Industrial Augmented Reality
Buyer's Guide

Select the Right AR Solutions for Your Business

vuforia®

Controller Maintenance
Step 5
Disconnect Green Cable

Controller C56

3 of 18

Ensure all the Instrument Cluster indicators turn on.

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DIGITAL TRANSFORMS PHYSICAL

AR success depends on investing in solutions that are the best fit for your business; we've produced this buyer's guide to help inform your AR planning process.

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AR Delivers Value Across the Industrial Enterprise

Industrial businesses are increasingly investing in augmented reality (AR) strategies to solve high-value business problems. AR is a visual and interactive method of overlaying relevant digital content onto physical environments in the frontline workers' field of view, which reduces the inefficiencies of paper-based work instructions, addresses workforce challenges, and empowers employee success.

It's no surprise that augmented reality is gaining traction in industrial settings. AR provides innovative solutions to an essential yet traditionally underserved resource—your frontline workforce.

With proven benefits for workforce optimization, like increased safety, new levels of efficiency, reduced errors, and minimized waste, AR offers opportunities for value across the enterprise and throughout the product lifecycle.

MANUFACTURING Increasing workforce and operational efficiency is key to reducing waste, lowering costs, and improving responsiveness to shifting demands. Opportunities for improvement with AR include assembly and the set-up, operation, and maintenance of equipment on the factory floor. Learn more here.

SERVICE In the face of stringent customer demands, product complexity, and a shortage of skilled technicians, ensuring service quality is critically important. Opportunities for improvement with AR include remote assistance, customer self-service, and performance support for maintenance and repair. Learn more here.

TRAINING In-person mentoring, classroom training, and on-the-job shadowing in production environments are costly, time-consuming, and in some cases infeasible. Opportunities for improvement with AR include onboarding, skills development, on-the-job training, eLearning, and virtual or remote training. Learn more here.

SALES & MARKETING Traditional sales and marketing methods are no longer enough to provide competitive differentiation. Often product size, lack of availability, and increased complexity prolong sales and impede customer under-standing. Opportunities for AR include virtual product demonstrations and brand innovation. Learn more here.

Considerations for Choosing the Right AR Solution for Your Needs

Content Development: AR authoring applications typically balance the depth of features against ease of use. Off-the-shelf solutions offer easy-to-use pre-built user interface elements, require minimal skills, and offer faster time to value. Efficient DIY authoring environments offer more flexibility for tailored, immersive AR experiences but require some technical skills. Custom-coded AR application development requires advanced skills and knowledge of third-party tools.

Content Sources: Content for augmented reality experiences can come from an array of different sources. For some use cases, AR content can be created without pre-existing assets simply by recording the best practices of SMEs while they are performing specific procedures. Existing CAD data can be repurposed for the creation of more precise or product-specific procedures. 2D and 3D content, animated sequences, and data from IoT and business systems can be integrated into AR experiences to provide greater detail.

Content Delivery and Devices: A key consideration for any AR implementation is how content will be delivered to users. Most industrial companies implementing AR strategies are primarily using mobile devices which are readily available and cost-effective. For use cases requiring hands-free work, 2D head-mounted devices like RealWear and 3D wearables like the Microsoft HoloLens are popular options.

Content Hosting and Deployment: Hosting considerations are critical for the success of a fully deployed solution. For some organizations, industries, and geographies, cloud hosting is not an option. Considerations such as security, compliance, connectivity, and company or governmental regulations often require on-premises deployments. For other industrial businesses, the cost and accessibility benefits of cloud and SaaS are preferred.

Vuforia Enterprise AR Suite Delivers Flexible AR Content Creation & Delivery Solutions

Vuforia's Enterprise AR suite consists of five solutions providing different levels of capabilities, usability, and flexibility to addresses a broad range of workforce challenges. To assist your decision, the following section details each product's distinguishing capabilities and optimal use-cases.

Out-of-the-box AR offerings that deliver ease-of-use and fast time-to-value   **+**   *Highly differentiated, innovative, flexible AR development tools*

vuforia® chalk™   vuforia® expert capture™   vuforia® instruct   vuforia® studio™   vuforia® engine

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vuforia® chalk™

Bring your technicians and experts together for real-time problem-solving and collaboration.

Vuforia Chalk is an out-of-the-box remote assistance solution that uses augmented reality to foster better collaboration across distributed workforces. Chalk combines Vuforia's best-in-class computer vision with real-time audio and video communications to connect field technicians, factory operators, or customers with remote experts for faster, more effective troubleshooting on-site.

Distinguishing features and capabilities:

- Augmented reality and real-time audio and video are packaged into a single application.
- Users draw digital annotations that "stick" to objects in the physical world with 3D environment mapping.
- Anchored digital annotations improve accuracy and precision during communication between users.
- Broad device support provides access for iOS and Android devices, desktops, and RealWear headsets.
- Connect Codes enable registered users to "host" Chalk sessions with participants outside of their company.
- Low bandwidth mode supports video streaming at high-resolution/low-frame rates, even with poor Wi-Fi.
- Session summaries deliver still frame images of each digital annotation made by users at the end of a session.

Best for:

- Accelerating technician and customer issue resolution in the field via remote trouble-shooting and support from field maintenance and service subject matter experts
- Reducing downtime on the plant floor with remote support from manufacturing subject matter experts and factory operators on-site
- Ensuring accuracy of product and machinery installations in the field through remote guidance from subject matter experts

Learn more about how companies are already using Vuforia Chalk today to improve support and collaboration across their workforce.

- Henkel Case Study
- Howden Case Study
- Vuforia Chalk

vuforia® expert capture™

Simplify the capture of domain expertise and streamline the creation of knowledge-based AR training and work instruction.

Vuforia Expert Capture is an out-of-the-box SaaS-based solution providing fast and easy expert knowledge capture and transfer of best practices to support manufacturing, service, and training use cases. Unique knowledge capture capabilities, combined with simplified authoring, enables organizations to build easily consumable AR-guided procedures that help frontline workers learn on the job and perform tasks more efficiently, accurately, and safely.

Distinguishing features and capabilities:

- Voice-enabled capturing mechanism automatically sequences procedures and delineates between steps.

- Microsoft HoloLens' location-awareness assigns specific physical locations to each step.

- Secure, web-based authoring environment with predefined UI elements accelerates content authoring.

- Access and version controls improve traceability and collaboration.

- Optimized delivery application features an intuitive UI and data capture at the front line.

- Managed self-serve reporting environment enables stakeholders to access data captured on the front-line.

Best for:

- Capturing expertise and tacit domain knowledge and transforming it into on-the-job guidance for all

- Easily creating and scaling AR guided operator work instructions, maintenance instructions, machine set-up and changeover, line clearance instructions, standard operating procedures, and assembly instructions

- Improving technician and customer experiences with in-context, on-demand AR service instructions and standard operating procedures based on the best practices of experts

Learn more about how companies are already using Vuforia Expert Capture today to improve their knowledge capture and sharing capabilities.
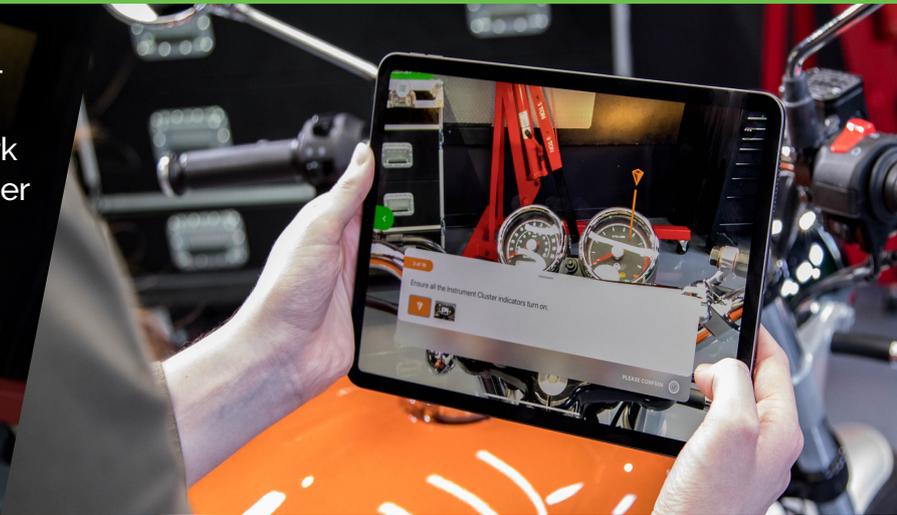
- Entegris Customer Success Story

- Vuforia Expert Capture

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vuforia® instruct™

Accelerate and simplify the creation and delivery of CAD-based work instructions for quality and field maintenance inspections.

Vuforia Instruct is an out-of-the-box SaaS-based solution for fast and easy creation, execution, and analysis of CAD-based work instructions that eliminate reliance on paper and empower employees. Leveraging 3D CAD, authors can create easy-to-understand procedures that direct attention to critical points of interest, present comparative perspectives, and digitally ensure the quality and completeness of work.

Distinguishing features and capabilities:

- Existing CAD models can be leveraged in a secure, web-based workspace are accessible anytime, anywhere.

- Predefined tasks and UI elements accelerate content creation.

- Version and Access control capabilities enable traceability and easy collaboration.

- Point of Interest Markers (POIs) indicate the precise location or part to be inspected.

- Intuitive UI and real-time data captured from the frontline facilitate procedure execution.

- Built-in analytics portal provides access to centralized execution to drive continuous improvement.

Best for:

- Accelerating learning curves and improving accuracy with easy-to-follow visual AR instructions for inspection training that demonstrates what good looks like, thereby reducing errors or misunderstanding

- Ensuring quality with AR instructions for end-of-line inspections that provide a comparative perspective and enable data capture during procedure execution at the frontline

- Identifying issues and accelerating corrective action through AR visual guidance for post-maintenance field inspections

Learn more about how companies are already using Vuforia Instruct today to improve their inspection processes.

- [Harpak Ulma Packaging Customer Interview](#)

- [Vuforia Instruct](#)

vuforia® studio™

Flexibility and efficiency combine to enable the development of immersive AR experiences that leverage existing 3D and IoT dataproblem-solving and collaboration.

Vuforia Studio is a flexible, efficient way to create immersive, tailored 3D AR experiences. Vuforia Studio allows technical content creators to transform existing CAD, 3D animations, and IoT data into detailed AR experiences to provide critical information to frontline workers and customers, where and where they need it most.

Distinguishing features and capabilities:

- 3D CAD data repurposed from virtually any source delivers greater return on your investment.

- Efficient authoring environment with the flexibility to customize via JavaScript enables tailored AR experiences.

- Incorporated animated sequences from Creo Illustrate improve understanding and safety.

- IoT and complex metadata (airflow, heat, components) can be exposed to increase operational efficiency.

- Connection to learning management systems and other enterprise systems enable traceability and compliance.

- Advanced tracking methods, including spatial, model, and Area Targets enhance user experiences.

- Enablement of digital thread with PTC's core technologies supports digital transformation.

Best for:

While Vuforia Studio offers the flexibility to address a broad variety of use cases, some of the most common, high-value scenarios include:

- Training on-asset, in the context of the physical products or remotely with virtual assets, including exploded and x-ray views

- Validating design and demonstrating product configurations, options, and fit with full-scale product visualizations

- Providing model-specific service instructions, including accurate identification of spare parts, by overlaying 3D digital content onto real-world equipment

- Enabling real-time IoT data visualization of operating conditions and equipment performance on an object or in a space

Learn more about how companies are already using Vuforia Studio today to improve their training, service, and operational efficiency.

- ↗ Howden Case Study

- ↗ Vuforia Studio

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vuforia® engine

Develop engaging, branded augmented reality applications using Vuforia Engine's powerful and flexible computer vision technology.

Vuforia Engine is a flexible, advanced software development kit (SDK) for creating branded augmented reality applications that can be deployed cross-platform on the widest range of phones, tablets, AR headsets, and smart glasses . For use cases requiring custom content and branding, developers can harness powerful computer vision to leverage images, 3D objects, and environments for tracking AR experiences.

Distinguishing features and capabilities:

- Unparalleled accuracy allows developers to build robust, precise AR experiences in a variety of environments.

- Broad platform support permits companies to reach the largest possible audience with the widest range of supported AR devices.

- Support for leading development platforms promotes the creation of photorealistic AR experiences.

- Wide range of powerful target types to bring your applications to life:

  - Standard target types enable image, object, and horizontal and vertical surface recognition to enable AR experiences across a wide variety of uses.

  - Advanced target types facilitate the use of 3D CAD models or 3D scans of large, indoor spaces to develop experiences for industrial and retail use cases.

Best for:

- Organizations with skilled developers (either in-house or outsourced) who want to create fully customizable experiences to drive employee or customer engagement

- Driving better customer experience through product companion apps that provide unique, immersive AR experiences

- Improving employee or customer engagement with virtual product visualization and demonstration apps

- Creating large scale AR experiences or navigation/wayfinding experiences in retail or industrial factory settings

- Leveraging advanced development skills (either in-house or outsourced) for fully customizable experiences

Learn more about how companies are already using Vuforia Engine today to improve customer experiences and brand awareness.

⬈ TVS Case Study

⬈ Vuforia Engine

Vuforia Solutions Checklist

To address your manufacturing, service, and training challenges and drive tangible business benefits, focus on high-value AR **use cases** and identify the necessary **capabilities** for your environment. The following section serves as a quick reference to understand and compare technical functionality against your business criteria so that you can make the best AR investment decisions for your particular business needs.

CAPABILITIES		Vuforia Chalk	Vuforia Expert Capture	Vuforia Instruct	Vuforia Studio	Vuforia Engine
	CONTENT DEVELOPMENT EXPERTISE					
	None	✔				
	Minimal - Out-of-the-Box Functionality		✔	✔		
	Medium - Tailored Experiences				✔	
	High - Custom Experiences					✔
	3rd party development tools (Required)					✔
	PRIMARY CONTENT SOURCE					
	Real-time annotations on shared video	✔				
	Captured video (RealWear or HoloLens 2 required)		✔			
	CAD Data			✔	✔	✔
	Images or Objects					✔
	3D scans of spaces / environments				✔	✔
	OTHER CONTENT SUPPORTED					
	Native 3D Sequence Integration (Creo Illustrate)				✔	
	Native IoT & Biz System Data Integration (TWX)				✔	
	2D Media and Data		✔	✔	✔	✔
	2D / 3D Media and Data			✔	✔	✔
	CONTENT DELIVERY /DEVICES					
	Mobile – iOS and Android	✔	✔	✔	✔	✔
	Mobile –Windows				✔	✔
	2D head-mounted devices – RealWear	✔	✔		✔	
	2D head-mounted devices – Vuzix				✔	✔
	3D Digital Eyewear - Microsoft HoloLens 2				✔	✔
	3D Digital Eyewear Magic Leap					✔
	Web	✔	✔	✔		
	CONTENT HOSTING / DEPLOYMENT					
	Secure SaaS Environment	✔	✔	✔		
	Secure Cloud Environment				✔	
	Secure Cloud and On-Prem				✔	
	SDK (download & used in dev platforms)					✔

CAPABILITIES		Vuforia Chalk	Vuforia Expert Capture	Vuforia Instruct	Vuforia Studio	Vuforia Engine
	CONTENT SCANNING OPTIONS					
	Apple LiDAR-enabled devices (Scans up to 500 sq ft or 50 m2)				✓	✓
	3D Environment Scans: Matterport (Scans up to 10,000 sq ft or 1000 m2)				✓	✓
	3D Environment Scans: NavVis (Scans up to 300,000 sq ft or 30.000 m^2)					✓
	CONTENT PLACEMENT / TRACKING					
	Advanced Target Types (Area Targets)				✓	✓
	Advanced Target Types (Model Targets)			✓	✓	✓

USE CASES		Vuforia Chalk	Vuforia Expert Capture	Vuforia Instruct	Vuforia Studio	Vuforia Engine
	Remote Installation Troubleshooting	✓				
	Remote Technician & Customer Support	✓				
	Remote Operator Support	✓				
	Job-specific/on-the-job Training		✓			
	Maintenance / set-up & changeover		✓			
	Operator and Assembly instructions		✓		✓	
	Quality Inspection			✓	✓	
	Post Maintenance Field Inspection			✓		
	Inspection Training			✓		
	On-Asset or Virtual Asset Training				✓	
	Operational Oversight				✓	
	3D Guided Service Instructions				✓	
	Customer Self-Service Instructions		✓		✓	
	IoT Data Visualization				✓	
	Product Visualization				✓	✓
	Product Companion / User Manual					✓
	Navigation/wayfinding in large environments					✓

Better Together: Vuforia Instruct and Vuforia Expert Capture

As part of Vuforia's SaaS-based work instructions, Vuforia Instruct and Vuforia Expert Capture can be combined to work seamlessly together and address a wider range of enterprise use cases. Whether you're capturing expertise or leveraging existing CAD data, Vuforia makes authoring, publishing, and scaling instructions to your workforce fast and easy.

Getting Started with AR

Whether you are facing an immediate need to quickly and efficiently ramp-up new employees, service increasingly complex products, or empower a global workforce to improve operational efficiency and customer experiences, AR provides innovative solutions to help address your unique business challenges.

To better recognize and prioritize your challenges and AR opportunities, explore the Use Case Guide.

For more in-depth guidance to kickstart your AR projects, get your copy of Getting Started with Industrial AR Solutions.

Ready to start your company's augmented reality journey? Contact an AR Expert.

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