Manufacturing capabilities of United Engine Corporation (UEC)
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 today

- 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
UEC technology capacity in international partnership area

- NPO Saturn
  - Fan module
  - Low pressure compressor & turbine
  - Final assembly

- SAFRAN
  - Low pressure compressor blades
  - Booster
  - Rear turbine frame

- UMPO
  - Low pressure turbine blades (machining)
  - Labyrinth seal ring
  - Shafts
  - Drive rings
  - Combustor can parts
  - Dressing brackets

- Pratt & Whitney Canada
  - High pressure turbine case
  - Low pressure turbine seal ring
Manufacturing capabilities: UEC as a 2-4 tier supplier
Fan and blisks

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%
Compressor blades

Processes:

• Manufacturing of blanks using precision forging and isothermal forging with specified grain size
• Advanced machining
• Impulse electrochemical machining
• Ion-implantation doping
Low/high pressure turbine

**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
Nacelle

Design features:

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