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I. THE COMPANY

LEADER AND PIONEER IN COLLABORATIVE & AUTONOMOUS ROBOTICS
Designer of AMR, (Autonomous Mobile Robots)

1. ELEVATOR SPEECH

Effidence is a French company that designs autonomous mobile robots to optimize flows on all types of support and meet the current challenges of the logistics and industrial supply chain.

2. PRESS RELEASE DESCRIPTION

Effidence provides innovative robotic solutions to optimize the intralogistics flows of key-players in the industry or logistics. Founded in 2009 by Cédric TESSIER, Effidence offers agile and efficient robotic solutions that adapt to the needs of its customers and their growth: collaborative robots "follow-me" and autonomous to work with or near humans; standalone robots or cooperating in fleet type "swarm-me". In 2020, Effidence has signed a strategic partnership with MANITOU group to distribute EffiBOT robots in Europe, and market MANITOU's warehouse trucks (stacker, tractor, order picker, ...) robotized with Effidence technology.

3. EFFIDENCE, FEW FIGURES

20 employees

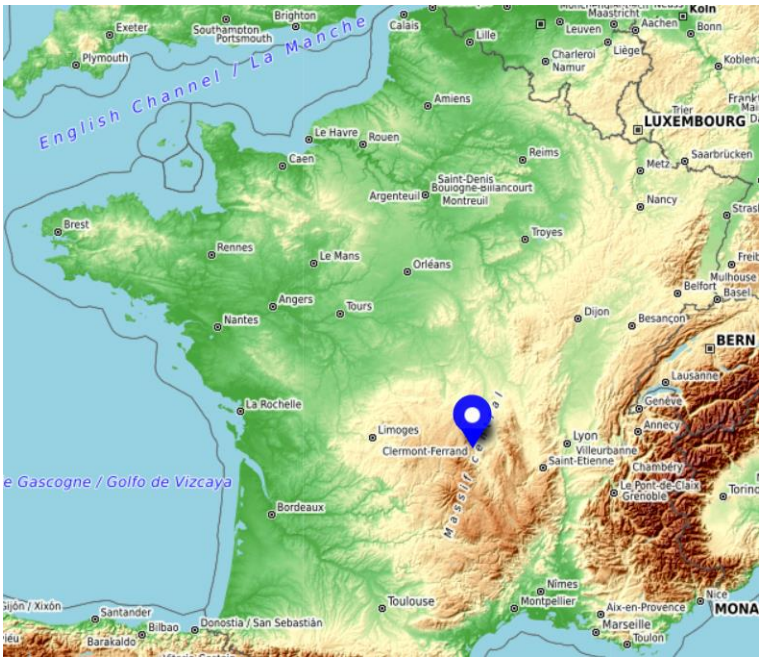
250 robots sold since 2016

60 % research department

4 continents, global presence

II. EFFIDENCE, FRENCH KNOW-HOW AND EXPERTISE

1. GEOGRAPHIC SITUATION



Founded in 2009, Effidence is part of a local dynamic, alongside players such as Michelin or Hall32, which boost French industry. The company's expertise is strenghened by the presence of graduates from the Clermont-Ferrand schools ISIMA and POLYTECH, who make up the strength of its team. Based in Romagnat, the company offers a rewarding and fulfilling environment for its employees.

2. TECHNICAL-BUSINESS PARTNERSHIP | MANITOU GROUP

Since 2020, Effidence and Manitou have developed a strategic partnership, with the aim of combining the manufacturer's know-how and its vast distribution network with the expertise of the pioneer in collaborative and autonomous robotics.
This collaboration has resulted in the creation of a complete range of AMR, with the robotic stacker **EffiBOT-P**, the robotic tractor **EffiBOT-T**, and a more compact version of the **EffiBOT**: the **EffiBOT-XS**.

3. REFERENCES

III. AMR, A NEW ERA OF ASSISTANTS

1. AUTONOMOUS MOBILE ROBOT

The globalization of industry introduced the use of the first robots, AGV, Autonomous Guided Vehicles : robots that follow a predefined path and are guided by physical elements (wires on the ground, beacons) or virtual elements.

In recent years, a new generation of robots has become widespread, the AMR (Autonomous Mobile Robots) or AIV (Autonomous Intelligent Vehicles). These robots directly integrate the intelligent navigation system, which allows them to navigate their environment completely autonomously, without any guidance system.
Once in possession of a map of the site, on which the landmarks necessary for their location appear, the robots choose the paths to take according to several criteria (distance, congestion, etc.).

The SLAM technology, (Simultaneous Localisation and Mapping), allows the navigation system to locate itself in real time while the robot is moving. This is achieved by continuously comparing the vision data recorded by the sensors with the pre-installed map. The flexibility of this technology allows the robot to adapt instantly to its environment, for example to avoid an obstacle. The fleet coordinator will also be able to further optimize the robots' routes by smartly managing them.

Flexibility in travel, optimization of the routes ; AMR /AIV are also simpler and cheaper to install than AGV, by eliminating the work required to install guidance devices. Since the installation is almost exclusively based on software mapping, it will not leave a footprint on the infrastructure and will therefore make it easier to make changes. Indeed, modifying a scenario, a trajectory, or the layout of a site, will only be a software modification.

AMR can therefore operate in a changing environment and adapt perfectly. Moreover, unlike AGV, when an AMR encounters an obstacle, it can bypass it and choose another route to reach its destination. It will not remain blocked.

This **new era of assistants** is a real **time-saver**. They increase **productivity** and **streamline operations** while working alongside your operators.

These robots take care of repetitive tasks so that your operators can focus on **their value-added tasks**, **while preserving their health and reducing the risk of musculoskeletal disorders.**

2. APPLICATIONS AND USE CASES

Order picking | Kitting | Indoor & outdoor conveying | Transport of loads, parcels or pallets | Line-side replenishment | Sorting | Interconnection of conveyors | Logistics train

IV. THE ROBOTS

EffiBOT

IP54 option available

EffiBOT, AMR indoor-outdoor, is a modular and bi-directional robot, available in 2 or 4 driving wheels and 4 steering wheels. **EffiBOT** is the perfect logistics assistant. It is not designed for any particular task and can therefore be used as required. Thanks to its multiple sensors, this robot can move close to other machines and pedestrians. This makes it a very versatile tool that can be used for many different tasks in many different locations, and the investment will pay for itself very quickly.

It can be adapted to the customer's process with different equipments :

- **3D-CartGRIP**; a system for picking up and delivering trolleys. It automates the pick-up and drop-off of trolleys in factories and warehouses. Thanks to an innovative 3D cart gripping system, it ensures the transport of a large volume of parts in complete safety and in all circumstances: at high speed, following an emergency stop, on uneven ground. With the Follow-me 360° collaborative technology, the **EffiBOT** assists your operators in moving heavy loads.

- **Convey-LINK** is a motorized roller equipment for **EffiBOT** that automatically transfers packages, totes or pallets between fixed conveyor lines. A triple safety is provided by the bi-directional infrared communication between the **EffiBOT** 's mobile conveyor and the fixed conveyor. This ensures accurate docking of the robot and synchronisation of the rollers between conveyors. Using the **EffiBOT** with **Convey-LINK** allows fixed conveyors to be interconnected, while at the same time offering the flexibility of a mobile conveyor rather than the space and rigidity of a fixed installation.

- The **Convey-DROP** is a **free-moving roller system** that transfers loads, bins or boxes onto fixed conveyors. The **Convey-DROP** is an economical solution and does not require any third party energy. The transfer is done mechanically by means of gravity movement. Its structure guarantees an optimal loading volume. It connects conveyors throughout a warehouse without limits.

- It is possible to add a **Hook-A** self-releasing hook to our robot to automate the delivery of trailers or trolleys. This accessory uses safety electronics to continuously monitor the presence of the trailer.

- For the logistics train function, it is recommended to use single-track trailers. Effidence also offers two models from the Shaped Trailers range ; the **Flat-Shape** (top) single-track trailer and the **C-Shape** (bottom) for the transport of rolls. These trailers follow perfectly the trajectory of the robot in order to secure the conveying.

- The **TouchScreen** is a **collaborative tool connected** to the robot and/or to the site's internal systems. Ergonomic and customizable, this HMI (Human Machine Interface) can be the user interface to address missions, include commands for using the AMR, follow-me mode, autonomous mode. It can also be a diagnostic tool for the robot. Interfaced with production management systems (MES, ERP) or warehouse management systems (WMS), the **TouchScreen** becomes a remote information medium, displaying the data required to carry out a task, such as picking or pallet docking.

EffiBOT Technical information

- **Wheels :** 4 pneumatic steering wheels
- **Motorization :** 2x4 or 4x4, BLDC 48V
- **Power :** 570 to 1800 W
- **Length of the tray :** 1200 mm / 900 mm
- **Width of the tray :** 600 mm
- **Height of the tray :** 550 mm
- **Wheelbase :** 800 ou 500 mm
- **Ground clearance :** 120 mm
- **Maximum load carried :** 300 kg
- **Maximum towed load:** 500 kg
- **Weight :** 130 kg
- **Speed :** 7 km/h
- **Autonomy :** 8 hours with continuous use
- **Energy pack :** Rackmount Lithium battery / Wireless induction charging available
- **Slope :** 10 %

EffiBOT-XS

EffiBOT-XS is an agile and compact bi-directional AMR able of carrying, gripping and conveying loads up to 300 kg thanks to its various attachments. Like the **EffiBOT**, the follow-me mode is available on this AMR, just by pressing the button on its console.
For any other application, the robot can also transport your loads in a completely autonomous and safe way.
Its compactness and manoeuvrability allow it to move through narrow aisles without the need to turn around.

Lift-XS

Convey-LINK XS

3D-CartGRIP XS

- **Dimensions :** 800 mm
- **Maximum load carried :** 300 kg
- **Weight :** 120 kg
- **Speed :** 7 km/h
- **Autonomy :** 8 hours with continuous use
- **Energy pack :** Lithium battery /
  Wireless induction charging available
- **Slope :** 7 %

EffiBOT-P

EffiBOT-P is a robotic stacker that can lift up to 2 tons. It can be used both as a collaborative robot, with the Follow-me mode, and as a stand-alone robot. It is also possible to switch between these two modes or to use it manually if required. **EffiBOT-P** is equipped with customizable touch screens for improved ergonomics.

This stacker can also be associated with identification elements such as RFID tags, barcodes or QR codes or beacons to ensure the traceability of the transported items.

- **Dimensions :** 2240 mm (with forks) x 985 mm x 2125 mm
- **Maximum load carried :** 2 Tons
- **Speed :** 6 km/h
- **Energy pack :** Pure lead, lithium battery / Wireless charging by induction available
- **Slope :** 7 %

** Option : platform / barcode reader*
Manual operation available (accompanying or self-propelled as option)

EffiBOT-T

EffiBOT-T is a robotic tugger that can tow loads and single-track trailers up to 6 tonnes. Like the rest of the AMR range, it can be used in collaborative, autonomous or manual mode with its self-supporting platform.

This robot is also equipped with ergonomic touch screens for more interaction with the operator.

- **Dimensions :** 1551 mm x 984 mm x 2115 mm
- **Maximum load carried :** 6 Tons
- **Speed :** 7 km/h
- **Energy pack :** Pure lead, lithium battery / Wireless charging by induction available
- **Slope :** 7 %
- **Communication :** WIFI

** Option : "step feed".*
Self-supporting manual operation available

V. EFFIDENCE & ITS MULTIPLE INTERACTIVE MODES OF USE

Three operating modes are available with Effidence's AMR. It is possible to switch from one mode to another at any time, simply by pressing a button.

1. FOLLOW-ME MODE

Effidence's signature innovation is the natural tracking of person without the need to wear a device : the Follow-me. This is intended for use in picking/kitting applications to relieve operators. Simply press the Follow-me button and the robot will follow the detected person, and adapt its pace to the person, (accelerate, slow down, stop). This follow-me mode is available for both the EffiBOT and the l'EffiBOT-XS. For the EffiBOT-T and EffiBOT-P, it's also available in lateral mode for more ergonomics for the preparation of order / kit on pallet for example.

2. AUTONOMOUS MODE

This mode allows the robot to **move autonomously** from point A to point B, depending on the mission it has been assigned. The robot can connect several points without human intervention, for example from the warehouse to the production area. It is ultimately a fully automated logistics assistant. This mode is valid for all the robots in the range, for the transport of loads ranging from parcels, bins and pallets.

3. MANUAL MODE

The possibility of manual handling of the robot also makes it possible to offer an even more versatile tool, meeting the occasional need to use a manual trolley.

VI. EFFIDENCE NAVIGATION

1. INTELLIGENCE & NAVIGATION

EffiNAV

This is the Effidence robotic intelligence embedded in the robot system.

Effidence robots are equipped with a navigation system called EffiNAV, created and developed by the company. It is a state-of-the-art multi-sensor technology for environmental analysis combined with a powerful data fusion and control software.

For the user, the handling is very simple:

- It is the intelligence that allows our carts to become smart robots and to be used with the Follow-me mode.
- If the robot encounters an obstacle, the same system also allows for obstacle avoidance and bypassing.

Important : No prior modification of the premises is necessary for the use of the robots. The system has been designed to be completely integrated into the machine.

The AMR is equipped with various technologies: scanning laser, 3D cameras, radar, inertial unit, odometer sensor etc. which work together to provide a complete examination of the environment.

The particularity of this innovation is to have multiplied not only the sensors, but above all the types of sensors to analyse the environment with as much precision as possible; distance sensors that will locate the user's legs to follow or spot an obstacle at different distances and adapt the robot's progression, sensors of very close or more distant obstacles etc.

The processing and fusion of these data will enable the progression of the AMR to be controlled using a real-time comparison of its environment and its integrated virtual map (SLAM).

2. EffiNAV TECHNICAL INFORMATION

- **A robotic navigation system**
  - Compact housing
  - IP66/IP67 waterproof
  - Can be integrated into any existing network environment

- **Functions**
  - Automatic conveyance between several points,
  - Automatic tracking of people,
  - Obstacle avoidance.

- **Multi-sensor technology :**
  - Laser, localisation, day and infrared cameras, IMU inertial unit, odometer unit

- **Multi connectivity :**
  - Wire : Ethernet, CAN, USB, RS-232
  - Radio : UHF, WIFI, (4G)

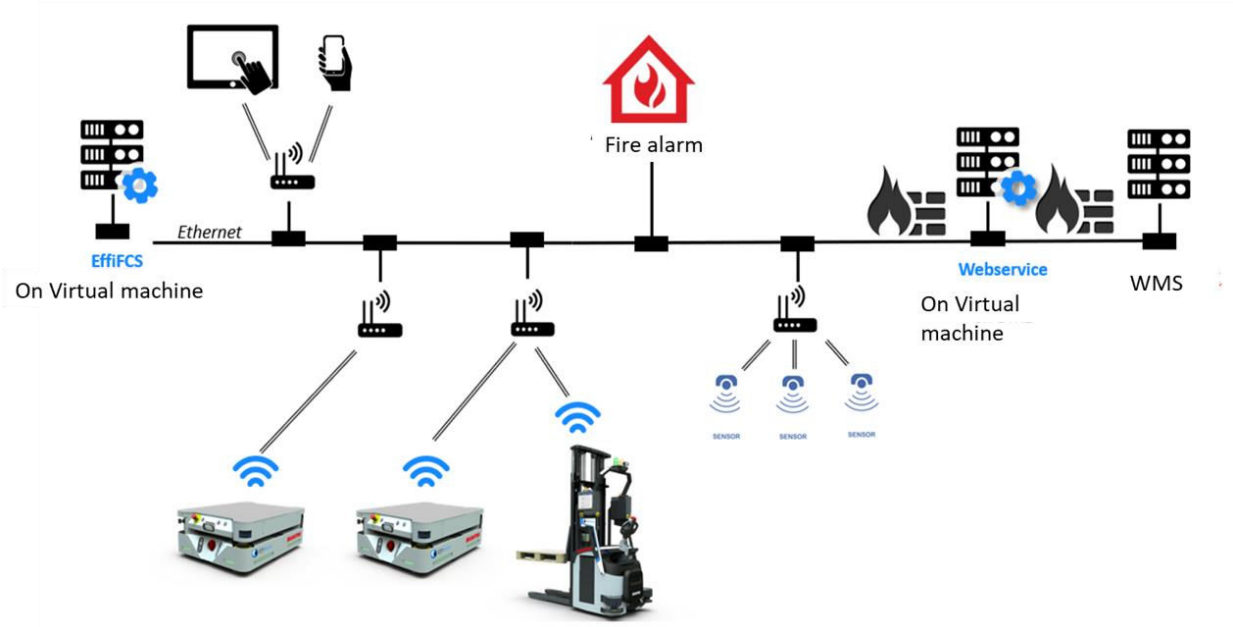
VII. EffiFCS, EASY MANAGEMENT OF A ROBOT FLEET

EffiFCS *(Fleet Coordination System)*

The FCS is a informatic server that pilots the evolution of a fleet of robots and ensures the interface with external systems: ERP, WMS/WCS, signalling, industrial machines.
Thanks to the FCS, it is possible to :
- visualize the different scenarios of use,
- create a priority order for the missions,
- interact manually to modify or delete missions.

Communication system as standard: BUS CAN 2.0b Ethernet, USB, RS232 Wifi 2.4 & 5GHz

The FCS is used to connect to the external environment of the robot:



This software ensures an ergonomic management and supervision of the fleet as well as a customizable real-time display: status, battery level, mission, destination...

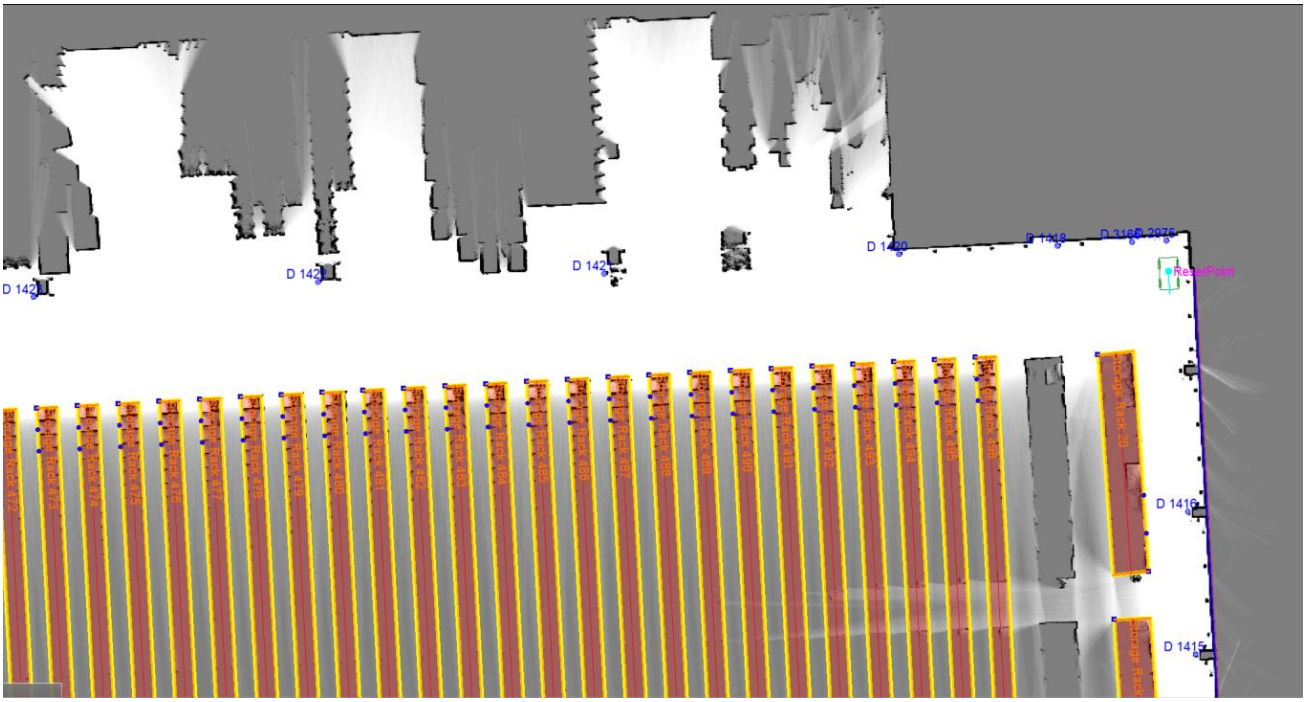
VIII. MAPEDITOR, INTUITIVE MAPPING SOFTWARE

The autonomous navigation of the robot requires an installation and a configuration with **MapEditor**. It is an ergonomic software that allows the creation of the map of the warehouse in which the robot will evolve. The handling of **MapEditor** by the customer is facilitated by Effidence training. Thanks to this tool, it is possible to modify the elements at any time, (addition or modification of a traffic rule, change of a picking zone...).

The first step is to record a LIDAR map of the environment by using the robot in Follow-me mode. This map is then transferred and processed in **MapEditor** to define :

- Natural features that can be used as landmarks for location, (walls, storage racks, poles, etc.).
- The different possible routes in the development area,
- Traffic rules and specific behaviours: speed limits, horns, yielding the right of way, loading/unloading, etc.

Here is a map created with **MapEditor**.



It contains a background image which is a visual aid to indicate landmarks, different paths, areas and report the position of reflectors.

IX. SECURITY AND INTEGRATION

1. SECURITY

Each robot is equipped with an obstacle avoidance and emergency stop system to operate safely in changing and mixed environments (human, manual handling vehicles).
Various elements and sensors secure the robots:
3D cameras, lasers, safety LIDAR, low sensors, presence sensors, detection cells, infrared scanners, rangefinders... For the EffiBOT, sensitive edges and safety side guards are also added.

EffiCONTROLLER is the safety device for robot movements. This system ensures a level of security **PI-d**. EffiCONTROLLER integrates a necessary continuous integrity check and a process redundancy.
The Effidence safety system has been audited by BUREAU VERITAS.

The safety zone of the robots is totally controlled and evolves progressively, depending on the speed: the more the speed increases, the more the safety zone extends in front of and around the robot. The size of this zone can be customised according to the process on MapEditor while respecting the minimum safety standards imposed by robot traffic.

2. POSITIVE COLLABORATION WITH HUMANS

All these safety elements allow Effidence robots to evolve alongside operators and create a positive collaboration dynamic between Man and Machine. In industry and logistics, Effidence robots change the working conditions of operators by relieving them. An intelligent assistant that contributes to the operator's well-being while improving the productivity of an activity.

Sound and/or light alarms can also be programmed to warn of the presence of a robot in an area with poor visibility.

The TouchScreen also provides an ergonomic grip on the robot and makes it easy to use.

X. EFFIDENCE | VALUES AND AIMS

FLEXIBILITY

In an intralogistics context guided by reactivity and the need for performance, Effidence solutions provide a flexible, scalable and ergonomic response to the challenges of industry and logistics 4.0.

INNOVATION

The evolution and adaptation necessarily involve innovation, to best meet the expectations of its customers. Since its creation, Effidence has never stopped innovating to create the robotic solution of tomorrow.

REACTIVITY

In line with flexibility, the Effidence team is reactive. Each request for information or support is handled by an involved multidisciplinary team. This reactivity contributes to the proximity with the customer.

PROXIMITY

This proximity to our customers or prospects is essential. The automation of a process requires changes and reorganisation which must be accompanied by an available and involved team, for greater efficiency.

RELIABILITY

The relationship with our clients must be based on trust, the reliability of the teams and the solutions proposed:

- Listening to the customer, understanding the project and its constraints, responsiveness and flexibility of the team
- Simple and reliable AMR solutions in terms of use and maintenance.

EFFICIENCY

The values promoted by Effidence and its organisation allow us to respond effectively to the challenges of productivity, competitiveness and CSR.

XI. EFFIDENCE'S 4.0 TECHNOLOGY FOR RESPONSIBLE IMPROVEMENTS

Effidence robots have been thought, designed and manufactured in France.
In its work of designing robots, the company integrates the dimension of **social responsibility**, both in the realization of the AMR and in their use.

- **The environmental aspect**
  - Green energy: electricity
  - Improved efficiency of AMR consumption
  - Optimized use of batteries
  - The sell of second hand robots

- **The social aspect**
  - A beneficial aid: optimising logistics, reducing drudgery and musculoskeletal disorders (MSD) for the user.

  - These robots take care of repetitive and unrewarding tasks so that your operators can focus on **value-added tasks**, **while preserving their health**.

  - More motivating and rewarding work: it's an opportunity for operators to learn new skills and grow professionally. This contributes to their personal development.

A company close to the operator and his working conditions

Effidence places the well-being of operators at the top of its priorities. Indeed, it is nowadays essential for a company to consider the "Health and Safety" aspect of its activity. Incidents at work, wear and tear, chronic fatigue ... These risks must be measured and avoided. With its robotic solutions, Effidence offers assistance to operators in their daily tasks in industrial and logistics sites. Thanks to these robots, the company accompanies the operators with efficiency, and avoids the handling of heavy loads and unnecessary travel. Indeed, they sometimes travel up to **15 km per day**.

Effidence, rich of an approach focused on the human being above all

Effidence 's philosophy is not to sell a robot but to offer a complete and integrated solution to its customers. To do this, the company provides tools for piloting, analysis, interfacing with the operational systems of a site, customisable equipment for each application, as well as intuitive and accessible mapping software.
Effidence sees its activity in the long term and envisages a relationship of trust and proximity with its customers, employees and stakeholders (suppliers, distributors, etc.).

The French company has based itself in part on the following findings and statistics:

75.7% of French people in the manufacturing industry say that lifting or moving heavy loads is part of their job. **66.3%** perform repetitive hand or arm movements, **41.6%** consider that they are in tiring or painful positions, 48.6% work in an environment with a high noise level, with several risks present:
- **76.7% :** risk of accident with machines or tools,
- **57.6% :** risk of accidents with vehicles during work,
- **44.9% :** increased risk of slipping, tripping and falling (*Source: ESENER 2019*)

- **The economical aspect**
  - Increased productivity
  - ROI
  - Efficiency and enhancement of the competitiveness of French industry

FOUNDER AND CEO OF EFFIDENCE

Cédric TESSIER
Founder and CEO
PhD in Robotics and Computer Science Engineer

I created Effidence because I am passionate about research and robotics, and I firmly believe that robotics is not only a source of progress and competitiveness for companies, but also a source of progress for people.

The solutions we design and develop at Effidence aim to be a step forward for people by relieving them of tedious tasks with little added value, and by refocusing them on their job, thus bringing greater profitability to the company.

Within Effidence we share these strong values which combine the search for excellence and performance for the company, as well as the well-being and health of people at work.