Future of flight

Our new generation of engines will transform flight, setting new benchmarks in efficiency, environmental performance and precision engineering.

Doing more with less

The aerospace industry leads the world in embracing technology and efficiency challenges. Targets for environmental improvements are tougher than ever and need to be met in a marketplace where fuel costs are in flux and competition is fierce.

The challenges facing the aerospace industry

We're a key partner in ACARE (Advisory Council for Aeronautics Research and Innovation in Europe) which has set itself ambitious technology goals for 2050. ACARE's vision for the future, Flightpath 2050, lays out clear environmental technology goals for aircraft relative to a year 2000 benchmark. Achieving these will take contributions from aircraft and engine technology, as well as improvements in airline operations and air traffic management.

Environment

Cut CO_2 emissions by

75%

Environment

Cut NO_x emissions by

90%

Noise

Reduce noise pollution by

65%

Consumers

Minimise turnaround times to meet consumer expectations

Doing more with less

Cut CO_2 emissions by 75% (per passenger-km) across the aircraft: an extremely challenging target that will demand integrated aircraft and engine solutions.

We've set ourselves the challenging target of a

30%

reduction in engine fuel

as our contribution to the overall

75%

reduction goal

Achieving a 75% reduction in fuel burn is equivalent to cutting 275 miles per USG or

1Litre

per 100km, per passenger

Doing more with less

NO_x emissions during landing and take-off have been regulated for many years to help manage local air quality around airports. The standards have become more aggressive over time, and they'll keep getting tougher. We're continuing to invest in low emissions technology to meet the Flightpath 2050 targets.

Environment

Cut NO_x emissions by

90%

Doing more with less

Flightpath 2050 also calls for a perceived noise reduction of 65% by 2050.

Noise

Noise reduction of

65%

The equivalent to an average reduction of **15dB** at each of the 3 points where aircraft is measured during take-off and landing.

Noise

Noise reduction of a large twin-engine aircraft by

15dB

Making its noise equivalent to a **Learjet 45,** which weighs 25x less and has 20x less thrust.

Doing more with less

As air travel has become the norm for millions worldwide, service expectations have grown alongside demand. That means more flights taking off and landing at airports every day as well as tighter turnaround times.

In 2015

3.6 bn

were carried by airlines

In 2030

6 bn

are expected to travel

That's an increase of

60%

or almost 2.4 billion people

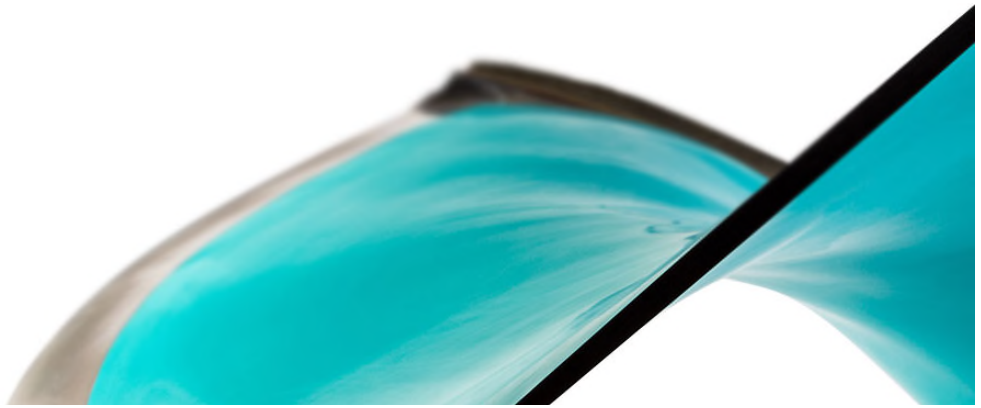
Innovation through evolution

We've crafted seven variations of our world-leading aero engine family since the launch of our first Trent engine over two decades ago. Each one is a feat of precision engineering, perfectly designed to meet the needs and challenges of the market it operates in. Today, our Trent XWB is the most efficient aero engine ever created. Evolving from this world-class lineage, the Advance and UltraFan will redefine the world of jet engines.

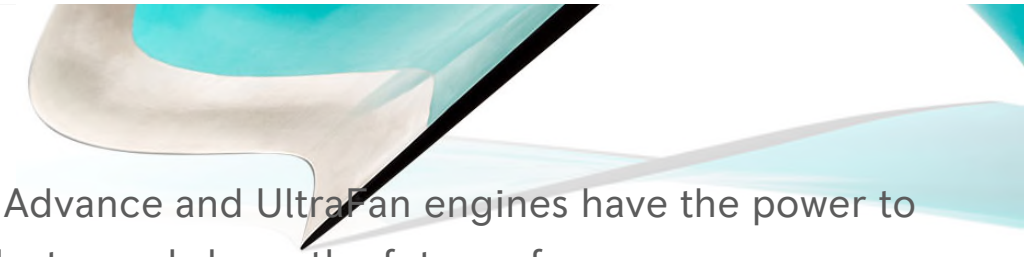
Innovation through evolution

A family of distinction

The success of our world-leading Trent engines has grown from continuous investment and our commitment to progressing on perfection at every opportunity. Nowhere is our dedication to meeting customers' needs and delivering better power for a changing world more apparent than in the Trent family.



A ground-breaking solution



By reengineering performance and efficiency, the Advance and UltraFan engines have the power to overcome the challenges facing the aerospace industry and shape the future of aerospace.

Solving challenges takes more than big thinking. Our concept for the future of aero-engines draws on over 100 million hours of Trent expertise, clear insight into our customers' needs and the ability to predict trends. Brought together, these allow us to engineer solutions that transform the challenges facing the industry into opportunities to do things better.

It's by embracing this opportunity that we're shaping the future of flight, and that's why we've developed our solution in two parts: Advance and UltraFan. Evolving our unique three-shaft engine architecture and combining this with a wealth of technological improvements, the high efficiency core compression and turbine system incorporated into Advance will deliver the highest overall pressure ratio of any commercial turbofan engine ever-made. The result? Greater efficiency, and lower CO_2 emissions.

UltraFan takes the evolution of Advance further, featuring all the same technology and more to enable us to deliver a step-change increase in bypass ratio. This will deliver further fuel efficiency and CO_2 reductions, and provide a further significant reduction in engine noise.

Overall pressure ratio

What:

Increased pressure ratio of 60:1 – almost double that of the Trent 700 – means a more efficient engine as more heat energy is converted to thrust

Benefit:

Less fuel needed to travel equivalent distances

Bypass ratio

What:

The increased bypass ratio of 11:1 – more than double that of the Trent 700 – increases fuel efficiency as the engine can generate thrust more efficiently by pushing more air flow out in a slower jet

Benefit:

Less fuel needed to travel equivalent distances

Fuel burn

What:

Minimum 20% improvement in fuel burn from the engine weight and efficiency improvements, leading to a lighter more efficient aircraft

Benefit:

Less fuel needed to travel equivalent distances

Weight saving

What:

750lb weight saving per engine resulting from lightweight CTi fan system

Benefit:

Weight saving of 1500lb on a twin engine aircraft, equivalent to 7-8 passengers travelling weight free; means less fuel is needed to power the aircraft

Fuel burn

What:

Minimum 20% improvement in fuel burn meaning a more efficient use of fuel

Benefit:

Less fuel needed to power the aircraft equivalent distances resulting in lower emissions

CO_2 reduction

What:

Minimum 20% reduction in CO_2 emissions

Benefit:

Equivalent journeys using Advance engines are less environmentally harmful

NO_x reduction

What:

A lean burn combustor will eliminate fuel rich hot regions in the combustor during engine high power operation

Benefit:

Significantly reduces NO_x and other emissions (e.g. smoke particulates), both in and around airports and at altitude

Bypass ratio

What:

The increased bypass ratio of 11:1 – more than double that of the Trent 700 – as the engine produces a slower jet of air

Benefit:

Perceived engine noise reduction in comparison to the Trent 700

Advanced materials

What:

Greater application of advanced materials and innovative high-temperature materials

Benefit:

Component engine parts can travel further and be exposed to higher temperatures for longer before needing to be replaced or serviced

Blue-sky thinking, real-life application

An innovative solution is nothing if it doesn't meet both current and future customer needs. That's why we've shared our roadmap for Advance and UltraFan with the aerospace industry; involving those who will be using the technology from the very beginning.

It also why we're involved in a range of programmes and joint research projects across the globe, working with everyone from governments to our peers to shape the future of flight and create better power for the changing world of civil aerospace.

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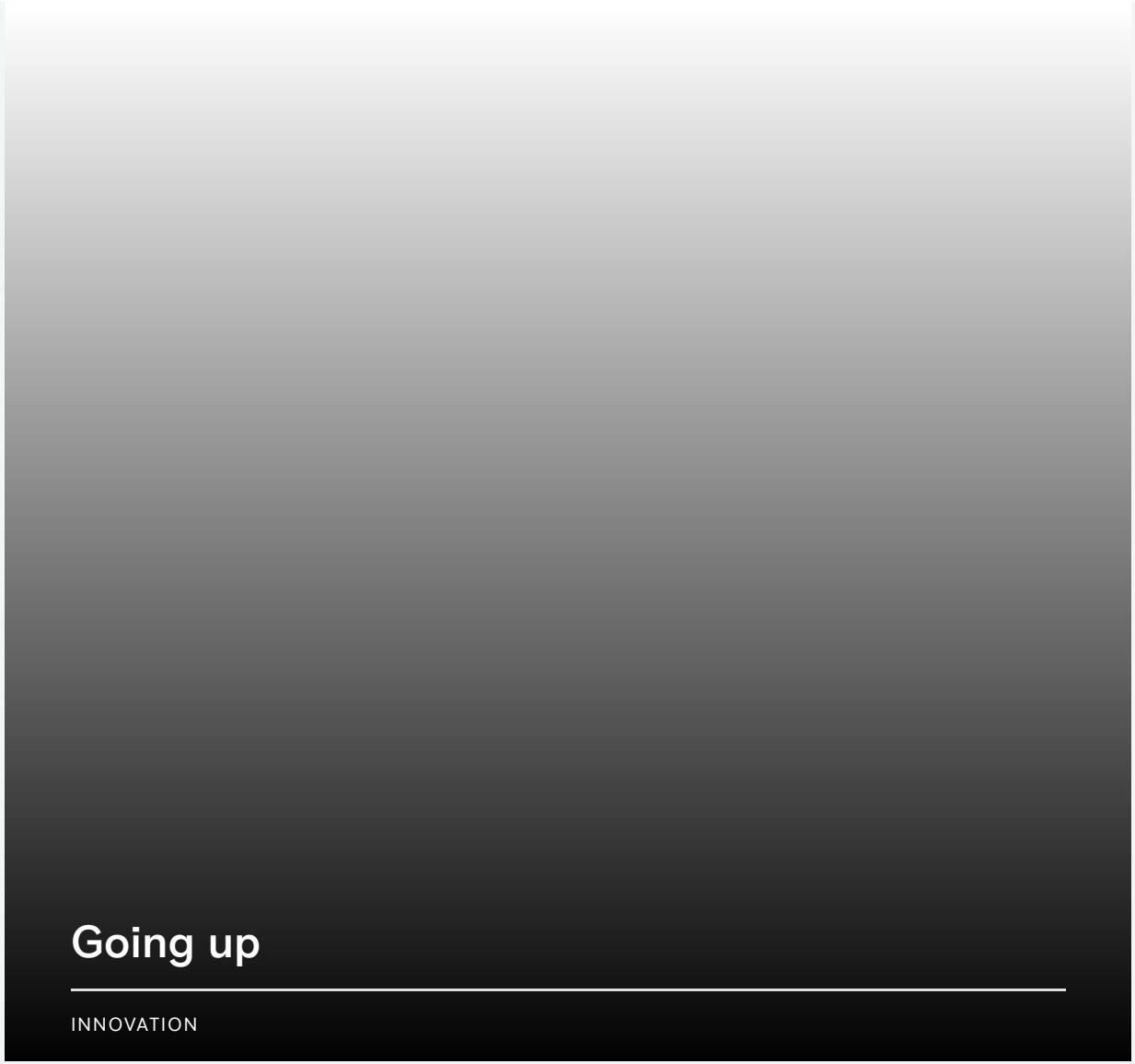
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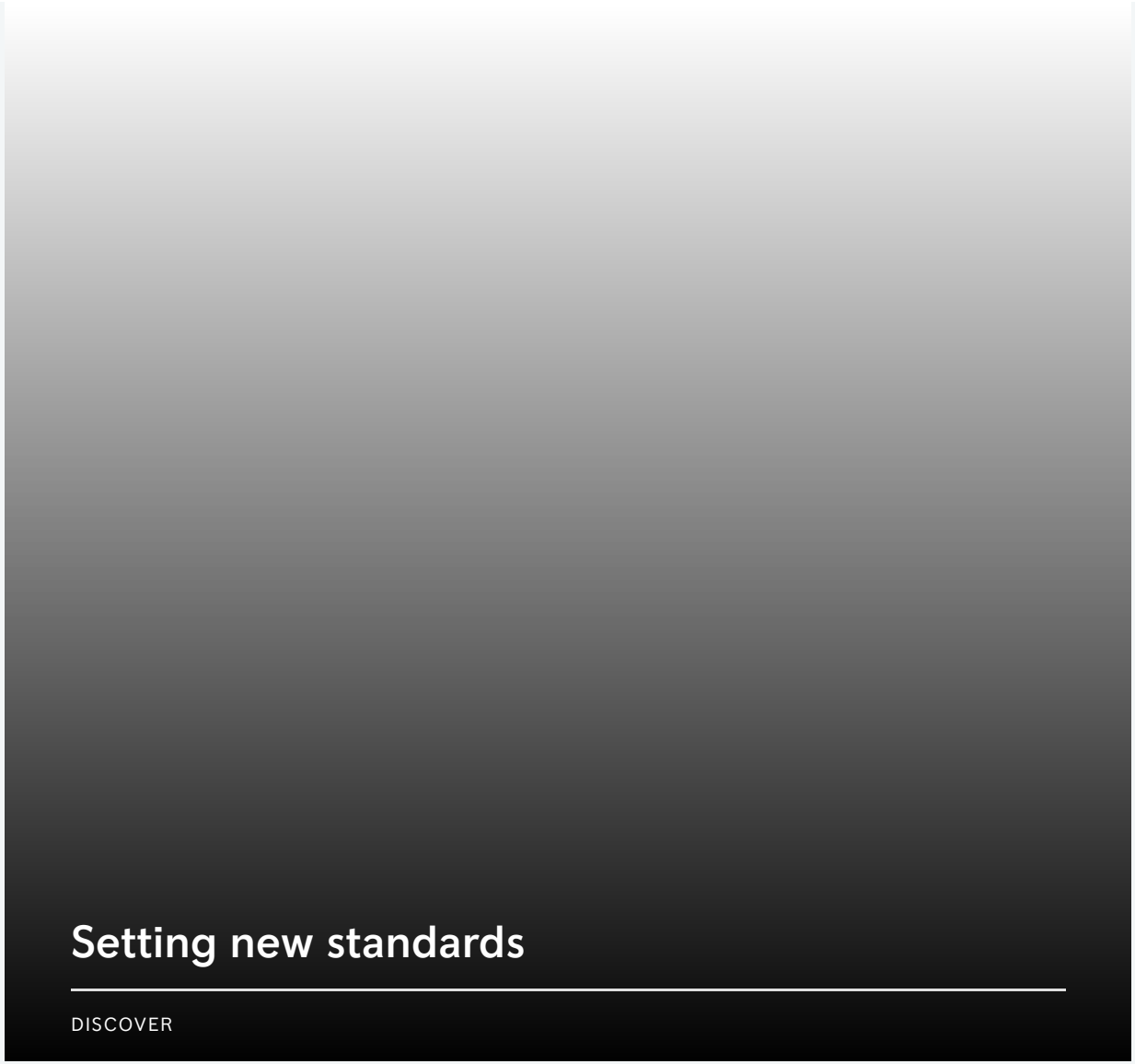
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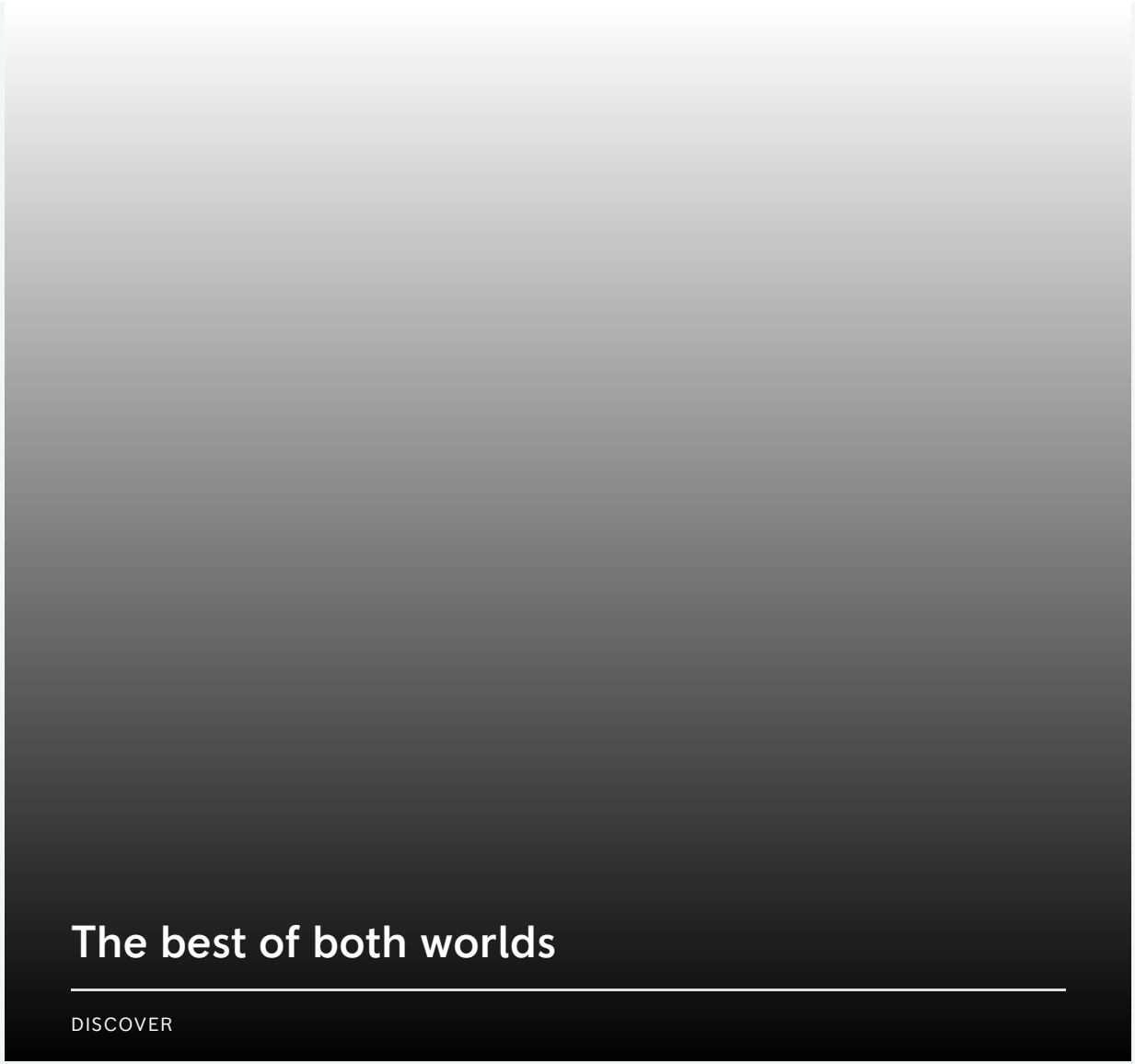
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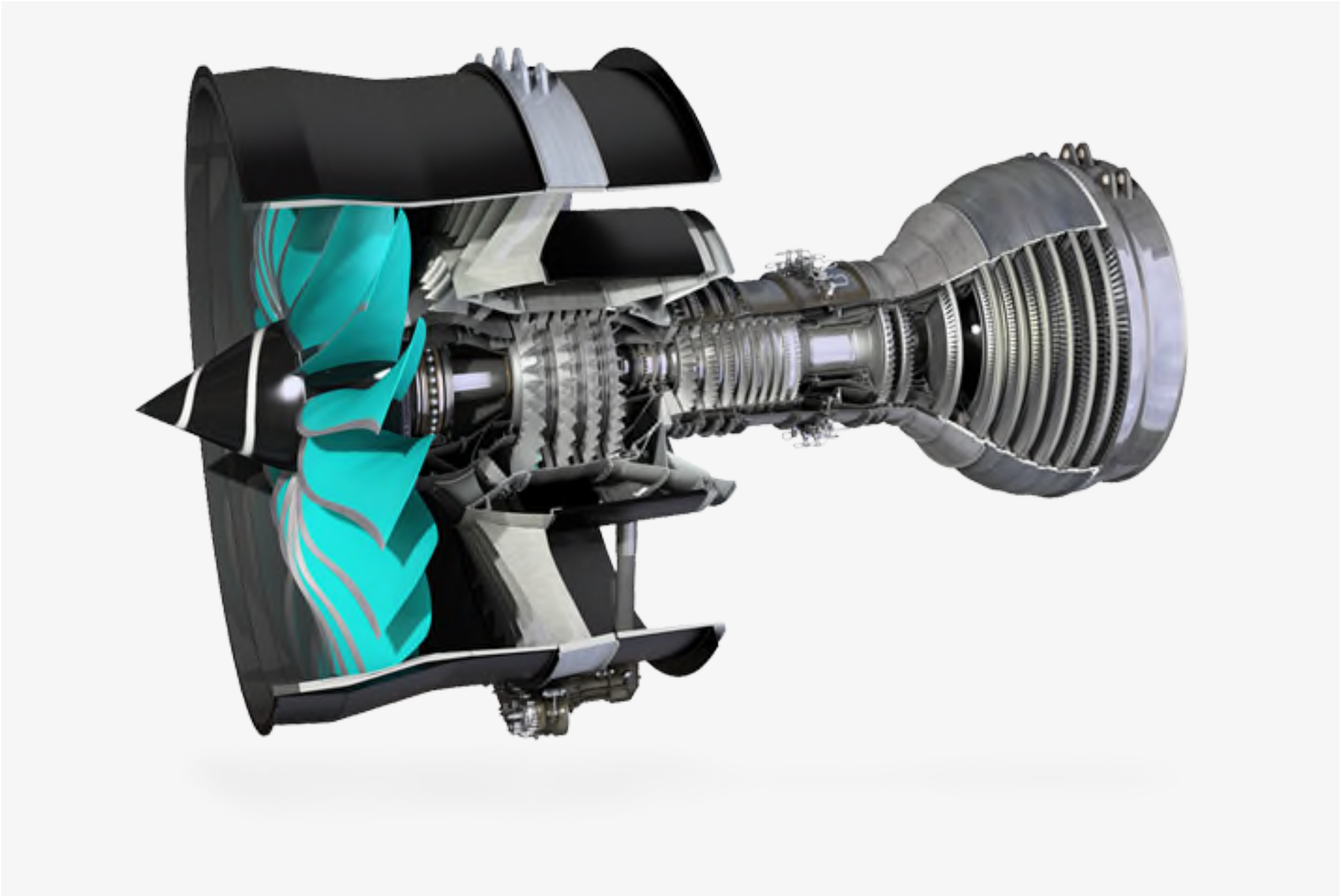

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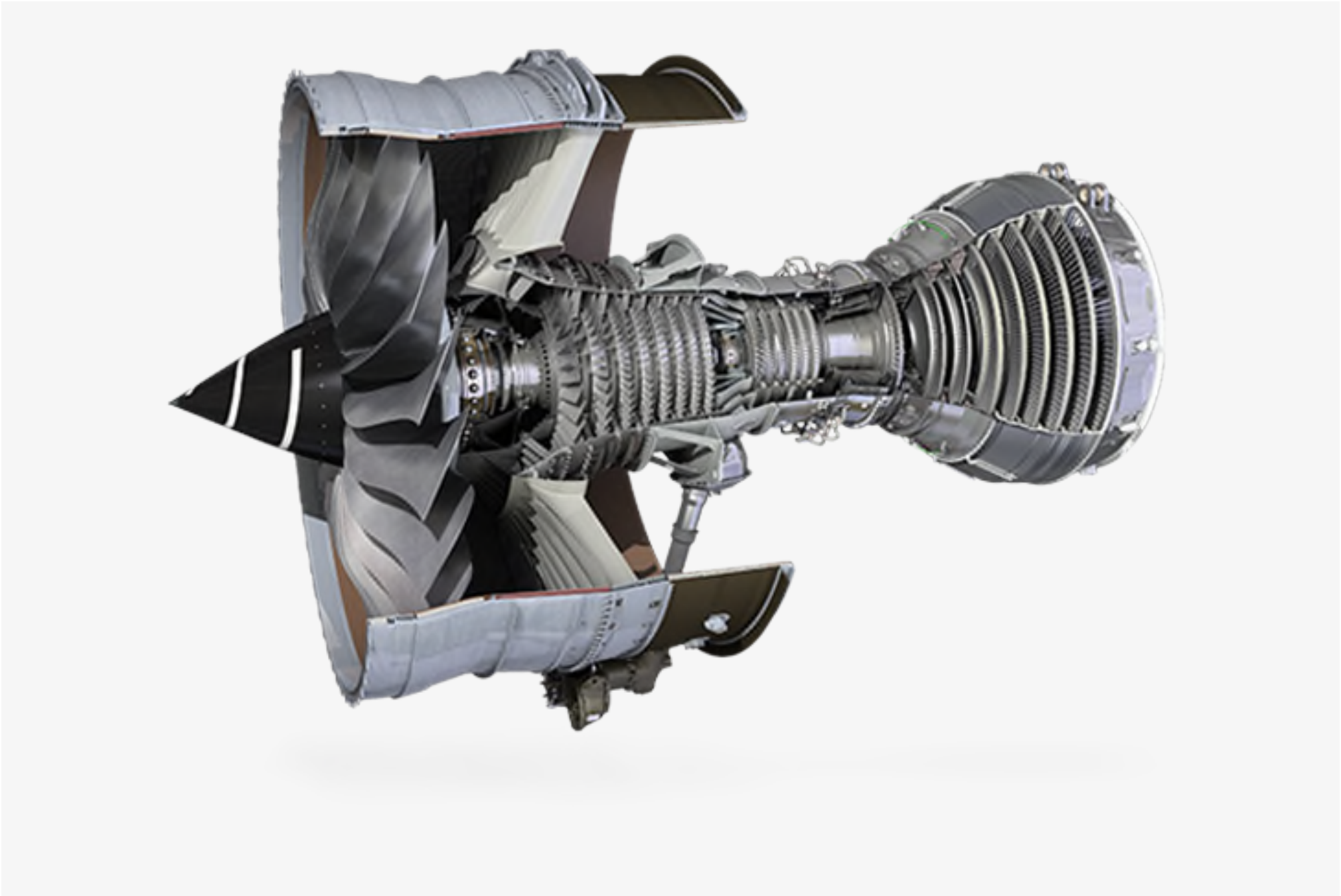

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