



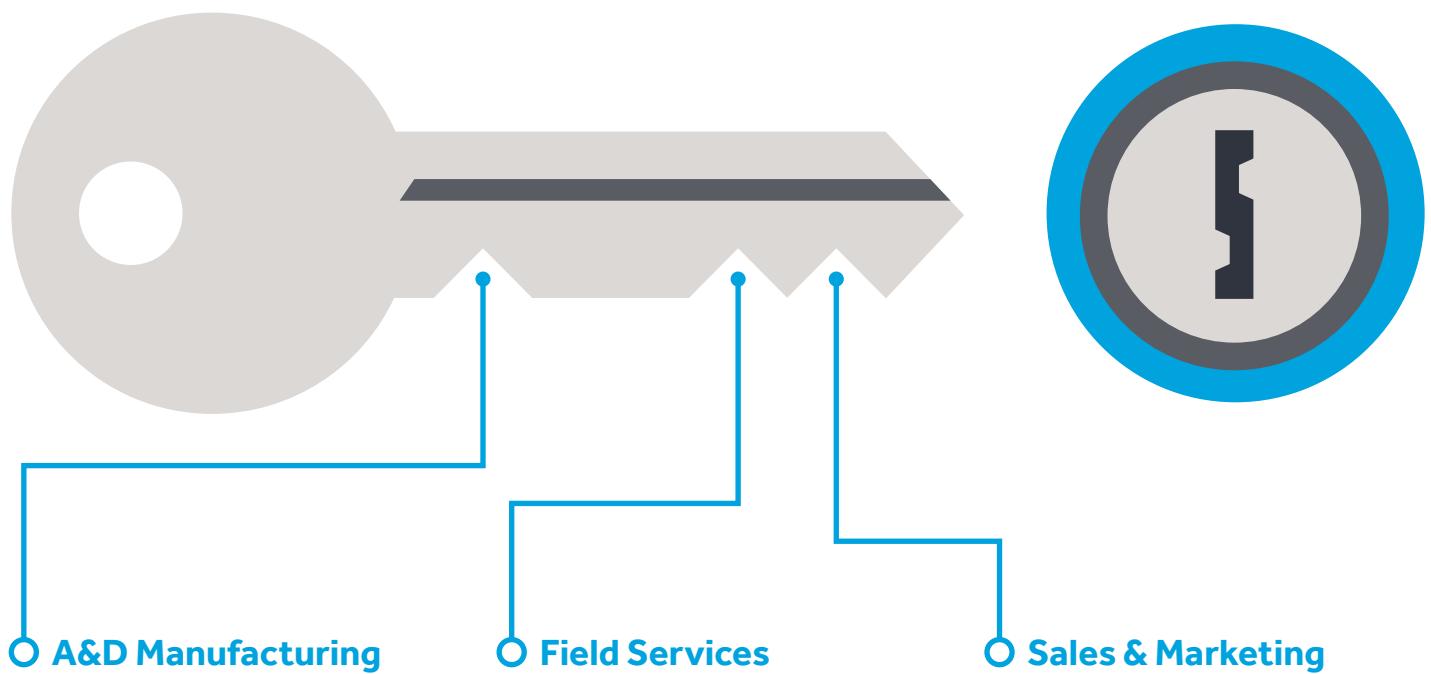
## TUNE INTO THE FUTURE WITH AUGMENTED AND VIRTUAL REALITY SOLUTIONS

Increase productivity, streamline workflows, and improve business bottom lines with AR/VR-based maintenance, repair, and training

## Overview

Technology disruption is changing the way the aerospace and defense (A&D) industry operates. As frontline workers are primarily responsible for factory performance and the use of intelligent machines, digital technology has become an essential tool to maintain a competitive edge. Technologies such as augmented reality (AR) and virtual reality (VR) offer the ability to transform how the A&D industrial workforce is trained and help improve maintenance efficiency on the factory floor.

# KEY INDUSTRY CHALLENGES



### A&D Manufacturing and MRO

- Misinterpretation of instructions leading to costly mistakes
- Lack of skilled workforce
- Low efficiency of operation and productivity

- High preparation time for written instructions
- Increase in downtime cost due to lack of specialists onsite
- Lower first-time fix rates and longer resolution time

- Loss of sales due to inability to virtually display products
- Increase in expenses due to multiple onsite visits and expensive prototypes
- Customer indecision due to complex proposals and requirements

## Empowering the A&D Industrial Workforce—Why AR and VR Solutions Are the Way Forward

As the A&D space continues to evolve and adopt advanced technology and floor equipment, there is an urgent need for skilled associates and frontline workers as they are crucial for operational excellence. AR solutions can be leveraged to improve maintenance processes, streamline workflows, and improve productivity by offering remote access and visual guidance for maintenance procedures. VR solutions can enhance the efficiency of skills transfer and offer better access to enterprise knowledge by facilitating experiential training in real time.

Here is why adoption of AR/VR technology in the aerospace industry is essential:

- **Facilitates uninterrupted workflow and improves productivity:** The current process for maintenance on factory floors involves paper-based work instructions. This requires high preparation time, and due to the time-consuming requirement of referring to manuals, it interrupts the workflow. With AR technology and smart glass devices, step-by-step work instructions can be augmented within the worker's field of view. This enables workers to focus on core tasks, which increases productivity significantly and eliminates errors.
- **Assists in training and bridges the skill gap:** With the growing shortage of skilled workforce in the A&D industry, new ways of training, collaboration, and tools are required to bridge the skills gap. Augmented work instructions and task flows can be used to provide training and guidance on the field and factory floor to educate the workforce.

- **Reduces downtime, improves response time, and reduces costs:** Maintenance of production equipment on factory floors leads to a delay in response time, increase in downtime, and increase in costs because specialists may be located offsite. With remote AR, frontline workers in the field and on the factory floor can collaborate with remote experts and communicate efficiently to reduce downtime, improve response time, and reduce costs.

## Cyient AR/VR Solution: Improving Productivity and Streamlining Workflows

Cyient provides comprehensive solutions using AR- and VR-based maintenance, repair, and training technology. We develop, run, manage, access, store, host, and distribute AR and VR applications. Our in-house, device-independent platform can be used to build applications for clients, customized to their requirements.

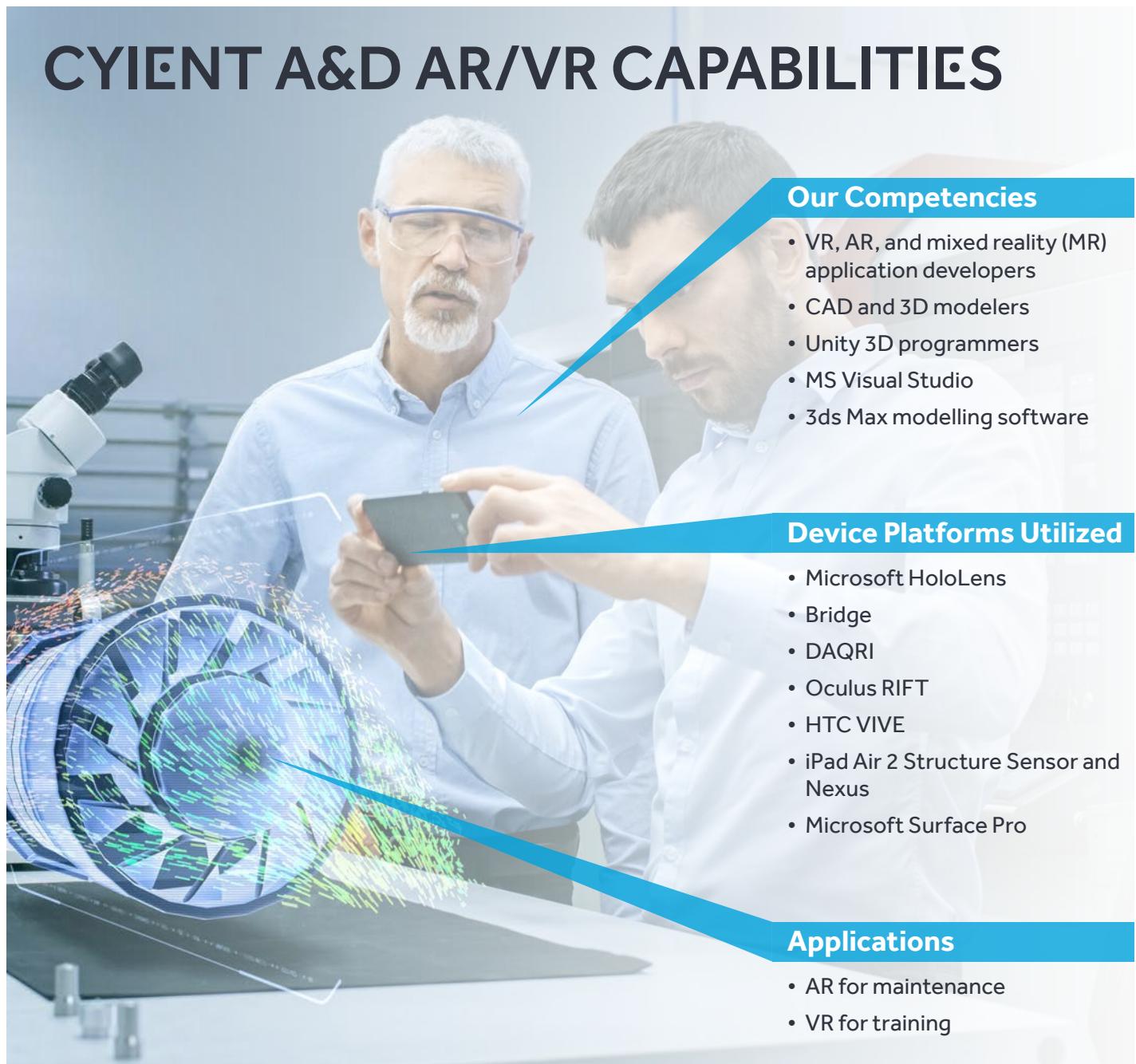
- **AR components** of our platform help create marker-based AR object recognition applications. The wearable AR devices and handhelds on which the AR applications run, provide contextual information allowing service engineers to carry out step-by-step guided maintenance, repair, assembly, and disassembly even without formal training.
- **VR components** of the training platform can help create a fully immersive experience based on client needs. VR modules are used to produce virtual training sessions with VR headsets and controls, to transport users into life-sized work environments with touch and feel, and are scalable with excellent recall.



## Augment Maintenance and Enhance Training—Cyient A&D AR/VR Capabilities

Our AR/VR-driven technology solution for the A&D industry is primarily focused on the industrial workforce, to enable them to:

- Seamlessly assemble and disassemble aero equipment
- Simplify the inspection and maintenance process
- Optimize, decommission, and revamp aero equipment



# CYIENT A&D AR/VR CAPABILITIES

### Our Competencies

- VR, AR, and mixed reality (MR) application developers
- CAD and 3D modelers
- Unity 3D programmers
- MS Visual Studio
- 3ds Max modelling software

### Device Platforms Utilized

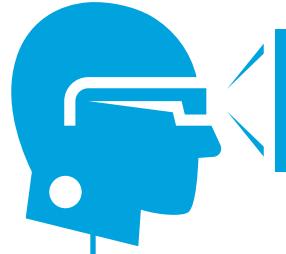
- Microsoft HoloLens
- Bridge
- DAQRI
- Oculus RIFT
- HTC VIVE
- iPad Air 2 Structure Sensor and Nexus
- Microsoft Surface Pro

### Applications

- AR for maintenance
- VR for training

# OUR AR SOLUTION

Features, Competency, and Applications for Maintenance



## Key Features

- Scanning of assets and retrieval of work order
- 3D model visualization to assist problem detection
- Access to digital repair manuals and real-time engineer support
- Built-in camera to record repair work

## Platforms and Devices

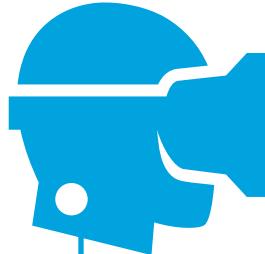
- Microsoft HoloLens
- DAQRI
- MS Visual Studio
- Unity 3D
- AR using Vuforia
- 3ds Max modelling software

## Applications

- Maintenance activities
- Rapid repair work
- Assembly of products
- Installation support
- Real-time integration (IoT)

# OUR VR SOLUTION

Features, Competency, and Applications for Training



## Key Features

- Immersive experience of the model and environment
- Model walkthrough, rotate, explode using gestures and voice commands
- Real-time engineer support

## Platforms and Devices

- HTC VIVE
- Oculus Rift
- Windows Mixed Reality HMDs
- MS Visual Studio
- Unity 3D
- 3ds Max modelling software

## Applications

- Training for operators
- Training for maintenance
- Training for safety and hazardous environments

## The Cyient Edge

With engineering solutions in our DNA, and an established expertise in creative engineering design services, Cyient has the domain knowledge to develop innovative AR maintenance applications. Our scalable and modular AR/VR platform blended with reusable assets enables consultative engagements. Clients can take advantage of our AR/VR Center of Excellence that has a mix of AR/VR/MR solution architects, digital enterprise architects, creative designers, and CAD to 3D model developers as a ready-to-use plug-and-play factory.

Cyient is also engaged in strategic partnerships with device manufacturers such as HTC VIVE, Oculus, and Microsoft HoloLens for co-development programs to accelerate innovative solutions.

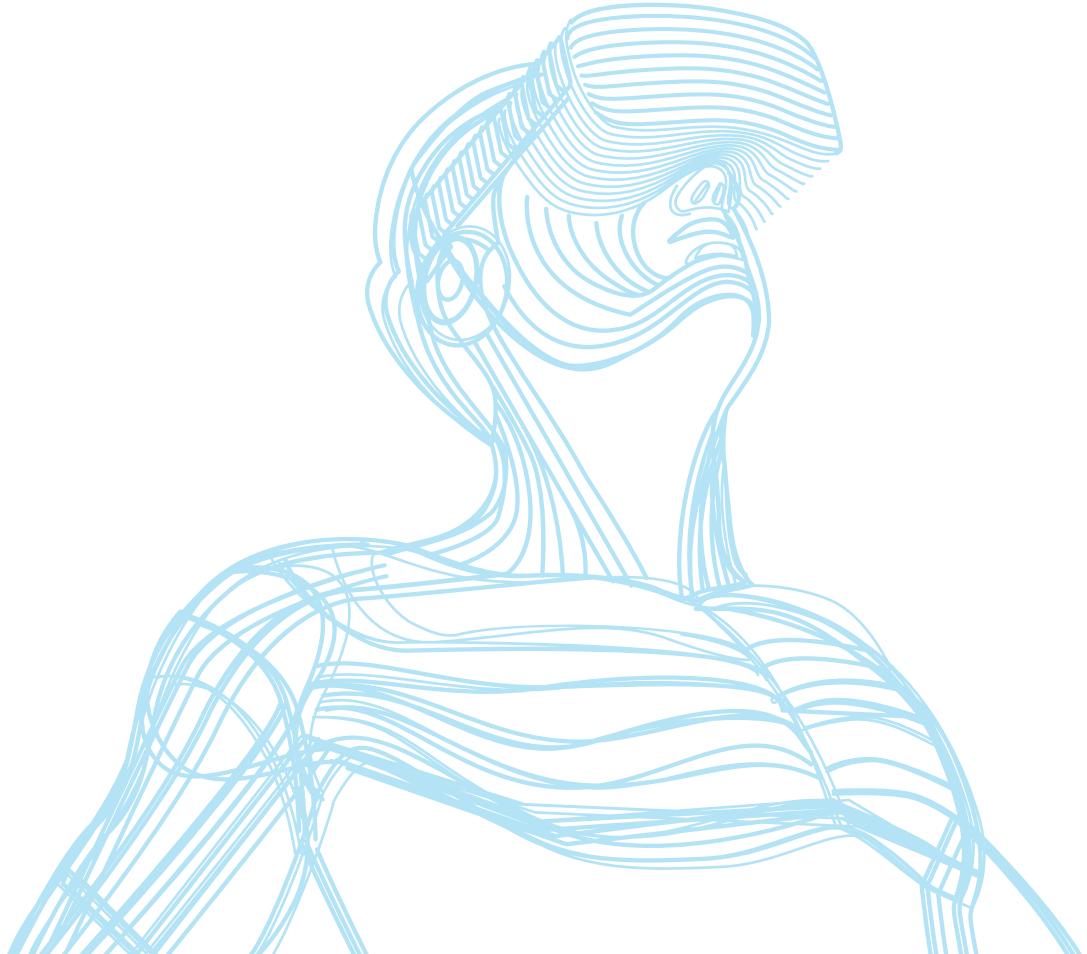
Cyient organizes hackathons to incubate ideas from technologists, scientists, and industry experts. These ideas are prioritized as per customer ROI and are added to the platform fabric for continuous improvement. Customers get improved versions of applications consistently.

### CAD model conversion

We need 3D model assets to create AR/VR apps. However, if the customer doesn't have this then we develop 3D models from CAD designs. We have intelligent systems ready to auto generate optimized version of high-poly CAD models targeting various devices.

### How we enable clients to do CAD model conversion to ensure privacy and patent rights

A desktop app is installed on the customer system. The customer can select a CAD model and click a button to convert to 3D, then upload to a Cyient platform portal. We will then use it in the AR/VR app creation. CAD model conversions through a desktop app ensure privacy and patent rights of customer models. The customer can then convert CAD models to 3D models and edit the features of 3D models as required before uploading/using in AR/VR apps.



## Industry Use Cases: How AR and VR Technologies Are Changing the A&D Landscape

With smart instructions, hands-free solutions, AR remote support, and the ability to view the Internet of Things (IoT) in AR, here are smart ways in which aerospace manufacturers and MRO's can improve productivity, and reduce errors, service costs, and skill gaps.

# AUGMENTED REALITY SOLUTIONS

Smart Instructions	Hands-Free Solutions	AR Remote Support	Viewing IoT in AR
<ul style="list-style-type: none"><li>Augmented work instructions within the worker's field of view</li><li>Step-by-step guide and visual instructions using existing 3D CAD</li><li>Augmented check-lists</li><li>Photo and video capture for compliance and reporting</li></ul>	<ul style="list-style-type: none"><li>Interaction using hand gestures and head motion control</li><li>Voice commands for hands-free actions</li><li>Information within the worker's field of view</li><li>Smart glass enables easy hands-free knowledge capture by skilled workforce</li></ul>	<ul style="list-style-type: none"><li>Remote collaboration between field technician and remote expert</li><li>Generation of task flows for repairing in real time</li></ul>	<ul style="list-style-type: none"><li>Measurement of present critical parameters with IoT in AR for frontline workers</li><li>AR illustration for repair and maintenance procedures</li></ul>

# VIRTUAL REALITY SOLUTIONS

Improve Productivity	Reduce Errors	Reduce Service Cost	Reduce Skill Gap
<ul style="list-style-type: none"><li>Right information at the right time increases performance</li><li>With information in the worker's field of view, there is no interruption in the task flow</li><li>Illustrated visual work instructions and task flows</li></ul>	<ul style="list-style-type: none"><li>Step-by-step visual instructions help reduce errors</li><li>Immersive trainings improve worker efficiency</li><li>Immersive reality demonstrates enforceable behavior in hazardous situations</li></ul>	<ul style="list-style-type: none"><li>In the projection of a 24-month workforce training program, elapsed time reduction can reach about 8 months, creating cost savings of approximately 33%</li><li>Smart trainings improve first-time fix of issues</li><li>Faster response time</li></ul>	<ul style="list-style-type: none"><li>Replace manual-based training with VR training modules with 3D models</li><li>Immersive learning increases retention period</li><li>VR replicates same live scenario in a realistic workplace to allow employees to take risks while working in demanding environments</li></ul>

## About Cyient

Cyient (Estd: 1991, NSE: CYIENT) provides engineering, manufacturing, geospatial, networks, and operations management services to global industry leaders. We leverage the power of digital technology and advanced analytics capabilities, along with domain knowledge and technical expertise, to solve complex business problems. As a Design, Build, and Maintain partner, we take solution ownership across the value chain to help our clients focus on their core, innovate, and stay ahead of the curve.

Relationships lie at the heart of how we work. With more than 15,000 employees in 21 countries, we partner with clients to operate as part of their extended team, in ways that best suit their organization's culture and requirements. Our industry focus spans aerospace and defense, medical, telecommunications, rail transportation, semiconductor, utilities, industrial, energy and natural resources.

For more information, please visit  
[www.cyient.com](http://www.cyient.com)

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