AEROSPACE AI LANDSCAPE

Understanding how AI is emerging across the aerospace ecosystem

UK Civil Aviation Authority

AI is emerging across the entire aerospace lifecycle, from aircraft design and manufacture through to airport operations, maintenance, regulation and customer services.

Our analysis shows AI is already delivering value today, while more advanced applications continue to raise important questions around assurance, human factors, governance and trust.

IDEAS TO REALITY

PEOPLE AND GOODS IN MOTION

A SAFER, MORE EFFICIENT AND SUSTAINABLE TOMORROW

DESIGN & DEVELOP

TURNING IDEAS INTO TOMORROW'S AVIATION

- Engineering design support
- Simulation & modelling
- Digital twins
- Certification support

BUILD & SUPPLY

FROM COMPONENTS TO CONFIDENCE

- Manufacturing robotics
- Visual inspection
- Quality assurance
- Production support
- Supply chain optimisation

OPERATE (GROUND)

KEEPING AIRPORTS MOVING

- Airport operations orchestration
- Passenger flow management
- Security screening
- Ground vehicle automation
- Turnaround optimisation

OPERATE (FLIGHT)

ENABLING SAFE, EFFICIENT FLIGHT

- Flight optimisation
- Crew support tools
- Air traffic support
- Autonomous drone operations
- Future flight concepts

MAINTAIN

KEEPING FLEETS FLYING

- Predictive maintenance
- Engine health monitoring
- Automated inspection
- Maintenance planning
- Asset optimisation

ASSURE & REGULATE

TRUST, SAFETY AND COMPLIANCE

- Regulatory knowledge systems
- Compliance checking
- Assurance frameworks
- Evidence generation
- Digital assurance methods

SERVE CUSTOMERS

A BETTER JOURNEY FOR EVERYONE

- Accessibility services
- Digital assistants
- Claims processing
- Travel planning
- Personalised services

WHAT WE'VE LEARNED

Key insights from our analysis of more than 200 aerospace AI use cases and stakeholder engagement.

1. **AI is delivering value today**
   Many current applications focus on improving, productivity, operational performance and decision support.
2. **AI spans the entire aerospace lifecycle**
   Use cases were identified across design, manufacture, operations, maintenance, regulation and customer services.
3. **Assurance is becoming a critical enabler**
   Confidence in performance, robustness, reliability and evidence is increasingly important as adoption grows.
4. **Human factors are increasingly important**
   The challenge is not simply technology capability. Success depends on effective collaboration between people and AI-enabled systems.
5. **Future adoption requires coordination**
   Many emerging challenges span industry, regulators, standards bodies and international partners.

WHERE ADOPTION IS HEADING

AI adoption is progressing, with increasing capability and broader application across the ecosystem.

Delivering Today

- Operational optimisation
- Maintenance support
- Security screening
- Customer services

Expanding Adoption

- Airport operations
- Engineering support
- Air traffic support
- Digital twins

Future Opportunities

- Advanced autonomy
- Future flight concepts
- Integrated digital environments
- Advanced human-machine collaboration

EVIDENCE BASE AND AI USE

Extensive stakeholder engagement and analysis of more than 200 aerospace AI use cases has helped build a clearer picture of the emerging aerospace AI landscape. AI tools were used during this process for data analysis, administrative support, and content generation, following guidelines for safe and responsible AI.

LOOKING AHEAD

This landscape represents a snapshot in time. Technology, applications and regulatory approaches continue to evolve. The analysis has also highlighted emerging developments and areas requiring further exploration.

Protect People. Enable Aerospace