC
- ▶ UEC has an access to intellectual assets of wide range of Russian research institutes

## UEC’s key customers



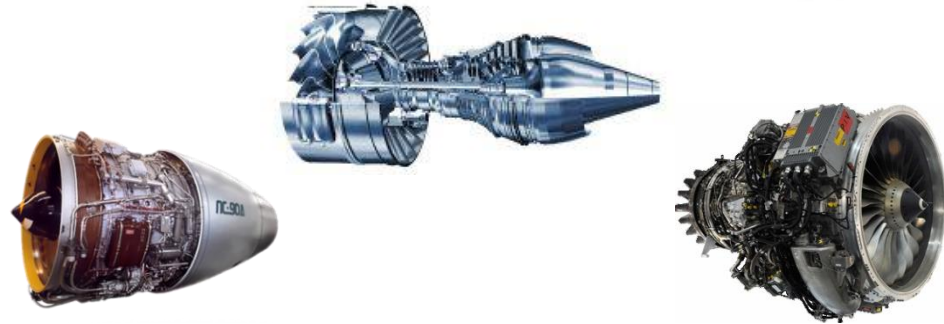
- ▶ UEC consolidates 27 subsidiaries and affiliated companies:
  - ▶ 7 design and engineering bureaus
  - ▶ 10 manufacturing facilities
  - ▶ 5 support and repair facilities
- ▶ Over 80 thousand people are employed in UEC in total



# UEC aerospace products range

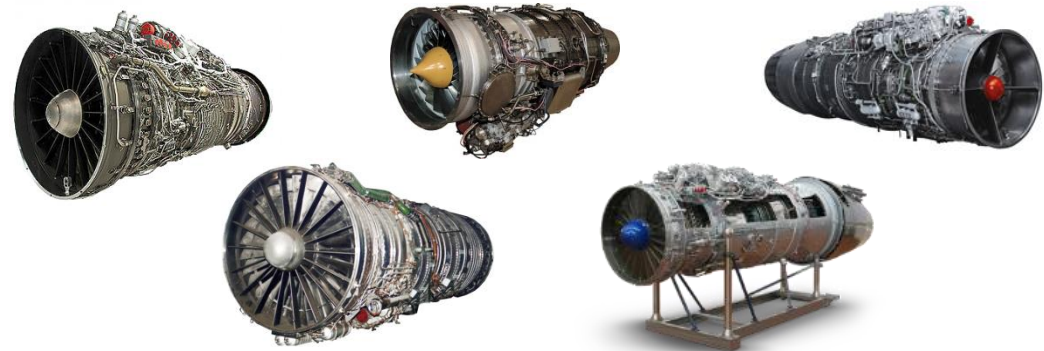
## Civil & Transport Aviation Engines

- SaM-146 (*Sukhoi SuperJet 100*)
- PD-14 (*Irkut MS-21*)
- PS-90A (*Tupolev Tu-204/214, Ilyushin Il-76, Il-96*)



## Military Aviation Engines

- AI-222-25 (*Yak-130*)
- RD-33/93 (*MiG-29, AVIC JF-17*)
- AL-31F (*Sukhoi Su-27/30/33/34, AVIC J-10*)
- AL-41F-1S (*Sukhoi Su-35*)
- NK-32 (*Tupolev Tu-160*)



## Helicopter Engines

- TV3-117 (*Mil Mi-17/28/35, Kamov Ka-32/52*)
- VK-2500 (*Mil Mi-17/28/35, Kamov Ka-32/52*)
- TV7-117V (*Mil Mi-38*)



## Rocket Engines

- RD-107A/108A (*Soyuz Rocket Launcher*)
- NK-33 (*Soyuz-2-1v, Antares*)



# International certificates collected by UEC's companies



# Manufacturing capabilities within international cooperation



SaM-146 engine

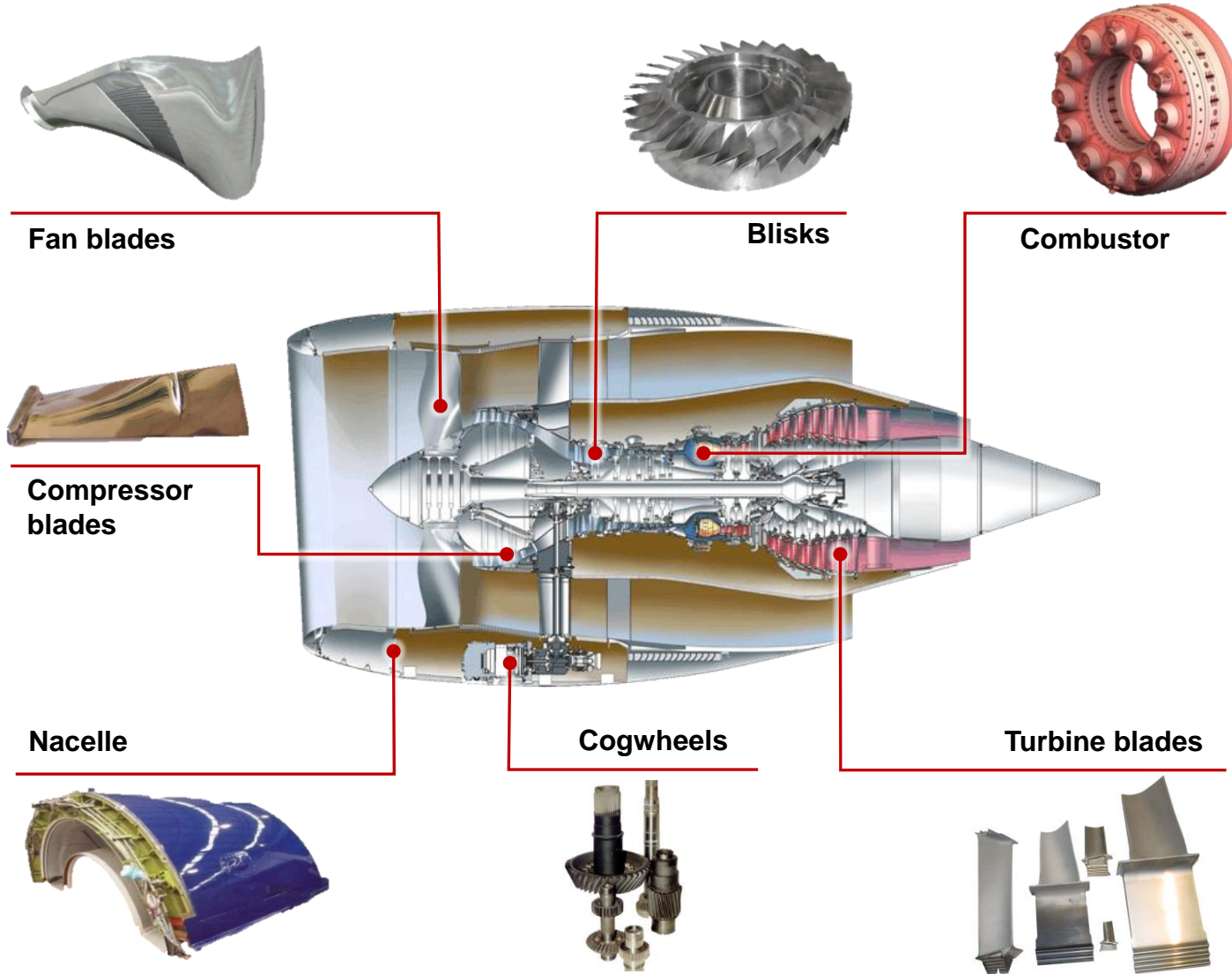


Parts for SaM-146.  
In prospect: parts for  
CFM LEAP



«Gear rings» parts for  
PW 200/300 and other

# Manufacturing capabilities: UEC as a 2-4 tier supplier



## Hollow wide chord fan blades

### Processes:

- Waterjet cutting
- Superplastic forming
- Diffusion welding
- Advanced machining

### Alloys:

- Titanium



## Blisks

### Processes:

- Linear friction welding
- Advanced machining

### Alloys :

- Titanium and nickel

### Advantages:

- Rotor weight reduction by 15-20%
- Complexity of manufacturing reduction by 20%





# Low/high pressure compressor

## Compressor blades

### Processes:

- Manufacturing of blanks using precision forging and isothermal forging with specified grain size
- Advanced machining
- Impulse electrochemical machining
- Ion-implantation doping



## **LPT blades:**

### Processes:

- Precision casting without further machining
- Casting of hollow thin-wall blades

### Alloys:

- Intermetallic titanium



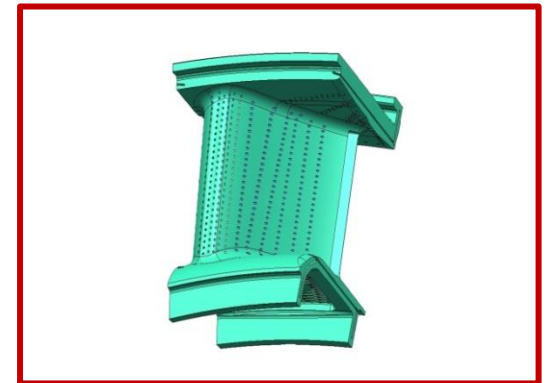
## **HPT blades**

### Processes:

- High-speed electrospark drilling of cooling holes with variable-cross section
- Electron-beam sputtering of ceramic heat-protective coating
- Plasma sputtering of ceramic coating

### Alloys:

- Carbon-free monocrystal alloys
- Alloys suitable for high temperatures (up to 2000K)



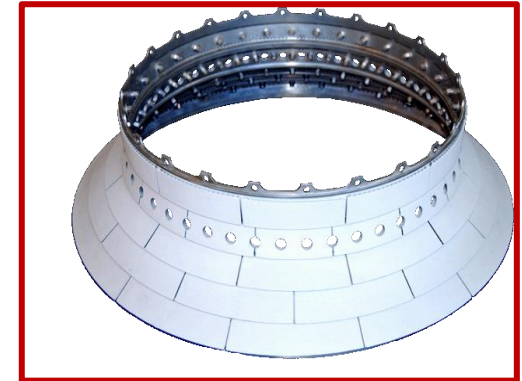
# Combustor

## Processes:

- Application of complex (metal + ceramics) plasma heat-protective coatings on combustor parts
- Technology of high-efficient cooling using laser or electrospark perforation
- Ultrasound treatment of high-precision nozzle elements made of hardmaterial

## Materials:

- High-temperature composite materials



# Accessory gearbox

## **Cogwheels (including cogwheels with nonsymmetrical and continuous double helical teeth)**

### Materials:

- High-temperature composite metals
- Accuracy class - 4-4-5

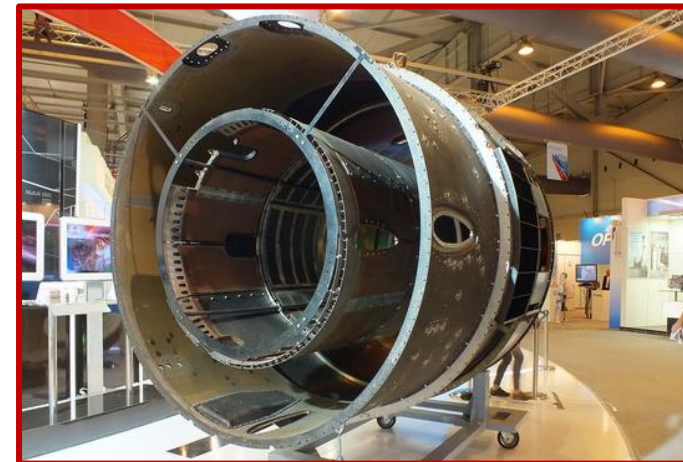
### Processes:

- Advanced machining
- Advanced methods of thermal and chemo-thermal treatment which reduce vibration up to 1,5 times and increase durability by 1,5-2 times
- Technology of cinematic diagnostics of cogwheels and gearboxes health



## Design features:

- Carbon-glass fiber honeycomb structures
- Skin panel with high-temperature material
- Noise-absorbing composite and metal materials





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corporation*

