



## ***Virtual Reality Training Module I***

***2019 IPLOCA Health & Safety Award***



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## 1. COMPANY PROFILE

We are an **International General Contractor providing services to Oil & Gas and Power industry.**

Our activities range from **engineering**, to **construction** and to **operation & maintenance of plants and pipelines**.

We have **over 70 years experience** in challenging projects, **performed** under the **most critical environmental and logistical conditions** in **remote locations**, combining **advanced technologies and methods**.

We are a “loop cycle service company”, providing:

- **Engineering**

Our engineering capabilities are applied to a wide range of works and delivery methods: from EPC projects to maintenance services. Leveraging on field experience we inject first class engineering solutions into all activities.

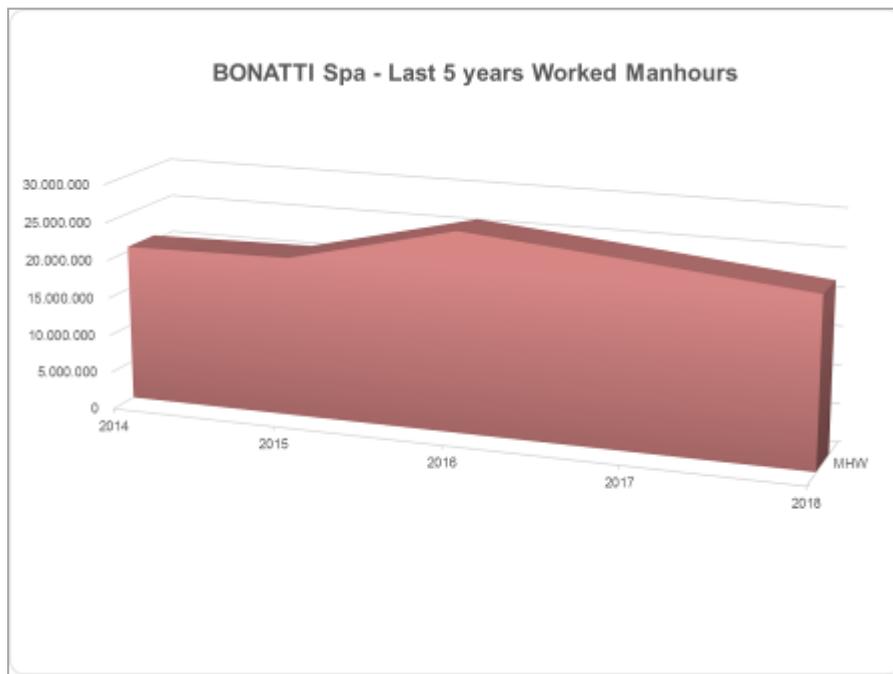
- **Construction**

We review project processes since pre-construction phase. The effective integration of construction knowledge into planning activities, design and field operations allow us to achieve the overall project objectives in compliance with time, accuracy and HS&E requirements. Our experience in construction is a wealth of knowledge developed over decades executing challenging projects all over the world. Due to our experience in all disciplines we commit full reliability performance to our clients: this is our main goal.

- **Operation & Maintenance**

Our multi-years experience in global operation & maintenance services allows us to integrate the client's operational capabilities. The goals are production efficiency and optimized overall project lifecycle costs.

Our Group is present in **4 Continents** with **10,000 people** working with us.



## 2. INTRODUCTION

Bonatti recognizes that promoting a learning culture across the company is key to achieve any significant progress in QHSE performance and in achieving top standards and encourages the quest for innovation as a crucial element to explore new ways of leading HSE differently.

One of the main challenges we are facing is being able to satisfy project needs in terms of perfectly competent manpower in a market of faster and faster-tracked project execution expectations.

In order to make that happen in a consistent, sustainable manner, Bonatti recognizes as a top non-negotiable factor is the development of a risk-aware workforce, one who leads HSE proactively, knowing the right behaviors to be applied at all circumstances and one who chooses to do the right thing when in the field or at with their families.

Bonatti has therefore engaged to commit in this area of improvement on its journey to Operational Excellence and to satisfaction of Clients' expectations.

To this end, Bonatti has approached a new system aimed at effectively engaging the workforce by delivering HSE Training in an innovative way using Virtual Reality technology.



**Virtual Reality Training - Module I** engages the workers in a Virtual working area - specifically chosen from typical Bonatti worksite operations - and "being there", make them perceive and understand which hazards and consequently which risks are present and which consequences can impact them when they fail to comply with the rules and behaviors.

A Virtual Reality scene is setup taking into account normal work processes and applicable HSE requirements that are in force in a typical project and thanks to the innovative technique described hereafter the trainee has a full sensorial experience of the surrounding working environment, equipment and co-workers and is enabled to test his working knowledge, practice and behaviors in an extremely real-like looking and feeling, but still protected, working environment.



### 3. DESCRIPTION

The **Virtual Reality Training - Module I**, has been designed to seamlessly reflect usual operational and risk scenarios: Module I applies specifically to a typical Bonatti's operational scenario, which is Excavation activities and associated hazard connected with the use of heavy plant and its "Exclusion Zone".

Ditch excavation work is a routine activity. Excavation is a necessary phase of different types of work (pipelines instalment, foundations for civil construction etc). It may have influence on different job positions. In a typical worksite it is possible to identify several sources for unwanted events. Virtual Training would allow to workers involved to immediately experience – in an innovative light - those factors that could represent incident's causes, such as interaction man vs machine, the need for devoted process and requirements to protect each worker on site, etc..., and supports the development of HSE culture by means of state-of-art technology and the full involvement of the workforce.

In the **Virtual Reality Training - Module I**, the worker can explore a typical worksite and is asked to perform the assigned task, but here everything happens in a protected environment

Once the worker dons the visor with built-in headphone and gestural control, is transported in the Virtual Reality (VR) perceiving all the stimuli generated by the training program.



### Let's start!

The training commences with an interactive panel giving information of unwanted events happened on field in similar conditions.

From the interactive panel the user picks up the intended language and the professional role from a defined list (helper, welder, topographer, supervisor etc.).

At this point, the program directs the user to recover a specific tool (in accordance with the selected role) from a specific zone of the work area (located inside or nearby the ditch) and within the *Exclusion Zone*.

Depending on the user's behavior and his respect of the safety rules, the program provides audible and written feedbacks to the user.

### Scenario

In the VR scenario, an excavator is working on the end side of an existing trench. The task to perform is to recover a tool from another zone inside or outside of the trench. Moving in the work area, interacting with the banksman to stop the excavator, gain consent from the watchman to enter in the trench (using devoted access/egress points) and recover the tool, while a countdown on his virtual watch is running to simulate any perceived haste.

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The user will perform the task in the VR applying the required HSE rules and processes to perform the appointed task.



Lack of HSE rules respect brings the user to conclude the VR training with an incident: e.g. if the user approaches the excavator and enters in the related exclusion zone without prior check the equipment has come to a complete shutdown (as per relevant HSE procedure: contact the banksman, request equipment shutdown, bucket down, green light from the banksman to proceed) the running excavator suddenly will rotate, hitting the VR user with the bucket.



### ***Live the experience***

The VR training is a simulator used to increase the risk perception and possible unwanted consequences.

The innovation of the VR Training is to let each trainee to test in a protected environmental his/her own HSE knowledge and experience the consequences of an unwanted event on himself thanks to its sophisticated technology able to represent all external inputs.

In the most evolved behavioral based safety program or during a conventional training in the O&G Industry, the facilitators share videos, pictures, speeches with the audience.



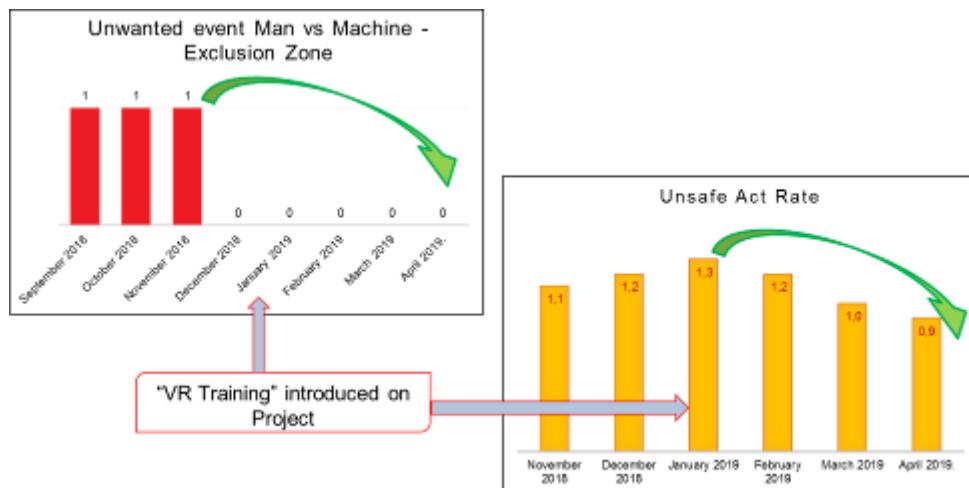
With the VR Training the worker ***lives*** the experience, acquiring in real time the HSE requirements, rules and processes to comply with!

With such a technique, the trainee enters the merit of what consequence an unsafe behavior may lead, in a sort of graphic way.



## 4. ACHIEVEMENTS

The **VR Training - Module I** has been tested on 'TAP Project – Greece Lot 2 and 3' by Bonatti, since the start of the initiative the Unsafe Act and Situation Rate (UASR) considerably decreased, and unwanted events related to man vs machine – Exclusion zone, has been stopped.



## 5. CHALLENGES AND CONSTRAINTS

One of the main challenge of the **VR Training - Module I** has been to fully customize a virtual work area and to implement in the program code the HSE requirements, processes and rules applied on a real Project area, considering the human factor and ensuring a realistic feedback and stimulus to the user.

The initial reluctance to wear the technological equipment by the workers has been overcame by the interest and curiosity to explore a VR where the HSE knowledge is directly acquired through a virtual but nevertheless strong practical experience, allowing the user to test his own work and safety notions.

## 6. LONG TERM PLANNING

The **VR Training - Module I** has been tested on TAP Project, and it revealed its potentiality and its easy and immediate application.

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Bonatti Spa will adopt this training modality on all Projects worldwide, customizing several Modules to expand the activities included in the VR Training.