



中航商用航空发动机有限责任公司  
AVIC COMMERCIAL AIRCRAFT ENGINE CO.,LTD.

# Product Development Needs

Nov. 2014

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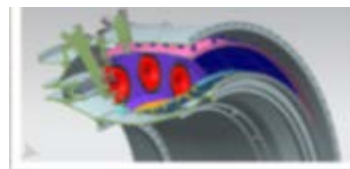
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# Engine for wide-body aircraft

## Critical Technologies



OGV & Optimized fan duct flow path



Lean premixed low emission combustor

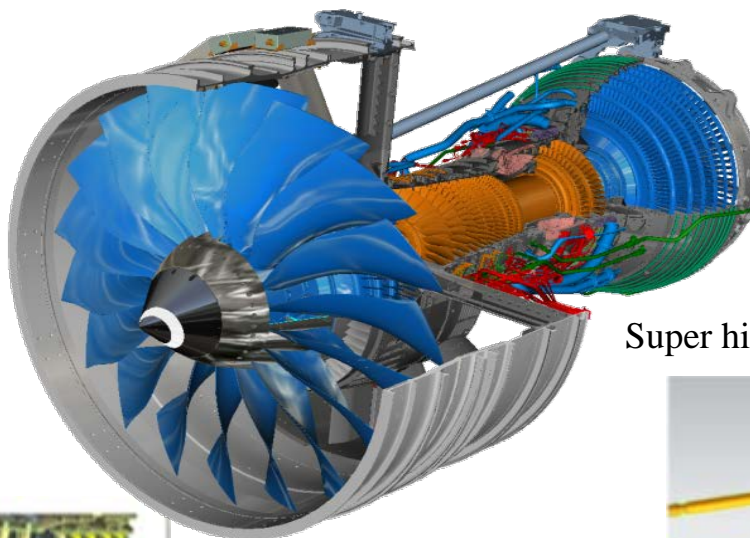
Composite material fan casing



Composite material swept wide chord fan blade



Blisked high efficiency compressor



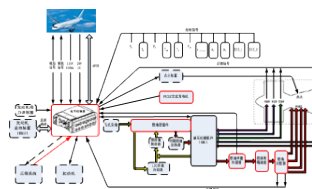
Advanced turbine cooling



Super high lift LPT blade



FADEC system



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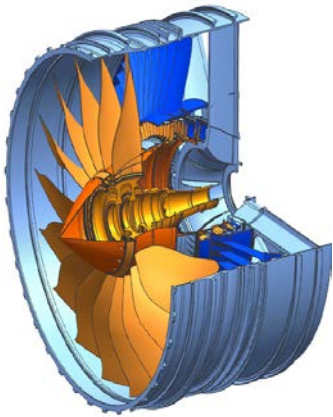
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# Areas open for cooperation

## 1. Fan / Booster



Item	Demand	Detail	Resources Recommended
1.1	Aero design evaluation	<ul style="list-style-type: none"><li>• Aerodynamic performance evaluation</li><li>• Flutter analysis for fan blade</li></ul>	?
1.2	Composite fan blade design and manufacture	<ul style="list-style-type: none"><li>• Diameter 2m</li><li>• Resin-based composite material</li><li>• Intensity check test</li></ul>	?
1.3	Composite material fan casing	<ul style="list-style-type: none"><li>• Design and analysis method</li><li>• Manufacture and intensity check</li></ul>	?
1.4	Fan / booster performance test	<ul style="list-style-type: none"><li>• Performance test</li></ul>	?
1.5	Other related		?

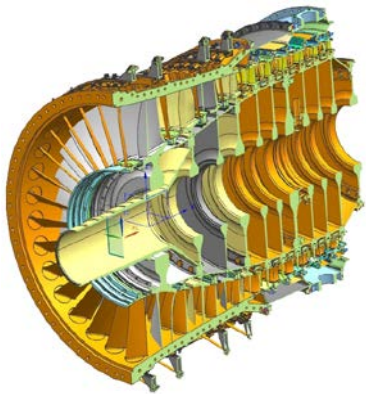
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## 2. High Pressure Compressor



Item	Demand	Detail	Resources Recommended
2.1	Aero design evaluation	<ul style="list-style-type: none"><li>• Aerodynamic performance evaluation for 10-stage compressor</li><li>• Influence evaluation of blade tip clearance and leakage on compressor performance</li><li>• R1 flutter analysis</li></ul>	?
2.2	Life prediction for blade		?
2.3	HPC blisk manufacture	<ul style="list-style-type: none"><li>• Material: Ti6242</li></ul>	?
2.4	Performance test	<ul style="list-style-type: none"><li>• 10-stage compressor</li></ul>	?
2.5	Other related		?

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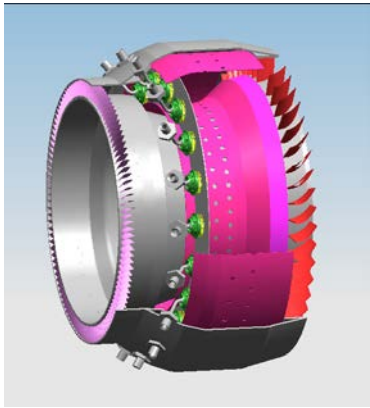
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## 3. Low Emission Combustor



Item	Demand	Detail	Resources Recommended
3.1	Test	<ul style="list-style-type: none"><li>• All kinds of combustion tests</li></ul>	?
3.2	Design evaluation	<ul style="list-style-type: none"><li>• Evaluation of combustor component for LPP</li><li>• Evaluation of single sector combustor design</li></ul>	?
3.3	Other related		?

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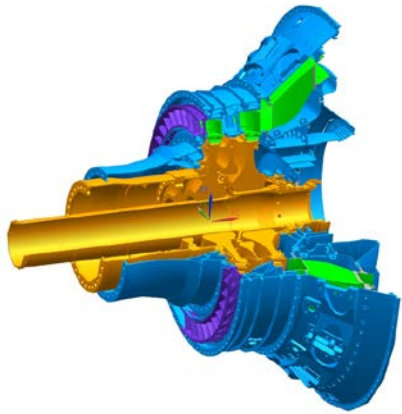
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## 4. High Pressure Turbine



Item	Demand	Detail	Resources Recommended
4.1	Aero design evaluation	<ul style="list-style-type: none"><li>• Aerodynamic performance evaluation for turbine component</li><li>• Loss evaluation</li><li>• Optimization for design</li></ul>	?
4.2	Design technology	<ul style="list-style-type: none"><li>• Advanced cooling design</li></ul>	?
4.3	Turbine guide vane	<ul style="list-style-type: none"><li>• Material: CMC</li><li>• Manufacture</li></ul>	?
4.4	Disc manufacture	<ul style="list-style-type: none"><li>• Diameter: 800mm</li></ul>	?
4.5	Superalloy turbine rear casing manufacture	<ul style="list-style-type: none"><li>• Diameter: 1700mm</li><li>• Minimum Thickness: 2.5mm</li></ul>	?

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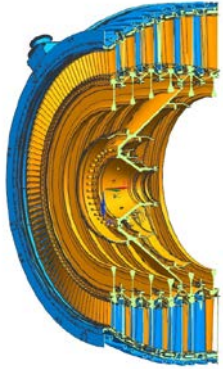
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## 5. Low Pressure Turbine



Item	Demand	Detail	Resources Recommended
5.1	Aero design evaluation	<ul style="list-style-type: none"><li>• Aerodynamic performance evaluation for turbine component</li><li>• Loss evaluation</li><li>• Optimization for design</li></ul>	?
5.2	Design technology	<ul style="list-style-type: none"><li>• High lift LPT blade design</li></ul>	?
5.3	Performance test	<ul style="list-style-type: none"><li>• 7-stage LPT performance</li></ul>	?
5.4	Other related		?

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## 6. Main Accessories

Item	Demand	Detail	Resources Recommended
6.1	EEC electronic controller		?
6.2	EMU		?
6.3	HMU		?
6.4	Other related		?

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## 7. Systems

Item	Demand	Detail	Resources Recommended
7.1	Design evaluation for air system	<ul style="list-style-type: none"><li>• Optimization for design parameters</li><li>• Design method evaluation</li></ul>	?
7.2	Sealing technologies		?
7.3	Safety analysis and evaluation		?
7.4	Structural design for supporting system		?
7.5	Active clearance control technologies		?

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