
GUIDE TO INDUSTRIAL AUGMENTED REALITY USE CASES



UNLEASH THE POWER OF AUGMENTED REALITY



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ABOUT UTILITYAR

EXECUTIVE SUMMARY

AR glasses provide a superior form factor for service technicians, engineers and plant operators to

- Identify the correct asset that they should be working on
- Provide them with the information they need to work on it
- Guide them through the correct procedure to complete the tasks they must complete
- Validate that the work has been completed including step verification records
- Enable a trouble-shooting video call where a remote adviser can see exactly what the local resource is seeing real-time, and directly mark-up the local worker's vision to help communicate how to fix problems identified

Augmented Reality (AR) provides a unique opportunity for industry to reduce human error, streamline work procedures and increase workforce productivity. AR glasses are transparent glasses that use a forward-facing camera to recognise elements of their surroundings and can then project relevant information on the lens of the glass where it is visible to the wearer. The glasses wearer predominantly sees the real world, though with digital information also in their vision.

AR is widely recognised as a nascent technology poised for growth and tech leaders such as Google, Microsoft, Apple and Epson have invested heavily in the space. The benefits that it can deliver in Industry and Utilities will be significant in relation to the costs of providing setup, integration and support of their increasingly sophisticated assets in the field.



HOW AR GLASSES WORK?

Augmented Reality (AR) glasses are being produced by a growing number of hardware manufacturers. The glasses are internet connected computers which can be used to visualize the world in an augmented way. The three key features of these glasses are as follows:

Transparent Glass

Augmented Reality Glasses generally have clear transparent glass which means the wearer is predominantly seeing the real world and so remains aware of their surroundings. In addition the glasses will fail safe (allow the wearer to remain seeing the real world – not impair their vision) if there is any technical problem encountered. These is an important safety features use in the workplace.

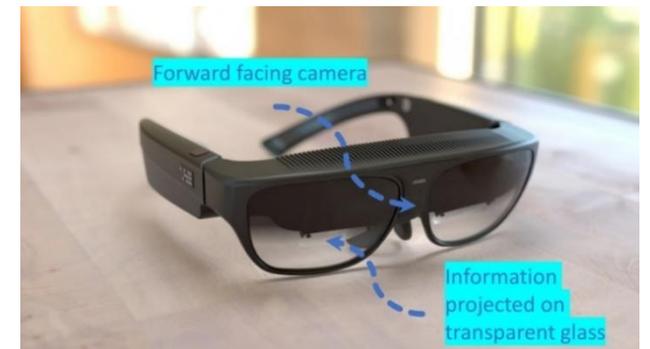
Forward Facing Camera

Forward facing cameras allow the glasses to understand their surroundings (using object, bar code or QR Code recognition). They also allow the glasses to take images or video and broadcast that media live to a remote location.

Visualisation of text/data/images/video in the vision of the wearer

AR glasses allow the wearer to see information/media projected on transparent glass or on a small screen in front of them, and so allow the wearer to see relevant information to help them get their job done. The information may be presented as “heads-up” information displayed directly in front of the wearer. Alternatively it may be “pinned” to a real-world object, such as a virtual name plate hanging over an object, or it may interact directly with real world object, such a virtual handle overlaid on a real-world handle (as in the image).

- Internet connected
- Transparent Glass – see the real world
- Forward Facing Camera
- Images/Data visible to the wearer



WHICH GLASSES?

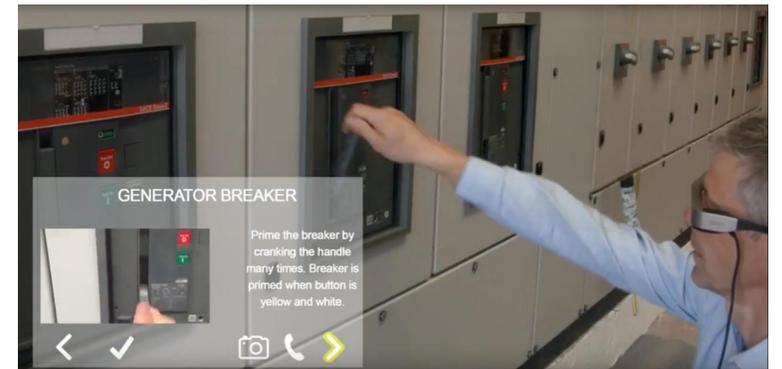
Selecting the most appropriate glasses

As with any other application, different use cases and circumstances mean that there is not one technical solution which is always the best option. AR glasses come at different price points, with different weights, sizes and form factors. Choosing the most appropriate pair for your use case is important in ensuring a successful project. Below sets out a number of the factors which are likely to be important in helping you make a choice

Heads-up display or fixed to a point in space or other object

A very exciting capability in AR relates to fixing virtual graphics to a point in space or to another object. This could mean that a label sits above a real-world object (such as a person's or an asset's name sitting above them in space), a 3D graphic is overlaid on a real world object (such as a virtual cup of coffee left on a table) or a virtual graphic interacts with a real-world object (such as a virtual ball bouncing on a real world table). The key features are that the glasses must recognise the real world items and then remember where they are relative to the wearer, so when the virtual object stays in position when the wearer moves their head.

These are all very exciting capabilities, and should be applied when appropriate. On the other hand, simple heads up display of information is simpler, less immersive, and can be preferable for some applications. Where an application is based on the idea of providing heads up display of information to an operator, the application is simple and relatively inexpensive to produce as well as the content being easy to create. The hardware is also cheaper and lighter.



WHICH GLASSES?

ATEX, Safety Glass and other industrial requirements

Some workplaces require ATEX rated or safety glasses for H&S reasons. As you would expect, this reduces the number of options available, though it can be done. That said the value that is created by using the technology in these places is often much higher.

Comfort requirements and suitability for the wearer - Weight

Comfort is an important decision factor when choosing a headset or glasses. In the event that the wearer will be using it for a long period of time, comfort is important. In addition, battery life is important when the device will be in use for an extended period of time, though in many cases a larger battery and comfort for long-term wear do not work well together.

Battery life

Battery life in AR headsets/glasses varies significantly depending on the level of technical sophistication of the headset, battery size and usage type. Similar to a phone, our experience is that the actual usage time of the device is low relative to the amount of time the wearer has it on standby.

Monocular Vs Binocular

Monocular devices such as Google Glass or Vuzix M400 are good for presenting heads up information to the wearer through a single screen in front of one eye. These devices can be less intrusive and also have the benefit of generally working well with the wearers regular glasses, allowing for the device to be shared between more than one user.

Binocular devices facilitate more sophisticated graphics being presented to both eyes. They are also more intuitive to use as most of us are used to seeing through both eyes.

WHICH GLASSES?

Need for and convenience of special lenses

Some glasses allow the focus of the image to be adjusted, and so reduce or remove the need for specialist lenses. Others allow special prescription lenses to be purchased which fit within the device. Finally some devices are designed to facilitate use of a wearers regular glasses.

Field of View

Much ink has been devoted to the “Field of View” (FOV) or the size of the area in which the device can provide augmented vision to the wearer. This is important particularly in the event that the application the wearer is interested in includes moving virtual items (say a flying object in a game) or they wish to link a piece of information to a specific real world item or point in space. In the event that the application only requires information to be projected heads up for the wearer, there is little need to worry about the FOV. Also, when first using a headset the FOV issue seems important, but once a wearer has adjusted to the new normal, it ceases to be an issue.

Cost

Headset costs vary depending on the model and the number of headsets being purchased. The lowest cost headset we have worked on is €1,000 and meets the requirements of many applications. At the other end of the spectrum some devices cost closer to €6,000 or so. When costing a headset we feel strongly that the cost now is not representative of where we expect things to go over the next few years.

Flexibility to change device in future

We believe that the costs and technologies set out above will change significantly over the coming years. We therefore discourage organisations doing anything which ties them into one headset or platform. Flexibility to change solution will be extremely important in future as things develop.

REMOTE ADVISER VIDEO CALLING

- Onsite worker wears glasses, views problem area and calls Remote Adviser (RA) for assistance
- RA sees what worker is seeing on their laptop/phone
- RA can draw on the vision of the worker in real-time
- RA can speak to worker to explain next steps

When a worker has a problem that requires the experience or expertise of others to fix, the current solution involves requiring that expert to come to the site or to diagnose the problem over the phone. This is time consuming and often results in significant delays. It is also wasteful as experts often travel long distances to solve problems that take minutes to fix. Finally it can be dangerous as directing people on how to fix a problem over the phone is not good practice.

Augmented Reality glasses allows a remote adviser to see what a local worker is seeing through the headset forward facing camera and, very importantly, to provide guidance to them audibly and using onscreen mark-ups (visible on the glasses of the local worker), while the worker is present and has their hands available to take the actions required to fix the problem.



REMOTE ADVISER - BENEFITS

- Field staff trouble-shooting: allows the main office/other staff to communicate with a worker in the field
- Off-hours communications with on-call staff: reduces the need for on-call staff to come to site
- Communicating with internal staff in different parts of the site
- Communicating with vendors located in remote locations: link vendors to the site to speed up support
- Use of local technical staff for installation: allows hardware manufacturers to avoid sending staff to install/maintain equipment
- Confined spaces assistance: where only one worker can be accommodated
- Testing trainees: watch live or record a task completed by a trainee

Reduction in technical service costs in the region of **50%**
Improved uptime and service offering valued at millions



WORK PROCEDURES

AR Glasses Solution

- Worker wears Augmented Reality Glasses while completing a task
- Glasses recognise the asset
- Make procedure step visible to glasses wearer
- Follow Standard Operating Procedures content step by step
- Short steps – see text, images, video or holograms overlaid on the asset they are working on
- Validate work is completed correctly by taking images, video, notes
- Records and notes are automatically uploaded to report

Status Quo

Paper based work procedures have been the norm in many industries for a long time but they present significant drawbacks where records are required, notes taken need to be relayed to others, or updates to procedures need to be circulated. Additionally, in many circumstances there simply isn't a good place to leave them while doing work, leading to poor adherence.

Similarly tablet based procedures have the same drawback relating to where to locate the tablet while the work is being done and so adherence to the procedure is limited. They therefore require the worker to travel back and forth between the area where work is being done and where the tablet is located to follow the procedure properly, which is monotonous and time consuming. Ultimately it may lead to corners being cut and the procedure not being followed correctly.

Often, procedures of these types are not used in real-time, rather they are “tick box” exercises which are carried out after the work is completed.

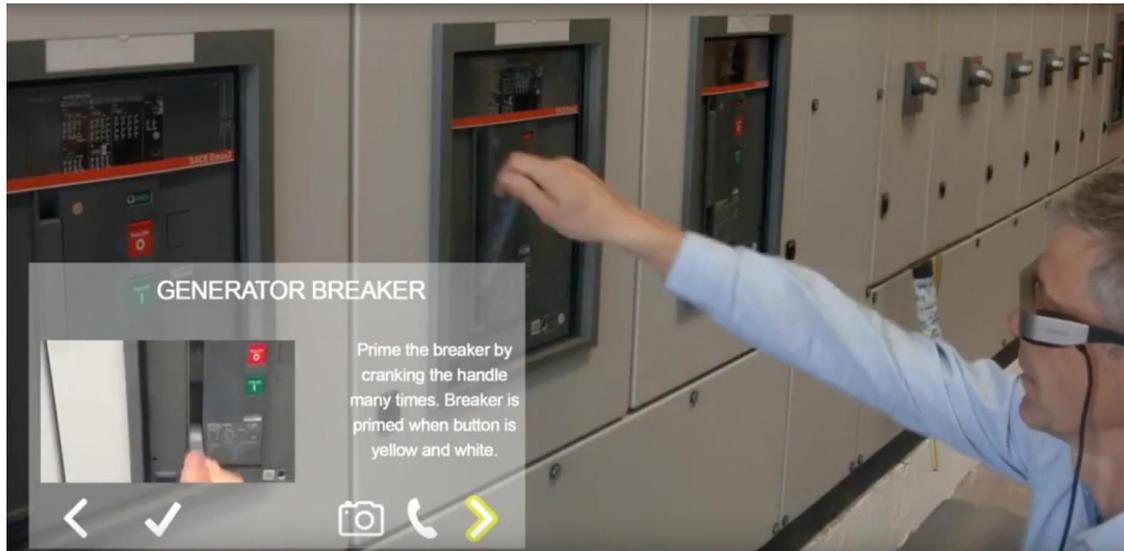
Augmented Reality Glasses Solution

Augmented Reality glasses-based solutions are different. Firstly they use the forward-facing camera to automatically recognise an asset being worked on and to validate that it is the correct asset. Context-relevant work instructions allow technicians to speed up processes by reducing the need to look up reference material. The procedure is delivered handsfree and when they need it. Procedural steps can be delivered in the form of images, drawings, video or 3D hologram, allowing for better detail to be provided to the worker as well as removing the need for translations and local adaptation. Finally they standardise the quality of work and validate that it has been completed safely and correctly by allowing the worker to take video and pictures while they are doing the task.

WORK PROCEDURES

Connect to your existing database

Generally speaking AR software can be linked to an existing SAP, IBM Maximo, Service Now or other ERP asset and maintenance management system. Alternatively, a simple database on the software providers own servers can facilitate a Proof of Concept project. AR projects are regularly cited as a important reason for investment in database management projects.



Pilot projects have reported a 40% increase in productivity using Augmented Reality for asset maintenance and work procedures.

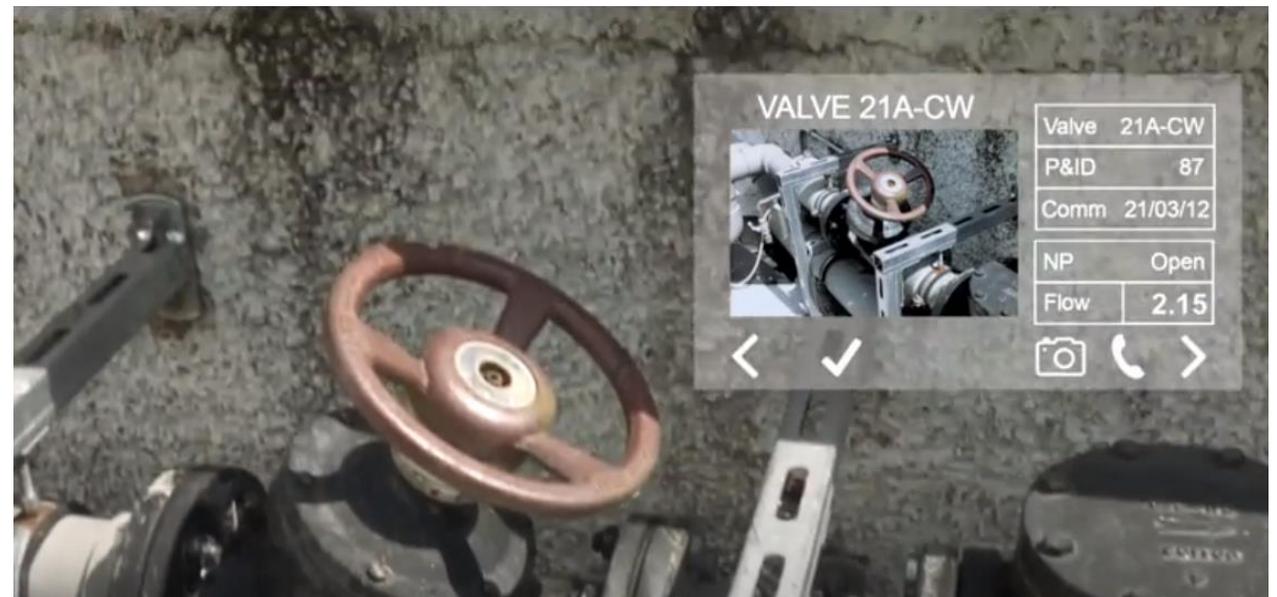
Procedure related benefits:

- Improved adherence to work procedures, made possible by having the procedure to hand while doing the task
- Error avoidance: again due to having procedure steps to hand at the right time
- Process time reduction: reduction in need to return to computer/tablet to check procedure
- Procedure following during high pressure situations: better form factor for staff in high pressure situations such as during a power failure etc
- Procedure validation: using the camera to record images/video during procedure
- Time management of work procedures: recording of timing of each step allows better time management of future work procedures
- Training and work procedures: better form factor for recording procedures or training staff on new procedures

ASSET MANAGEMENT

- Worker wears Augmented Reality Glasses while looking at assets
- Glasses recognise the asset
- Contextually relevant information relating to asset visible to the wearer
- Record images, video, and notes
- Records and notes are automatically uploaded to report

We work in complex facilities, filled with multiple assets, systems and processes. Augmented Reality glasses allows an engineer or technician to view asset information live and handsfree in their vision automatically while they walk around a site. Live data which may be useful could include general information about the asset, details relating to where it fits within bigger systems and processes on the site, or live meter or alarm status data.



SURVEYING AND CONDITION MONITORING

Status Quo

Surveys carried out by engineers and technicians using paper or tablet-based solutions only capture part of the story. Workers record information and take pictures of some important points as they go, but they only gather the information which is obviously required, and often miss other things which later turn out to be important. Workers are required to stop to write down information and must remember to take photos at the correct times in the process. Once collected the information needs to be transferred to a location where it can be stored for future use.

Augmented Reality Glasses Solution

AR Glasses allow a surveyor to record video of what they are seeing as they carry out a survey using the forward-facing camera. They can also speak notes as they see things that need to be records which can later be turned into text for record keeping. If left running, the camera can also record lots of extra detail which may prove to be significant later on. Finally, the system can be set-up to allow the worker to see images/video of the previous condition of an asset and so better assess next actions while they are still onsite.

- Worker wears Augmented Reality Glasses while completing a survey
- Records video and sound of survey
- Can show surveyor images or video of previous condition of asset for comparison
- Information gathered are automatically uploaded to report

- Worker wears glasses in location where they will be completing work
- Consumes step by step training which guides them on how to do task
- Potential for including test or similar content
- Trainer can watch worker live if required to observe what they are doing
- Trainer can provide real-time guidance to worker
- All training completed are digitally tracked and reported in online system

With an increase in the rate at which new workers join organisations, the need for scalable training solutions has never been greater. Further issues are the requirement to provide standardisation and documentation related to training. A further issue is restrictions on training related travel, meaning that alternatives need to be found.

Status Quo

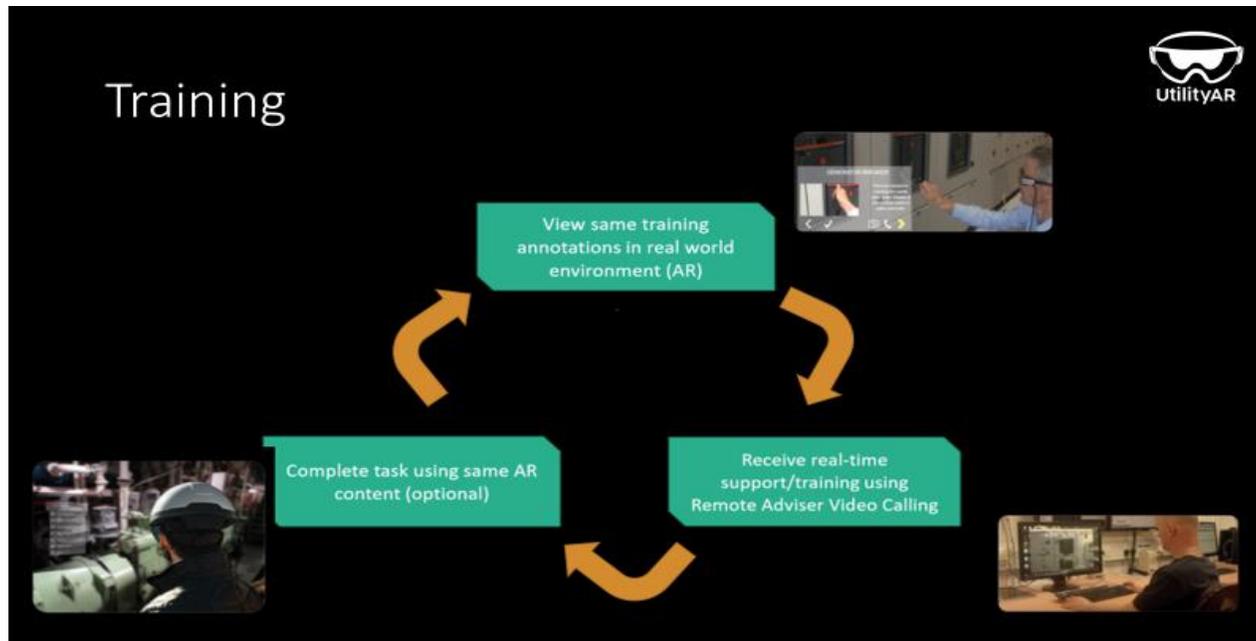
Shadowing a worker to train them is the best solution to providing training, but it is extremely time consuming and inefficient. It requires a productive worker to spend their time training rather than getting their job done. A further issue is that it is not standardised, poor practices are perpetuated between staff and some workers may just be poor trainers. While it remains an important element of training, particularly at the early stages, companies need to find a better solution.

Classroom training of workers is unengaging and yields poor results. It is also time consuming, particularly for field workers who are not based in the office and it also has the problem that there may be a long period between the time the training is provided and when it will be used. That said it is the best traditional way to deliver large volumes of basic training which involves text etc.

TRAINING

Training with Augmented Reality glasses allows a worker to view training instructions (pre-defined or provided by a live instructor) while they are at the physical location where they will be required to do the work. This immersive experience provides far better levels of engagement as well as being more time efficient and easier to document. Furthermore they can be assisted or assessed by a remote adviser using remote adviser video calling if required. Finally they can complete the actual tasks using the Augmented Reality Procedure Following system discussed above. This provides a unified training system and simplifies documentation while also giving the trainee a more engaging experience, leading to better results.

- Reduced travel
- Improved record keeping
- Greater staff engagement
- Superior knowledge retention
- Linked to real work procedure delivery system
- Reduced need for language localisation



INDUSTRY USE CASES – Engineering Consultancy

CDM Smith Provides International Expertise Using UtilityAR

CDM Smith is a full-service engineering and construction firm that provides consulting, design, and program and integrated construction management solutions in water, environment, infrastructure, energy and facilities projects for government and private clients. With over 5000 staff, they have offices throughout the world.

CDM Smith was looking for solutions that would enable them to improve their ability to bring their international expertise to regional projects, without the need for those experts to travel on every occasion.

CDM Smith reports **10-20%** cost savings by using UtilityAR Solutions. It is allowing CDM Smith to offer better outcomes to their customers in the project development, energy and utility sectors. Using AR software, the company have reduced the amount of travel required by their specialists while also improving the availability of those specialists for their regional projects. This is allowing the company to deliver savings in time and costs while improving their service.

“ UtilityAR has allowed us to provide specialist services across the world without our specialists having to travel to the site. ”

Jon Hunt
Client Services Manager, CDM Smith.



INDUSTRY USE CASES – Data Centre

CIX Data Centre Improved Resilience Using UtilityAR

CIX are innovating to provide greater levels of security, reliability and transparency to their cloud platform customers by using UtilityAR's software. The Augmented Reality glasses-based software helps the Cork based Data Centre to train staff faster and to provide staff with guidance in the event of a utility interruption. It also allows them to offer their customers real-time remote eyes in the event that a customer's infrastructure requires troubleshooting.

CIX improved their data centre reliability by using UtilityAR's Augmented Reality driven training systems. The technology allows staff to watch training videos while at the critical equipment and so be better equipped to take action when needed.

CIX allow CoLo customers to see their equipment live through their "Remote Eyes" service. This unparalleled service means their customers have a superior service to any other CoLo providers.



“ UtilityAR technology enables us to deliver a resilient service so our customers have peace of mind and also it enables us to invite them into the building at critical times. ”

Jerry Sweeney, CIX Founder

INDUSTRY USE CASES – Utilities/Field Service

BIOVERDA Power Systems Improved Functionality Using UtilityAR

BioVerda Power Systems operate gas and diesel engines across nine sites nationwide. BioVerda were looking for solutions that would enable them to maintain the operations of their Galway based site, without the need for full-time engineers. With their main office located in Dublin, it was critical they maintain their high-safety and maintenance standards while reducing the time required on site.

Dealing with complex machinery, training at BioVerda is highly important. Using Augmented Reality, they reduced training process times and ensured learning outcomes continued after the training period. UtilityAR Solutions now allow more experienced members of the BioVerda team to communicate their knowledge and problem-solving skills to less experienced workers from any location.

BioVerda's Galway site is a considerable distance from their head office in Dublin. When the site encounters issues, an engineer must visit the site, causing significant downtime and a backlog of work. UtilityAR's 'Remote Adviser' is providing AR solutions, allowing an expert engineer to communicate with the on-site operators, reducing downtime and fixing the problem sooner for BioVerda.



“
UtilityAR is helping us improve uptime, training and our response to unscheduled outages. We also believe it will improve the maintenance on our remote sites.
”

Donal O’Cinneide, Bioverda



About UtilityAR

UtilityAR (www.utilityar.com) creates Augmented Reality Solutions for Industrial Sectors like Manufacturing, Pharmaceutical, Utilities, and Data Centres. Driven by the team's experience in utilities and the industrial sector, UtilityAR is building the next generation of workplace and asset management tools for those industries. We understand the importance of ease of setup and use of the platform. This has been a focus in the design of the product and means that it is the easiest to integrate solution on the market.

Contact us at enquiries@utilityar.com

Request a **Free Live Demo** and see Augmented Reality in Action!

LIVE DEMO