KEG TRACKING

How can it benefit your business?

A SOLUTION BY

ALIZENT
ASSET INTERACTIVE

INTRODUCTION

Every year, billions **of Returnable Transport Items (RTI)** are in circulation around the world.

Among them**, kegs from the brewing industry.**

In theory, one keg can last up to 20 or 30 years. But in practice, theft and loss represents between 5 and 10% of the total kegs in circulation each year. With each keg costing around 100 euros, this can result in a large capex investment for replacements.

To counter this situation, using technology to **track kegs** can help you **understand and reduce losses**, increase visibility, **improve container management**, and directly **increase your ROI**.

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1 – THE IMPORTANCE OF TRACKING KEGS

*You might not fully know it yet, but **tracking kegs is the key**. So first, before we dive into tracking, let's start with the maybe-not-so-basics: what is keg management?*

A - What is keg management?

Keg management is a method or system that provides **information** required to ensure that **kegs operate efficiently** in the **supply chain**.

To achieve that, the provided information must be sufficient to check the following boxes:

→ New keg purchase volumes are **quantifiable**
→ New kegs are added to the supply chain at the **right time**
→ Kegs are **accounted** for accurately in the Asset Register
→ Keg losses are identified and accounted for, so that **keg supply meets keg demand** efficiently.

Besides the taste for accuracy, the major reason to manage kegs properly is the consequent **money a company can lose** if it doesn't track kegs.

A stainless steel keg (dependent on the size) can cost around 100 euros. Considering a fleet in the millions for larger brewers and a loss rate between 5 and 10%, you get an idea of the challenge the brewing industry can face.

Managing kegs requires an ability to have keg supply and demand in phase with each other. And the most important to get this is not necessarily to have an extensive view on each keg's location at a given point of time, but to **appropriately manage the fleet as a whole**.

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B - Challenges

Tracking kegs comes with challenges:

→ Anyone with Industry knowledge knows it, the supply chain can be a very complex process, with a **lot of data coming from many different sources**, sometimes from different countries in a global context. Efficiently visualizing, centralizing and managing this constant stream of information is crucial for efficient management of all the processes.
→ You need **fast and accurate communication**, you need to make quick and informed decisions, which enable you to give proactive instructions to many points of your supply chain, in a fast and efficient manner.
→ Furthermore, globalization also results in **global competition**, and the ability of a company to **adapt the situation**, changes and context in real time through data is a key driver to its relevance, competitiveness and success.
→ Many operations and a lot of information collection are processed manually, which inevitably leads to **human error**. You are relying on partially inaccurate data to make key decisions.
→ The **lack of visibility and control** in your supply chain opens the door to **loss and theft**. In the end, the container owner pays the bill.
→ Appropriate control takes time, but in real life, labor and time shortage leads to a **lack of control**.
→ **Seasonality** leads to supply chain bottlenecks.
→ Finally, **increased transportation costs** add to your expenses.

Every company faces these challenges.

Tackling these challenges the wrong way can lead to **wasteful practices** that actually **cost** companies a lot, such as **buying more** RTI (kegs) than needed, **increasing the number of labor hours** and contractors, and **losing kegs**.

On the contrary, **appropriate tracking** showcases a lot of benefits.

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C - Benefits of tracking

Tracking can have a positive impact on many parts of your business:

1 – Supply chain

Improve the accuracy of keg planning and availability.

The key for this, is to know your real cycle time and identify any areas where your assets may dwell and use the data to make informed decisions to make your assets work harder for you.

The Benefits are many: →

Preventing fraudulent activities:

→ Reduce shrinkage, theft and loss
→ Identify asset losses and loss rate trends

Visibility:

→ Know your population size inside / out
→ Know and manage your fleet location

Control & forecasting:

→ Improve the accuracy of your keg planning and availability forecasting
→ Compare container availability against the forecasted production requirements, to ensure keg supply meets demand, correctly and efficiently
→ Add new kegs to the supply chain when they are needed: not before, not after
→ Save time and improve productivity

Optimization:

→ Optimize Kegs usage
→ Optimize asset usage on your network, because you are aware of fill to fill and fill to return cycle times
→ Know the inefficiencies of your chain, to rectify and adapt for more efficiency
→ Optimize transportation management

2 - Finance

Minimize ongoing expenditure by optimizing container fleet usage.

The benefits are:

→ **Investments**
  - Identify, justify and schedule new keg **purchases** requirements
  - Accurately make **forecasts** for new container purchases and save money
  - **Optimize** the precious investment in your container fleet

→ **Profits and losses**
  - Supply chain inefficiencies cost you margin and benefits. Identifying them brings **benefits back up.**
  - A targeted approach allows you to **minimize keg losses.**

→ **Accounting**
  - Your **asset register** is clean and accurate.

3 - Maintenance

Better management of keg maintenance.

The benefits are:

→ **Identify Repeat Offending containers, which can help to:**
  - identify those that should be **removed from the fleet (scrapped).**
  - Make possible improvements in **maintenance process**
  - Make possible improvements on **Line / Brewery**

→ **Categorise Maintenance Activity / Process, which can help to:**
  - **Build Group repairs** such as Line Rejects / Trade Complaints / Repeat Offenders
  - Categorise maintenance activity into processes enabling you to **look at what behaviour is driving your maintenance activity**, as opposed to viewing it as one large pot.

→ **Enhance reporting / Adding in costs for activity, which can help to:**
  - Look at the **total spend of activity**, as opposed to high level numbers
  - See the amount you are **spending on maintenance**, and where

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4 - Quality

Minimize trade complaints, and use the data to help you offer a higher quality service.

Brewers actually face two main issues regarding quality. Firstly, most brewers have a procedure that logs and tracks trade complaints and ullage returns, but can do little with the information. Secondly, most complaints result in products being replaced without any real investigation into the cause or validity of the claim.

1) Help you understand the exact nature of the complaint and build up real quality data and customer profiles, and secures the manufacturing processes.

Last Fill Information gives you the **ability** to look for:
• Last Fill Location
• Packaging Date
• Best Before Date
• Last Product Filled

Looking at key information like this helps you build up a picture on the validity of the claim, and you can also see if numerous complaints are linked to the same location, product, or packaging date.

2) Give you accurate data on keg lifetime and warranties.

Last Maintenance Activity gives you the **ability** to look for:
• Last Maintenance Location
• Last Maintenance Date
• Maintenance History

Looking at key information like this helps you build up a picture to see if there is any link to complaints and maintenance.
Do you see more complaints on kegs that haven't had maintenance for a period or not ? This could help identify possible improvements in maintenance activity.

3) It allows for an improved customer service, and minimises the impact of product recall scenarios.

Supply Chain Information gives you the **ability to look at route to market** of complaints with information such as:
• Last Depot Seen
• Delivery User

Looking at key information like this helps you build up a picture to see if there is any link to complaints and the particular route to market it takes.

5 - Conclusion

As you can see, tracking kegs doesn't only bring benefits to the supply chain but to the whole business: it reflects positively on quality, maintenance and finance, creating value for all the departments as well as for the whole business.

2 – WHAT SOLUTIONS FOR WHAT OBJECTIVES ?

*If all these benefits look interesting to you, now that you know **why** you might want to use keg tracking, you might be wondering **how**.*

*It turns out there are not one but **several kinds of solutions, depending on your own situation and expectations**.*

A - Adapting the technology to your needs

The choice of any tracking technology will mainly depend on the reasons you want to track your kegs.

What are your tracking needs ?

By investing in a tracking system, you may have some very specific pain points to address. At Alizent, we have great experience in the industry and have built our product around addressing some pain points that are common to all brewers we have helped.

These are:

→ Understand and reduce keg losses
→ Know your stock by location (brewery, distributor, etc)
→ Know your keg cycle time
→ Know your population (number of kegs in use)
→ Know your investment needs (based on keg availability)
→ Monitor cross-border shipments
→ Recall batch products
→ Plan and monitor your maintenance activities

It's important to underline that for some objectives, tracking solutions will not directly resolve the problem by themselves. But they will give you the key and necessary information to better understand the situation, and therefore to drive decisions and act accordingly to solve the issue.

For instance, no tracking solution will reduce keg losses directly. However, it will give you some precious information to help you understand where and how kegs are lost, allowing you to take actions.

5 - BLE *(Bluetooth Low Energy)*

Pros: Bluetooth Low Energy system (BLE) offers a range at least 2 times longer than RFID, has a relatively good reading range and a high level of automation, a low cost, and is robust. Bluetooth-enabled devices such as computers or smartphones can read the low energy signal emitted by a small beacon attached to an asset, which makes the system highly compatible, versatile and universal, easy to use and convenient.

Cons: Its downsides is its poor reactivity. It will be very difficult to read the whole content of a truck in motion with BLE equipped objects, simply because BLE low power devices will only transmit every one or two seconds or more.

Finally, the BLE tag is the cheapest of all, but tags require a battery, which increases their cost, maintenance cost and housing constraints.

6. NFC

Pros: It has a small size and offers a good scanning speed, it's convenient as you can easily use mobile devices to control it, it's easy to deploy, and it's energy efficient.

Cons: NFC has a limited reading range, individual scans are needed, it's quite expensive, it's still not a popular technology, and it has a limited processing speed.

Conclusion

As you can see from the presentation above, there are many kinds of technologies to track assets, and the relevance of using one over another **depends mainly on each business' context and situation**.

Depending on **your goals, expectations, priorities, and also budget**, there is always a solution that will fit more than the others.

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The table below aims to list the available technologies, from the least suited one to the best suited:

	Manual	Barcodes	RFID	BLE	NFC	GPS
Reduce / Understand keg losses	+	+	++++	++++	++	+++
Know your stock by location (at brewery, distributor, etc)	+	++	++++	++++	++	+++++
Know your keg cycle time	+	++	++++	++++	++	+++
Know your population (number of kegs in use)	+	++	++++	++++	++	+++
Know your investment needs (keg availability)	+	+	++++	++++	++	+
Monitor cross-borders shipments	+	+	+++	+++	++	+++++
Recall batch products	+	+	++++	++++	++	+++
Determine current location and traceability of current routes	+	+	++	++	+	+++++
Plan and monitor maintenance activities	+	+	++++	++++	++	++

This table gives estimates only: each brewery's situation may differ, depending on some specific configurations.
In reality, choosing the right technology for the right tracking objective can be very difficult but at Alizent we have the knowledge and experience to guide you down the correct path that suits your needs. Having that in mind, however, some trends can be identified.

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In most cases brewers do some form of **manual tracking** of their own but this can be very labour intensive and typically done once or twice a year. This clearly is limited, and will not suffice to achieve complex objectives.

You may want to use it for very specific purposes only, on a limited number of kegs, and for very low value operations because of its high probability of errors.

On the contrary, **barcodes** allow you to avoid manual errors by identifying your kegs individually. Barcodes technology is the most commonly used one for asset tracking, mainly because of its low cost. The main weakness of barcodes is their poor level of automation, as kegs need to be scanned individually.

Barcodes can be very helpful to achieve basic objectives such as collecting information about the number of kegs in use, or keg cycle times, but other technologies are better adapted to achieve more complex objectives.

Generally, tracking assets with barcodes is ideal for situations where you:
- aim to keep an up-to-date record of your assets' information
- have a high volume of assets but don't have to process high volumes daily
- don't need to track assets in real-time
- don't need to track assets automatically.

The evolution from barcode has been to **RFID (Radio Frequency Id.)** and has a high level of automation. RFID allows to scan multiple kegs at the same time, even when moving at a high speed, or being out of a clear line-of-sight. RFID can therefore help you to achieve all the objectives listed above, but these advantages come with a higher price than barcodes.

The **Bluetooth Low Energy (BLE)** technology allows to achieve similar objectives than with RFID. And while being less precise than RFID and with a limited battery life, it's more flexible, and is easier to deploy.

Regarding **NFC (Near Field Communication)**, the objectives you can achieve are a little bit more limited than with RFID, due to its smaller reading range and inability to read multiple kegs at the same time. However, the real advantage is that it's easy to deploy due to the fact it can be easily read by smartphones so it minimizes any hardware investment you may get with other technologies.

Finally, for specific objectives such as current outdoor localization and route tracing, the **GPS** technology can perform better than RFID or BLE, as it is really adapted to control exactly where your kegs are at every time, or what route they follow. A GPS tag doesn't include much information though, but only real-time position.
Using GPS for asset tracking makes sense if you need to continuously and automatically track your kegs' geographical position, or if you want to make sure your kegs stay within a set boundary (geofencing).
Thus, the GPS technology is very goal-specific, and can be complementary to RFID or to other tracking technologies.

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B - Adapting the technology to who you are

Selecting a keg tracking technology doesn't only depend on the objectives you want to achieve, but also on **who you are as a brewer**. The table below aims to identify the best suited technologies, depending on some typical business characteristics, such as its size, or the volume of kegs concerned.

BREWERY CHARACTERISTICS	Manual	Barcodes	RFID	BLE	NFC	GPS
Company size	+	++	+++	Any	Any	Any
Volume of kegs to manage	+	++	+++	+++	++	Any
Financial capacity	+	++	++++	++++	++	+++
Value of assets (container and content)	+	++	+++	+++	++	++++
Supply chain complexity	+	++	+++	+++	+++	-
Labor availability	++++	+++	+	++	++	+
Maturity in term of automation and technology	+	++	+++	+++	++	+++
Implementation time availability (go-to-market)	+	++	+++	++	++	++
Distribution area	Local	Local to wide	Wide	Local to wide	Local to wide	Wide
Required line-of-sight for scanning	Clear	Clear	Any	Any	Clear	-
Kegs' transportation type	Individual	Individual	Mass	Mass	Individual	Both
Supported kegs' speed when moving	Low	Low	High	High	Medium	High

Scale : (From small (+) to big (++++))

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Some general trends can be identified from this table.

If you are a **smaller brewer**, with only a limited volume of kegs to manage daily, and consequently with a limited financial capacity, you may **look into barcodes**. If you don't need both a high level of automation and to reach high level objectives, barcodes might fully satisfy you. Barcodes technology is easy to implement, cost-effective, and widespread.

However, if you are a **much larger brewer**, with a higher volume of kegs and a complex supply chain, you should avoid barcodes. If you are such a brewer, you certainly look for a certain level of automation, and you might therefore **look into RFID or BLE**, or into a combination of both.

Generally, these two tracking technologies are better suited for breweries with :

→ a large fleet of kegs
→ no clear line-of-sight to scan kegs
→ high-speed moving assets
→ a tracking need at brewery gates (entrance and exit), or at fixed locations
→ high value assets
→ a complex distribution area
→ kegs moving not individually but in groups, implying multiple scanning

Then, if you don't look for a high level of automation, or if you want to leverage the technology as a **complementary option** to other technologies, you might **look into NFC**. The main limits of NFC are its need for a clear line-of-sight for the readers, and that it requires each keg to be scanned individually. That's why it can be useful in certain conditions only.

Finally, the **GPS** technology is very specific, but you might want to look into it if you are **dealing with some very expensive equipment**, or if you have a very **wide distribution area** and want to know your assets' real-time location. You might need some important financial capacities though, because GPS technology is expensive.

However, if your goal is not necessary to track real-time geographical position but more to achieve kegs inventory, to get usage history data, transactions, etc., you might use other asset tracking methods such as barcodes, NFC, BLE or RFID.

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C - Existing technologies

Several technologies can be used to track your kegs:

→ Manual tracking	→ GPS
→ Barcodes	→ BLE
→ RFID (active / passive)	→ NFC

Let's get into each of them.

1 - Manual tracking

It's the most basic option, and its pros and cons are directly those of manual work versus its automated version.

Pros: It's a low cost operation, requiring no technology, and with a high level of "freedom", as one doesn't need any third party contractor or equipment to perform the tasks, and you can build your own workflow processes.

Cons: The task is labor and time intensive, and it's difficult to centralize information. There is a higher possibility of errors, which can lead to a decrease in customer satisfaction, and overall management control is not easy with manual tracking.

2 - Barcodes

Barcoding technology in itself is **well known, reliable and cheap**, therefore a good way to track a fleet.

Pros: It's a low cost and low investment technology, with a fast processing of asset transactions. It's the most common technology so there are a lot of available solutions and equipment, which makes it versatile and universal.

Cons: Individual scanning is needed, which reduces the speed of the operation, and hence it is highly demanding in labor and time. Line of sight alignment is required, it's heavily reliant on the cleanliness and lighting of the environment (scanners are sensitive to the quality of barcodes), and it's not adapted to a high volume of assets, or to permanently on the move assets.

3 - RFID

Based on radio-frequency chips sending data to a scanner, RFID provides **automated real-time data transmission**, **without human intervention**. It has some benefits over barcode and over manual tracking, that also come with their own costs.

As there are actually **2 kinds of RFID technologies**, let's first examine what is true for both kinds, and then we will look into each:

• RFID in general

Pros: RFID shows a good level of accuracy and a high level of automation that removes human error from the equation, and it doesn't require line-of-sight alignment as does barcodes.
It can scan multiple items at once and track each item individually, which makes it both the quickest, most automated and most accurate process. And as it uses remote scanning, the ongoing labor is reduced.
It has a high processing speed, and the tag doesn't need to be on the asset's surface. RFID tags also offer the best resistance to the harsh cleaning and decontamination process received by kegs, that includes the use of compressed air, water, steam, caustic or acid chemicals, and pressurization.

Finally, there are several reasons why RFID is more stable than other wireless communication technologies:

→ RFID **networks are private**, so they are not really impacted by the rapid momentum of public wireless networks that face a high pressure for high speed.
→ RFID is under a high **price pressure**, so the challenge is to decrease the cost to address a larger scope of applications.
→ Most RFID investments are made for 5 to 10 years or beyond, so **companies using RFID require a long term technology stability** and lasting compatibility.

Cons: There is a cost associated with the technology investment, and a complex infrastructure is needed, for example scanning stations and bulk keg gates. Installing such an infrastructure is also time-consuming

As mentioned above, RFID tags fit between **2 categories**, called passive and active:

Passive tags don't have their own internal power source, and must be scanned only at specific moments of the process, or at specific readpoints. They are also **cheaper** than active tags.

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Active tags require a power source.

The result is that they are readable within a **wider range**, and that they can **continuously communicate** with a reading device.

This way, one reader (reading device) can automatically receive the data from quite a large area, accurately and precisely, and a network of strategically disposed readers will be able to **read each item within the entire facility** in an automated, detailed and easy way.

Active tags also have sensory capabilities, making them able to detect such parameters as heat or humidity, which can be useful in some circumstances, and which also allows to integrate them to an IoT network.

• Passive RFID

Pros: No power source required, they have a high read range that can be more than enough for asset tracking in comparison with active RFID.

Cons: It's a high technology investment but lower than active RFID

• Active RFID

Pros: The reading range is higher than passive RFID, it has real-time location capabilities (within a limited range of course), and the ongoing labor is highly reduced.

Cons: It's a high technology investment, the size of tag can be large. The power source has a finite lifespan and will eventually need to be replaced or recharged.

4 - GPS

GPS allows for tracking assets that are out of Wi-Fi coverage but have access to the cellular network, such as vehicles, or items being transported on sea. GPS tags provide **near real-time data**, and also exist both in their **active or passive** form, with the active ones sending continuous information automatically.

Pros: The GPS technology is robust, provides real-time data, with no manual scanning needed and no human intervention. One of the advantages of the GPS technology is the ability to set up alerts, to be notified when your assets move, and the alerts system is easy to set up.

Cons: It's adapted to very specific situations only, is very expensive, more reliable outdoor than indoor, provides limited information, and is big in size.

Additionally, GPS don't send other information than the location, and because they are high value devices that are easily removable they can be stolen, or simply they can be lost.

Finally, they are battery life dependent.

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D - Must-have characteristics of any tracking solution

If you have decided to go for a tracking solution, you might be wondering which one suits best for you.
As we said, the first and most important thing is to analyze **your own needs**, and then only will you know what technology fits best for these needs.

Tracking solutions offer great, perfectly proven recent technologies, that bring very efficient, time-saving and cost-saving solutions to many issues arising in the daily life of many businesses, and namely in the brewery industry and its supply chain.
Still, they are **not one-size-fits-all answers** to any company, any strategy, any process framework.
Before investing time and money to implement a tracking solution, one must really ask **what his business needs are**, and whether a tracking solution is the right answer.

Of course, if you need some support on that, **we're here to help** at Alizent.

But whatever your needs and the solution you go for, there are some crucial questions you need to ask yourself before.

1 - Is the solution scalable ?

We wish you a continuous growth for your company, and to achieve that **your solution needs to follow your growth**, efficiently and painlessly.

If you target a growth in noticeable proportions, choose a solution that will remain equally efficient with more assets and more sites.
If you need to track more than kegs, such as machinery or high-value goods, choose a solution that can do it all with the same relevance.
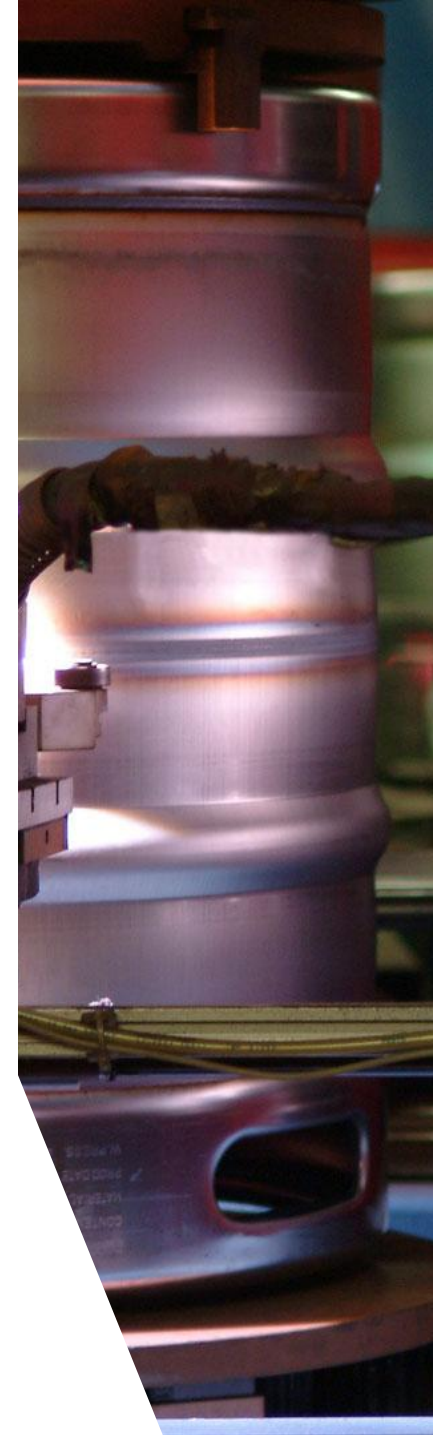
2 - Is my company ready?

If you are to implement a new technological solution, you will need the full cooperation of **every person and department involved with it**, but also the insight of their particular skills in some situations.

> *Are they ready? Will they be easy to onboard?*
> *Will you face resistance?*
> *If you're the decision maker, how will your direct staff handle the changes?*
> *If you're not the decision maker, how will your hierarchy react to that proposition?*

Whatever your role is and your coworkers' state of mind, be prepared to be **educational and clear** to **expose the improvements** you're expecting from the changes.

And doing so, make sure you leave no one behind: if you want your business to run and to really leverage the benefits of the solution you will choose, everyone needs to **understand fully** what this is for, and how to make it work the most efficiently.

3 - Is my keg tracking solution driving business intelligence ?

Your solution must feed you with relevant data and analytics, allowing you to make relevant forecasts and plans, to increase efficiency, and to reach your target ROI. It must give you the right keys to act, to take decisions, and to improve process efficiency and business performance at the end. It must have the ability to deliver smart reports, powerful reporting and trending reports to gain new insights.

4 - Is the solution easy to integrate ?

You should investigate the compatibility of the solution with your current framework, workflow, ERP and business system, to see to what extent it can be seamlessly integrated. It's better if you don't have to "break everything" to make it work. The solution should also be adapted as best as possible to a variety of processes depending on your various needs: you should count on it in every situation.

5 - Is the solution hardware agnostic ?

Your solution must support various identification and IoT sensor technologies technologies, and can have them work all at the same time. If there are other analytics you need because of your own requirements, your solution should be able to deliver them **easily and clearly**.

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3 – OUR SOLUTION

KEGFLOW

Alizent offers a kegs management solution called Kegflow.

A - Presentation

Keglow offers **analytic data driven keg management** in 3 steps:

1 |

Depending on your objectives, we identify **a proportion or all kegs** with a **unique identifier.**

2 |

We install **scan points** at **key locations** that will allow you to **read data** from tagged kegs.

We'll decide with you where the scan points should be installed along the supply chain, depending mainly on your tracking objectives.

Scan points can be from different types, depending on the technology and your needs. We essentially offer 3 types of scan points :

✔ A fixed scanning station, typically on the keg filling line
✔ A handheld scanner, typically for single monitoring of tagged assets at the final destination for example (bar, restaurant, festival)
✔ A bulk keg scanning RFID gate, typically at the entrance or exit of breweries and distributors, for kegs monitoring of vehicles transporting items tagged

3 |

Finally, **data will be stored** in KegFlow system allowing you to **access intelligent reports** feeding back **business critical information**. Once again, the KegFlow system can be tailored to meet your tracking objectives.

One of the key features of KegFlow is that the solution is based on **two different approaches** to suit different objectives:

• An **end-to-end approach**, which requires to tag 100% of the kegs
• And a **statistical approach**, which requires to tag only 20% of the kegs.

Which option to choose depends mainly on what objectives you want to achieve by tracking kegs.
Then, both the chosen approach and the objectives you want to reach will also influence the location of scan points along the supply chain. Let's get deeper into each approach.

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B - The statistical approach

The statistical approach was born from a common stumbling block for most asset management projects which is fitting tags to all of your assets can often be the largest cost of the whole project.

Comparative studies between a 100% tagged fleet approach and a statistical approach show that a **global accuracy of 99%** can be reached on certain objectives, with a **20% tagged fleet** only.

The statistical approach allows you to satisfy the following objectives :

→ Know the **number of kegs** you have in use (population report)
→ Know the **rotation rate** of your kegs (cycle time report)
→ Calculate your **investment needs** in term of new kegs to be purchased (keg availability forecast report)
→ Understand your **loss rate** (loss report)

To fulfill these objectives, and considering RFID technology is used, in most cases **two scan points only** need to be fitted: a scanning RFID gate at the entrance of the brewery, and a fixed RFID scanner on the keg filling line.

The location of scan points along the supply chain could be the one illustrated below:

Supply Chain / Scan Points (Statistical)

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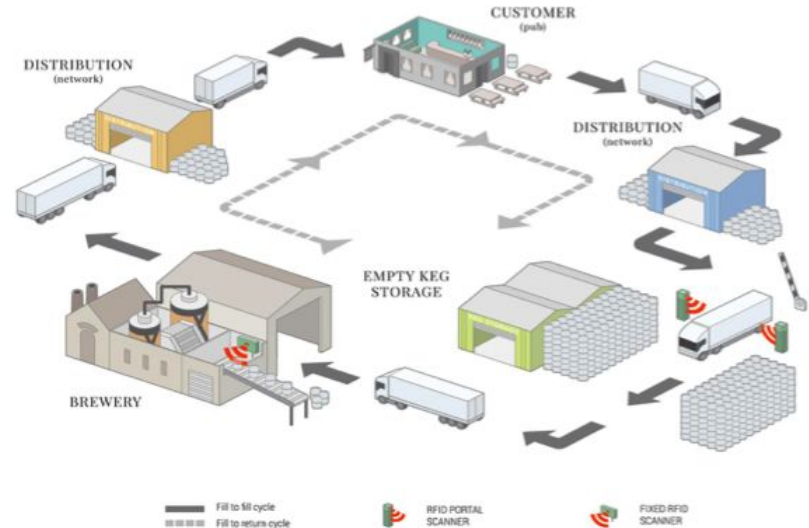
C. The end-to-end approach

The end-to-end approach consists in tagging and scanning **100% of the kegs**.

It is of course a **more costly** approach than statistical , but it also allows to meet many **more objectives**.

In addition to the objectives achieved with the statistical model (number of kegs, rotation rate, investment needs, and loss rate), the end-to-end model allows you to also meet the following objectives:

→ Know your **stock by location**

→ Identify points in the supply chain **where kegs are going missing**

→ Understand and control **quality related issues**

→ Control your **cross-border shipments**

→ Add value to your **maintenance** activities

→ Facilitate **batch product recalls**

→ Better **plan resale** of kegs

One advantage of the end-to-end approach is the possibility to have a **better knowledge** of your fleet **outside the brewery**.

For instance, scan points can be extended to include end-mile delivery. And again, the location of scan points will depend on your tracking objectives.

If we consider a brewery that wants to achieve all the objectives listed above, the **location of scan points** along the supply chain could be the one illustrated below.

It could include either **fixed scanning stations**, or **RFID scanning gates**, or **handheld scanners** at each entrance and exit of each location, as shown on the following picture.

Supply Chain / Scan Points (Complete)
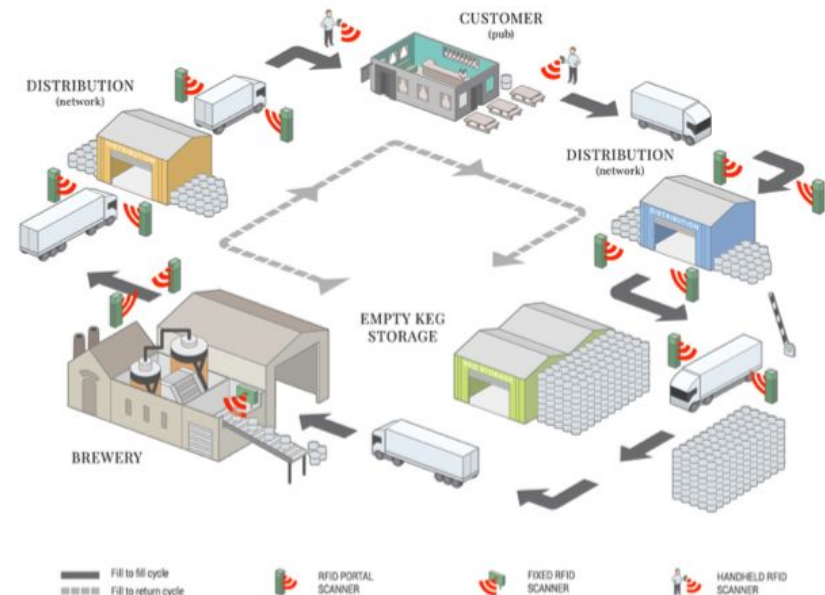
D - Comparison table

Below is a summary and comparison table to help you evaluate the various advantages of end-to-end approach versus statistical approach:

OBJECTIVE	% Tagged	Brewery (Post Fill)	Delivery to Customer - (Distributor)	Delivery to Customer - (Pub / Bar etc)	Collection from customer - (Distributor)	Collection from customer - (Pub / Bar etc)	Arrival at brewery (ready for refilling)	Maintenance scanning	Contactless Geo Location
Resale of kegs	100		X	X	X	X			
Keg theft	100		X	X	X	X			
Cross border shipments	100								X
Forging	100	X	X	X	X	X			
Maintenance	100	X						X	
Alcohol Taxes / Duty	100	X			X	X			
How many kegs in use	20	X					X		
Keg cycle time	20	X					X		
Investment needs (new purchases)	20	X					X		

Comparison table between information given by the statistical approach vs end-to-end approach

Conclusion

→

Auto-ID tracking systems can bring measurable, consequent improvements to your brewery's workflows, cycle times, cost-efficiency and ROI.

Not every solution is for every business, but many businesses have a great benefit in finding their right solution.

Kegs' tracking is not the universal miracle solution to every management issue. But to reach operational excellence, it is certainly a tool that can give decision makers a unique ability to visualize, analyze and foresee, and to make the right business decisions.

Know your needs, your expectations and your goals, and see what the technology can do for you.

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and here to accompany you on that way.

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