Tapping into Augmented and Virtual Reality to Empower Field Service

Abstract

The current industrial landscape is fraught with economic volatility, resulting in shrinking profit margins and restricted revenue channels and growth. In this difficult environment, labor arbitrage poses a significant threat to manufacturers in developed countries. Manufacturing employment has reduced drastically while consumer demand has become increasingly fragmented and unpredictable. With decreasing product differentiation, escalating customer expectations around product and service performance, and tighter environmental and safety regulations, service commoditization is on the rise. This is forcing manufacturers to rethink their existing service business models.

Thankfully, emerging technologies such as Augmented and Virtual Reality (AR and VR) are coming to their rescue. They are helping manufacturers transform business models - from providing ad-hoc support to developing services backed by business logic. As a result, organizations are now deriving value-adding potential not just from production activities but also from pre- and post-production processes.

The paper covers key trends shaping the service business of leading Industrial Machinery (IMC) firms and explores potential AR and VR use cases to demonstrate how these technologies can address new-age service challenges. It also highlights key considerations that organizations should look into when venturing into the AR-VR space.

What Ails Manufacturing Field Service

Service plays a crucial role in the industrial manufacturing set up. By bundling services with their industrial products, manufacturers are able to market holistic solutions, thereby amplifying the value of the product and creating competitive advantage. However, the sector faces some key challenges in taking advantage of the opportunity.

- Ensuring 'zero downtime': Unlike home appliances or personal devices, industrial equipment is a crucial part of a business and needs to function optimally in order to support the emerging 'always-on' business mandate.
- Addressing product complexity: Complex machinery such as turbines and power transformers is typically built to address specific customer requirements and varies significantly in build, configuration, and so on. This makes it very difficult for field service personnel to acquire technical mastery over the entire installed base. The situation is further complicated by legacy equipment that has been in existence for over 20 years.
- Tackling geographical spread: Industrial machinery is often installed in remote locations, and frequent visits by service technicians can prove expensive and time consuming. It is important for field technicians to optimize each visit.
- Bridging skills gap: Field service, especially in developed economies, is plagued by a unique challenge: an ageing work force combined with low levels of interest among the younger population to enter the field, leading to an acute shortage of skilled workers. As many as two million technical jobs are predicted to remain unfilled by 2020 as the shortage of skilled workers threatens to derail manufacturing industry's growth, especially in developed economies.[1]

Field service operations have a lot to gain by incorporating emerging technologies such as voice, video, internet of things (IoT), AR, VR, and others into their business strategy. Superior connectivity enabled by IoT, Social, Mobility, Analytics, Cloud (SMAC) technologies, automated systems, and connected applications is already a key force, helping service firms establish connection between agents and remote experts to access tools and information such as customer, scheduling and parts data, inventory position, and historic services. IoT-enabled remote diagnostics is also helping service engineers harness data-driven insights to drive preventive maintenance

and improve service delivery and asset uptime, significantly improving the value proposition for customers. The time is ripe for manufacturing firms to step up their service game by tapping into the potential of AR and VR.

Implementing AR and VR in Field Service: Key Factors to Consider

While AR and VR are set to offer a promising future for the field service domain, the manufacturers must consider certain factors before implementing these.

Augmented Reality[5]

Technological skill set: The skills required to launch AR applications depend on the desired level of interaction and user experience. Experiences that allow people to visualize products in different configurations or settings are relatively easy to develop. Instruction applications and interactive experiences are more complex to build.

Digital content creation: While existing digital content can be reused for creating basic AR experiences, advanced user experiences require development from scratch; typical approaches include adapting CAD illustrations or 3D scanning.

Hardware selection: Smartphones are the preferred device for most AR applications while tablets may be used when wider displays are required. However, for superior experiences, head mounted devices (HMDs) will need to be incorporated, which currently is expensive.

Deployment model: Organizations can take one of two approaches. One, develop custom applications with AR features and download them for usage. Two, build AR content through AR-publishing software and publicly launch AR-enabled apps. While the first approach is a good option for venturing into AR, the second method enables scalability and drives wider adoption.

Virtual Reality

Business objectives: Venturing into VR should be backed by clearly articulated objectives along with a well-defined financial model. As VR technologies are in the early stages of maturation, many aspects of the VR journey will unfold as organizations go down the path. A clear roadmap is therefore imperative.

Hardware selection: Unlike AR, in the case of VR, the role of the hardware is more pronounced, as content development depends on the type of hardware. While most of the hardware for VR is yet to become mainstream, the needs of the target audience (FSTs in this case) need to be kept in mind while selecting the hardware.

Lack of standards: Another factor to consider is the lack of development standards - each hardware vendor adopts their own standards. This impedes interoperability and wider adoption.

Back-end hardware: In the case of VR, the role of back-end computational power is crucial to delivering a superior user experience. Graphics Processing Unit (GPU) will be crucial to determining digital content rendering capability, speed, richness, and so on.

Four Ways for Field Service Teams to Leverage AR and VR

AR is driving the fusion of human experience across digital and physical worlds by overlaying digital information on top of physical assets. Field Service Managers are looking to gain competitive advantages by deploying AR and VR solutions that can help improve key service metrics such as first time fix rates, mean time to repair, mean time between failure, repair SLAs, and equipment downtime.

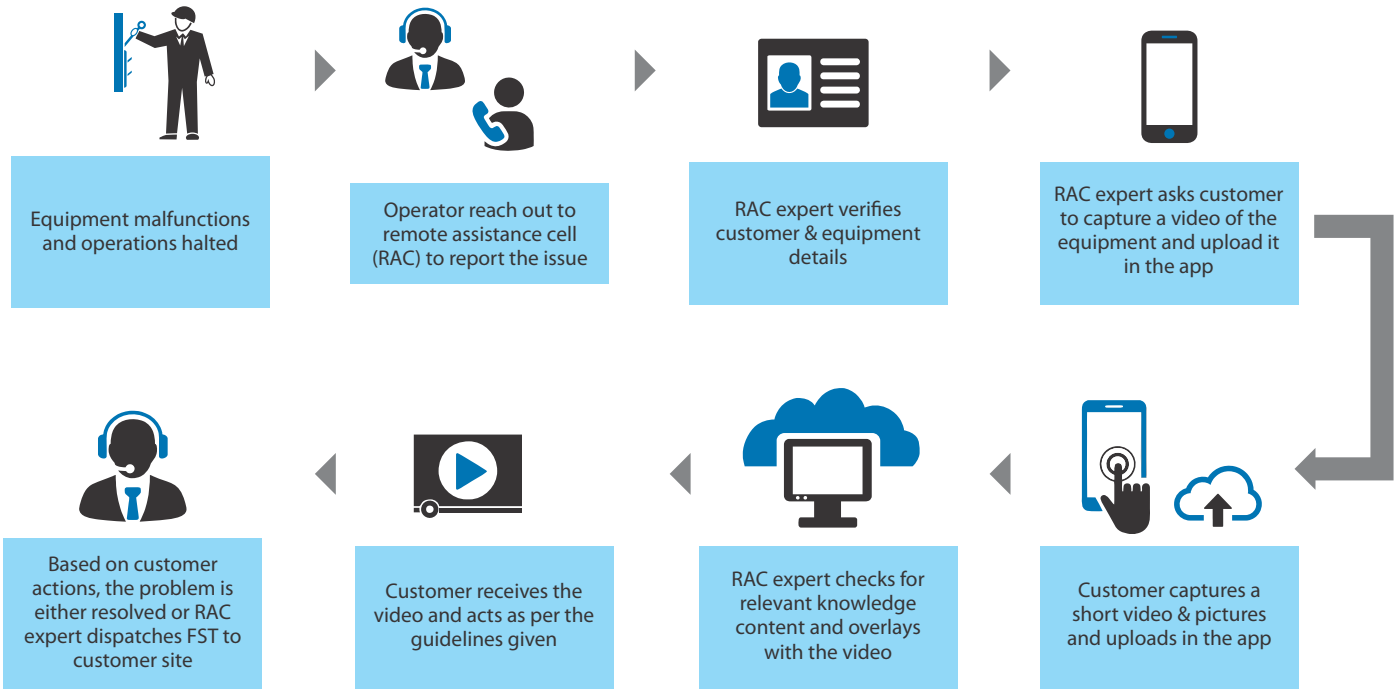
Video-assisted or AR applications in field service go much beyond improving the efficiency of field service workers by:

- Positively impacting recruitment, training, procedure documentation, knowledge management, resource allocation, and more.
- Efficiently capturing and transferring service knowledge for organizations with an ageing field workforce, using digital KMS.
- Creating office-based career paths for senior field agents who may have trouble traveling.
- Attracting millennials to consider field service oriented career options.
- Building and strengthening the technological capability and competence of field workforce.

Let's deep dive into four key use cases of AR and VR in field service operations along with associated benefits and key KPIs impacted (illustrated through diagrams).

Use Case 1: Equipment malfunction at customer site with customer performing self-diagnosis[1]

Key Personas: **Customer Operator, Remote Assistance Cell (RAC) Expert**



Benefits

Higher customer satisfaction on concern resolution due to feeling of 'self-accomplishment'

Self service capabilities for customers for speedy resolution of concerns

Faster response to customers' need resulting in faster equipment uptime

KPIs impacted

Customer Satisfaction Index

Equipment Up Time

Call resolution time

Use Case 2: Field Service Technician is at the customer site to repair the equipment

Key Personas: **Field Service Technician (FST)**

Field Service Technician (FST) is attending to the equipment issue at customer location

FST uses AR based HMD to focus on the equipment to get more details

Bill of Materials

Part Details

Reference Documents Links

Disassembly/Assembly instructions

Benefits

Contextual information to technicians helping in accurate problem diagnosis and superior quality of service

Support to newer and unskilled technicians in the field

KPIs impacted

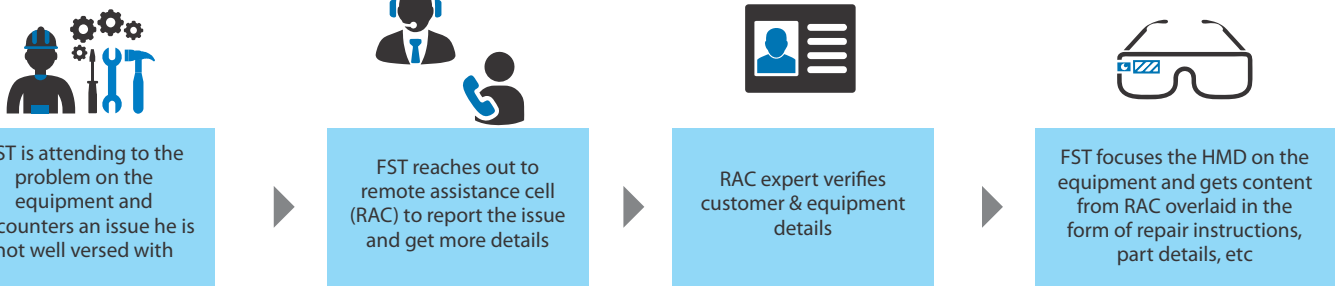
First time fix rate

Mean time to repair

Real world example: GE is testing a smart helmet that enables technicians to view instructions and receive remote assistance from experts.[2]

Use Case3: Guidance from RAC expert to FST

Key Personas: **FST, RAC expert**



Benefits

Guidance on right service and repair procedures resulting in better service quality and first time fix rates

KPIs impacted

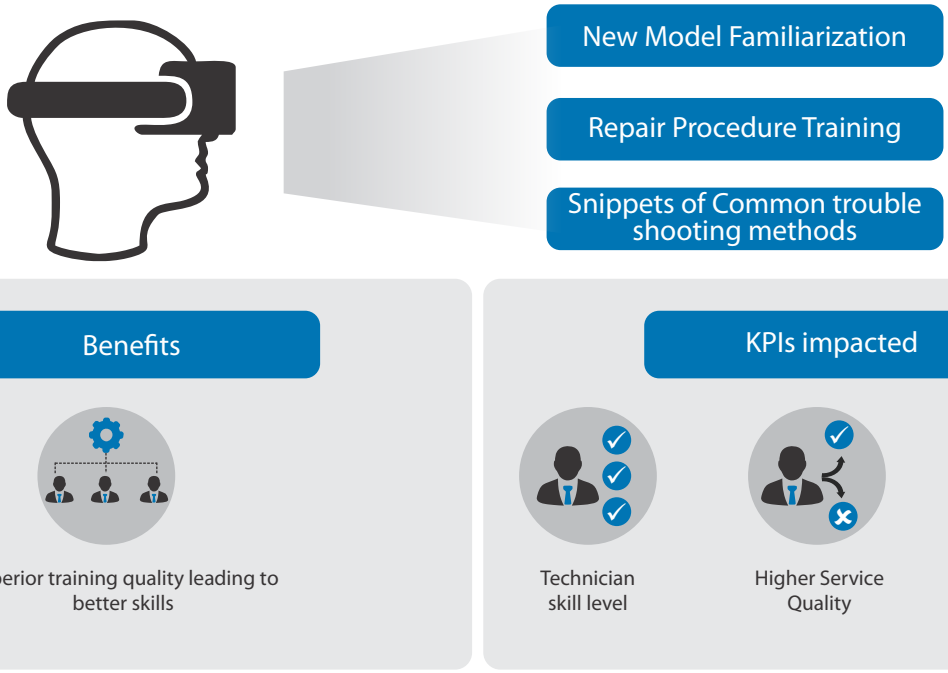
First time fix rate

Mean time to repair

Real world example: Kurtz Ersa[3] a global manufacturer of production machinery, maximizes machine uptime and productivity by leveraging AR to enable remote experts to send precise visual instructions to onsite FSTs via real-time augmented reality, live video, messaging, and voice.

Use Case 4: Training FSTs using VR

Key Persona: **FST**



Real world example: Houston-based **Training Centre of Air Conditioning and Heating**[4] uses content created by Brown Technical Media to deliver a VR experience to train students for the air conditioning and heating trade. With the aim of reaching a larger trainee population, Brown created a variety of heating, ventilation, and air conditioning (HVAC) eLearning products, including a full technician course that simulates the hands-on experience of a HVAC lab and physical school.

Why AR and VR are the Future of Field Service

The AR and VR market is expected to reach USD 215 billion by 2021.[6] It is clear that with further advances in technology, manufacturing organizations that are currently not using AR or VR for field service will do so in the near future. The technologies bring information to life, enabling users in remote locations to feel like they are interacting with experts on the scene. This will help the manufacturing industry drive improved customer satisfaction and loyalty. The best way to increase adoption and scale AR and VR applications in field service is to: create an integrated solution that connects devices and disparate systems across the enterprise, and supplement it with training, helping the users master the digitally-driven process.

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