



# ***“T-Rex” & Safety Revolution***

*2018 IPLOCA Health & Safety Award*



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## 1. COMPANY PROFILE

Bonatti SpA is an Oil & Gas International General Contractor with 70 years of experience in oil & gas and power industry. Our activities in the energy sector range from the production and transportation facilities to the power generation plants.

Bonatti has an Integrated Management System Certified for compliance with OHSAS 18001, ISO 14001 and ISO 9001.

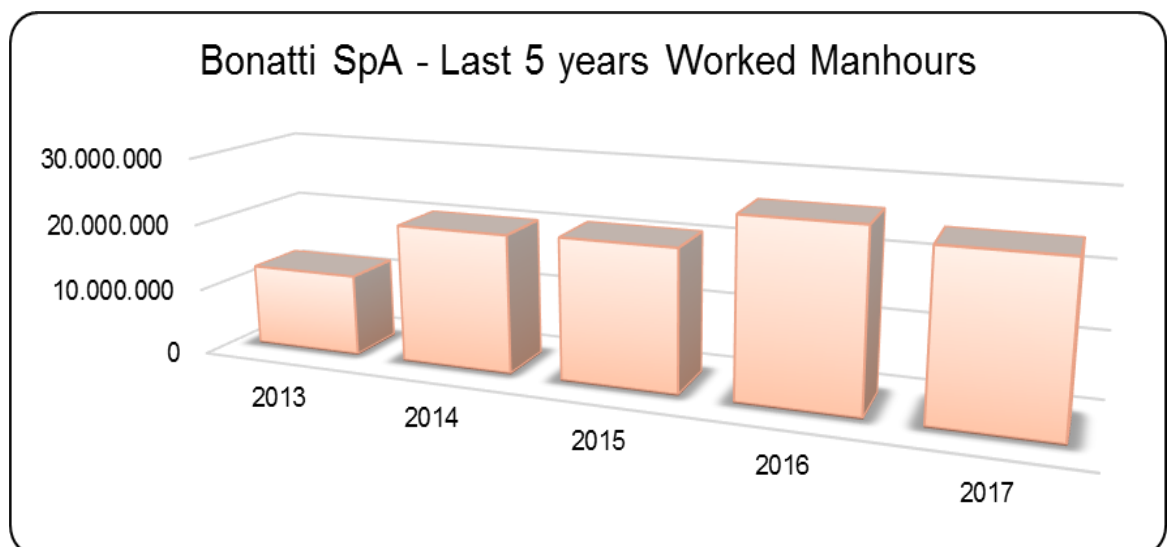
We trust in valuable relationship with our clients and partners: starting with constructability, through to engineering, procurement and construction, rounding off with the operation and maintenance of plants and fit-for-purpose tools to help clients optimizing their production rate.

Bonatti operates in several countries:

Algeria, Austria, Canada, Egypt, France, Germany, Greece, Iran, Iraq, Italy, Kazakhstan, Libya, Mexico, Mozambique, Romania, Saudi Arabia, Spain, Turkmenistan, Uganda, USA.

Bonatti is operating on TAP Project Lot 2 and 3 in Greece in JV with J&P avax.

One of main activities Bonatti carries on is Pipelines EPC Projects.



## 2. INTRODUCTION

The primary equipment used in Oil & Gas Pipeline Industry is the Side-boom. With the aim of enhancing Safety during operations Bonatti chose to design and manufacture an innovative type of pipe layer: The “T-Rex” model.

The innovative technologies, “T-Rex” is equipped with, ensures high Safety standards performances, in line with the high safety standard of our Company.



## 3. DESCRIPTION

The “T-Rex” model has been designed and manufactured to match excellent technical and Safety standard. Its frame and tracks are wider to increase stability compared to other models of Sideboom of its category (67 t). It has a 127 t capacity.

Such a high standard technology makes the “T-Rex” a revolutionary equipment.

The main Safety features of the innovative “T-Rex” model can be summarised as follows:

- Anti 2 block – wireless system
- Integrated System and Dashboard
- Devoted telemetry for each operator



### 3.1 ANTI 2 BLOCK – WIRELESS SYSTEM

The innovative Anti 2 block – wireless self-powered system, guarantees the continuous connectivity of the device, giving information and alerts directly to the integrate dashboard of the equipment.

This system overcomes the most common problems of this kind of device related to the accumulator, and to the accidental disconnection of the cables especially during boom’s assembling/ disassembling.

### 3.2 INTEGRATED DASHBOARD – ADVANCED CONTROL SYSTEM

The integrated dashboard provides the info and the status of the equipment to the operator on a single display, increasing the ergonomics and giving a single spot to be monitored on the display.

The Advanced Control System applied on the equipment allows the full customisation of the authorization to each operator and each Project location.

The “T-Rex” communicates continuously with the Bonatti IVMS System, which provides full-set info to the Fleet Manager and to the IVMS Coordinator (e.g. overloading, not authorized zone access, equipment properly used, mechanical condition) through a devoted website, alert SMS, and email.

The innovative Momentum Limiter is integrated in the dashboard and provides information to the operator on the load lifted and on the percentage of the capability reached at each single moment of operations. The model has two functional mode:

- “On Island”
- “In Team”

“On Island” mode is activated on default; when during lifting is reached the 90% of the operative limit of the Sideboom (100% of the Operative Limit is 85% of the Overturning Limit), the integrated system stops the operator allowing only safely manoeuvre.

This option, during coordinated lifting (lowering in) could bring to destabilize others Sidebooms involved in the same activity, for this reason a devoted mode called “In Team” can be selected by “Advanced” operator.

The “In Team” mode allows the Sideboom to operate according to the Structural Diagram, switching on a dedicated coloured bar with percentage. This serves to indicate to the “Advanced” operator the actual capacity reached by the Sideboom, in real time.

The Structural Diagram is a curve envelope constantly governed by the safety factor of the weaker component of the used configuration.

There is no case the “Advanced” operator can bypass the Structural Diagram and the overturning point of the T-Rex.



Integrated Dashboard



“In Team” mode on

### 3.3 OPERATOR TELEMETRY

The primary innovation of the Sideboom T-Rex model is the identification of the operator using a magnetic badge, matching his actual skills and following authorized area and mode.

If the operator is authorized to operate the equipment and is recognized from the central unit, the T-Rex switches on the engine and it is ready to operate in relation to the actual level of competence of the operator.

Each operator is assessed based on skills, experience, HSE requirements. From the results of such an assessment operators are included in the following three main categories:

“Green”, “Yellow”, and “Red” in accordance to the subdivision on the area where is authorized to operate (Green area – flat and slope < 7°, Yellow – flat and slope < 14°, Red – flat and slope > 14°)

Moreover, each operator is ranked as “Basic” or “Advanced”.

The operational area of each operator (Green, Yellow, Red) is verified by the T-Rex with two functions:

- the orography of the equipment itself
- and the Geo-fence on the IVMS unit installed on board.

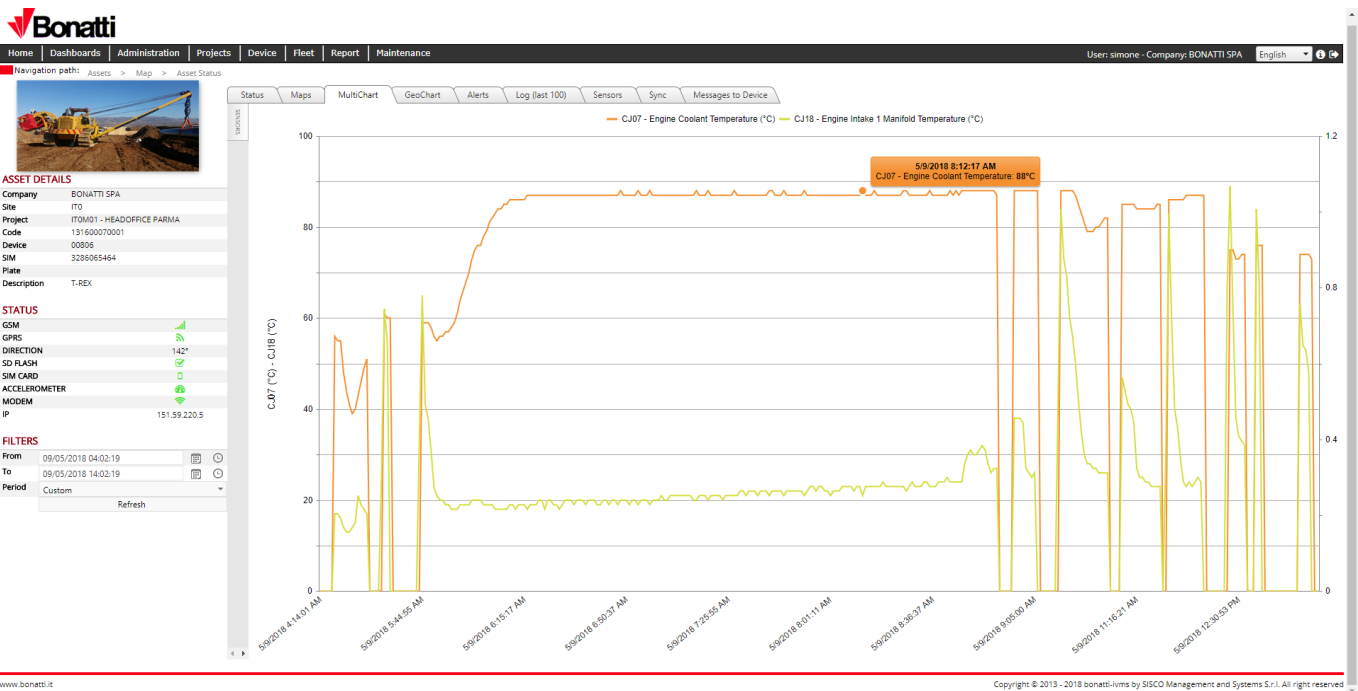
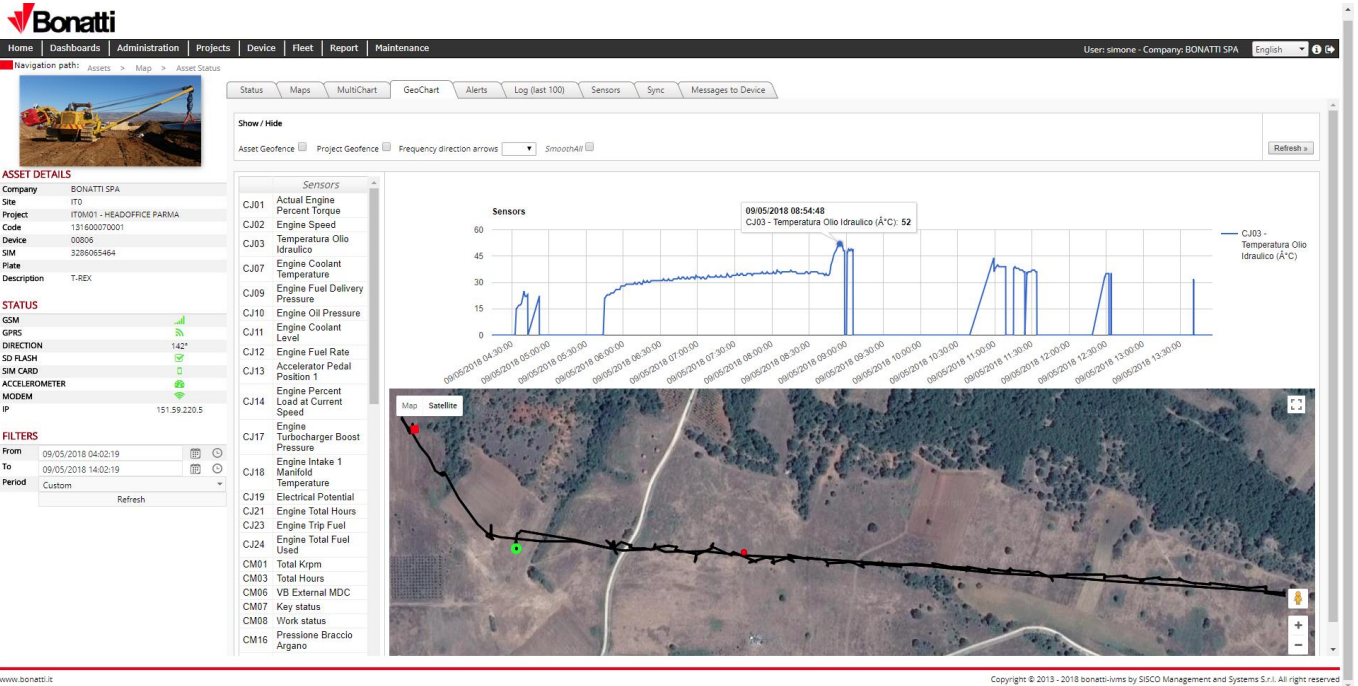
When the operator approach an area without authorization, the T-Rex immediately:

- Alerts the operator by acoustic and visual alarm message on the integrate dashboard of the equipment
- Sends an alert message to the Fleet Manager, if the operator does not stop to operate in the forbidden area
- In the case operator keeps on with a forbidden activity, the machine automatically slows down and stops the equipment in accordance with the set limits. This takes few seconds from the “violation”

Regardless of the operator ranking, when the T-Rex is operated on slope  $> 10^\circ$ , the equipment allows the operator to use only the first gear in order to reduce the speed and to stabilize the RPM of the engine.

These characteristics of the T-Rex are fully customizable and can include devoted geo-fence for underground utilities, OHPs, and for every area that requests a specific authorization to operate.





Example of Bonatti IVMS System monitoring the “T-Rex”

## 4. ACHIEVEMENTS

The “T-Rex” model prototype is used on TAP Project in the JV Bonatti – J&P avax, in order to test and to enhance its innovative technology. This model of Sideboom is able to solve all issues related to the operability and capability of the operators in flat and in sloped areas.

On top of this, there is the function of further customisation in case of restricted areas where equipment cannot operate or can be utilized only under pre-set conditions. This avoids human factor\error, which is the cause of several unwanted events in the Oil & Gas Industry.

## 5. CHALLENGES AND COSTRAINS

One of the main challenge of the new model is to radically change the concept of Sideboom, making it an extremely technological machine able to operate with the utmost precision.

## 6. LONG TERM PLANNING

As soon as the Test-phase will be concluded, Bonatti will apply this new technology to all the Projects. The devoted operator competences and skills assessments, already utilised on Projects, shall be incorporated in the worldwide Bonatti database.

The “T-Rex” model will make Bonatti to be the manufacturer of one of the most technological Sideboom ever produced before.