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Augmented Reality: the new normal in technical writing?

Required by law to be delivered with every product, the written manual is here to stay.

But using Augmented Reality, digital instructions can enhance the classic manual, making the information more intuitive and easier to understand.

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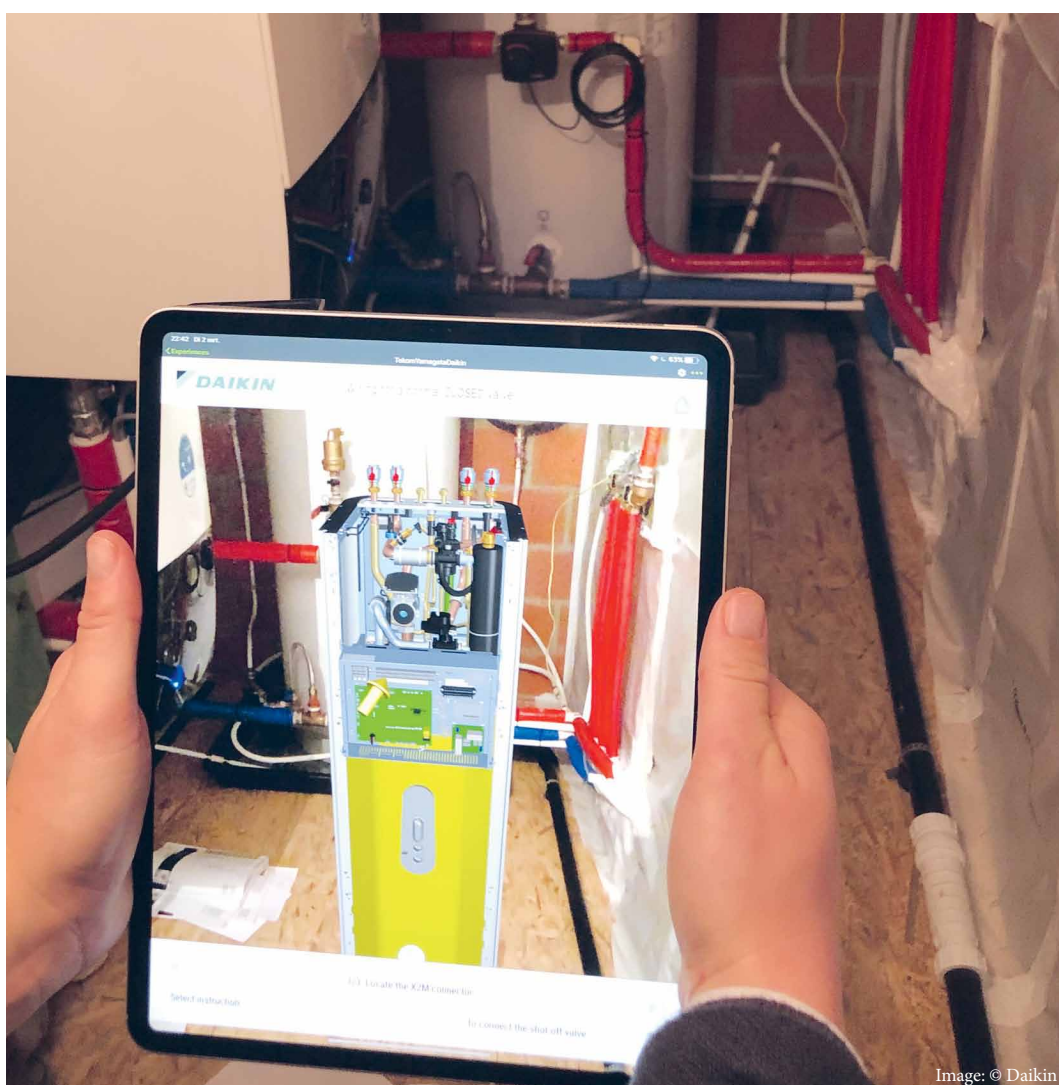


Figure 1: Instructions in Augmented Reality allow the installer to see digital information along with the physical product.

From your washing machine at home to complex industrial machinery, every device with the least bit of complexity comes with an installation manual. In fact, installation manuals constitute one of the main sources of product information shared between a product's manufacturer and its installer. Especially for complex products requiring specialized installation procedures, clear installation instructions are crucial. Manufacturing companies have long relied on the installation manual, combined with installer training and certification, to guarantee high-quality installation of their products. But classic manuals have limits. As such, they often fall short when an installer runs into an issue during installation.

New emerging technologies provide opportunities for enhancement. What if, for instance, installers could rely on Augmented Reality to get clearer installation instructions on site, while installing the product? Daikin, a leading manufacturer of heating and cooling solutions, joined forces with Savaco, a Belgian IT service provider, and Yamagata Europe, a technical writing and translation solution provider, to investigate how installation manuals can be upgraded toward clear digital instructions providing benefits for both manufacturer and installer.

The limits of classic installation manuals

At Daikin, manuals are provided with every piece of equipment delivered. As Daikin's heating and cooling systems consist of several units, this means various manuals are needed to complete one installation. "Take for instance a residential solution for heating. Such a system consists of a heat pump installed outdoor, an indoor unit, a hot water tank, a controller, and more. Each of these products requires specific installation procedures: fixing the unit, connecting pipes, connecting electrical wires, starting up the system," explains Bram Lowagie, product documentation manager at Daikin Europe. "As you can imagine, installing a complete heating or cooling system is a complex matter. That is why we require installers to get certified for installing our products, in order to guarantee a correct installation for our end customers." Currently, Daikin provides a written manual for each of its products. A printed short version is de-

livered along with the unit, and the full version of the manual is available online via Daikin's business portal. But these manuals have limits, as they contain only written descriptions and static, 2D representations of the product. This often makes instructions harder to understand. If an installer runs into a problem during an installation and does not find the solution in the manual, installation delays are inevitable. And these in turn lead to more delays at the construction site, where every action is interconnected.

Bridging the gap between manufacturer and installer

One way to reduce errors and delays in installation would be for manufacturers to make their products easier to install. But for complex products and systems, this isn't always feasible. Another way to bridge the knowledge gap between

a product's manufacturer and its installer or end user is to make installation instructions easier to understand. Converting installation manuals into digital instructions is an important step forward in increasing understandability. Today, more and more installers are digital natives who have grown up using digital tools such as smartphones and tablets. They are no longer used to reading written instructions, and they expect their supplier to support them using the same modern tools they use in their daily life. "Technology can help us improve our installation instructions and adapt them to customers' and installers' changing expectations," says Bram. "We believe digital instructions can make our manuals more intuitive and easier to understand, even by less experienced installers. This way, we want to better support our installers, guarantee a higher quality installation of our product, and finally ensure timely delivery and a happy end customer."

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Steps towards a better understanding of installation instructions

A first step in making installation instructions more intuitive and understandable is to build digital instructions focusing on a visual representation of the product and the instructions. Today, manuals rely heavily on text. Replacing this text with visual instructions enhances understandability. Secondly, it can be of great help to include animated 3D images of the product in the instructions, instead of photos and videos of a physical product. This makes it easier to give a full view of the unit (not only the visible parts) or to highlight important parts where needed. Finally, as an installer, it can be of great value to be able to do a virtual installation of the product off-site, by way of training, or as a preparation for the installation itself. "If an installer can get to know the product and go through the instructions virtually before starting the actual installation, he or she will be better prepared for the work on site," says Bram. Today, the written manual cannot be replaced. Providing an installation manual with each delivered product is required by law. But it could have great benefits for the installer if the classic manual were enriched with digital instructions, available for instance in an app on the installer's smartphone. So what technologies can help achieve clear, visual digital instructions in an existing classic written manual?

From text-to-speech to Augmented Reality

Yamagata Europe and Savaco investigated the possibilities using a Daikin installation manual to build a proof of concept. In the first step, written instructions were tackled. Using text-to-speech technology, Yamagata Europe converted all textual instructions in the manual into spoken words in multiple languages. As the instructions were available in multiple languages in Daikin's SCHEMA ST4 CMS, multilingual instructions are included easily in subtitles and spoken words. Next, an instructional video was created using the spoken instructions. One option was to take a camera and record how a person installs the product. But for that, you need the physical product, actors, a studio... And often, the result isn't clear, as the actor's hands block the view when performing an action. Instead, Savaco decided

to use the product's 3D CAD model as a basis for an animated instructional video. A product's 3D model is available from the moment its design is released, and if the product is changed, the 3D model can easily be replaced by the latest version in the video. This makes it possible to update the instructional video each time a new version of the product is released.

Finally, the process was taken even further by enriching the digital instructions with Augmented Reality. AR is a powerful technology that allows you to project digital information, such as a product's 3D model, onto the physical world. In this way, you can visualize the product in its physical context, such as a construction site, without having the product itself on site. What's more, it allows you to see aspects of the product that usually remain invisible, for instance, the inside of the product. In this way, AR can give a whole new dimension to digital instructions.

Savaco used PTC's Augmented Reality tool Vuforia to convert a selection of complex procedures in the Daikin installation manual into an AR experience. The AR experience was created using existing content: the product's 3D model and the instructions from the manual that were previously converted into voice instructions. In order to make the AR experience available for the installer, a QR code was added in the paper manual, which can be scanned by the installer using a smartphone or tablet.

A new normal in technical writing?

The result of Daikin's, Yamagata Europe's, and Savaco's joint effort is an installation manual enriched with digital instructions in animated video and Augmented Reality in multiple languages. For every complex procedure during installation, an installer can scan a QR code using a smartphone or tablet, and watch clear visual instructions to fully understand what needs to be done. When watching an AR instruction, the installer can even project the digital instructions onto the physical construction site, in order to get a full view of what the end result should be.

This type of digitally enriched manual has benefits for both manufacturer and installer. First of all, having clear visual digital instructions at hand makes it easier for the installer to complete an installation without running into problems or making mistakes. Especially if the installer is less experienced

in installing a certain type of device, digital instructions can be of great help. This results in shorter installation times, a higher quality installation, and a perfectly satisfied end customer.

For the product manufacturer, a higher rate of successful installations increases its status as a reliable supplier and decreases the number of calls or questions from installers with specific issues. Moreover, creating digital instructions doesn't require a lot of extra effort. No new content needs to be created, as written installation instructions and a 3D model already exist. Using text-to-speech and AR technology, they can quickly be turned into much richer, easy-to-understand digital instructions.

For Daikin, Yamagata Europe, and Savaco, this proof of concept confirms that enriching manuals with digital instructions can have a lot of added value. In times when both installers and end customers expect manufacturers to provide innovative support at all times, digital instructions in local language could become the new normal.

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