HackMTY 2025 – Pick & Pack of the Future
Pillar: *Smart Intelligence*

Expiration Date Management

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gategroup

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1. Understanding the Context

Before every flight, airline catering teams prepare hundreds of packaged meals, snacks, and beverages that will be loaded onto the aircraft. These products are organized in drawers and trolleys according to each flight's menu and service plan. Once ready, the trolleys are moved from the catering facility to the airplane, where flight attendants serve the passengers.

Each product has an expiration date printed on its packaging, just like items you find in a supermarket. However, in airline catering, the process happens on a much larger scale and under strict time constraints. A single catering unit may prepare food and beverage items for more than one hundred flights per day, serving tens of thousands of passengers.

To make sure all products are safe to serve, employees must verify that nothing expired or close to expiring is included in the trolleys. This task is usually carried out manually. Workers visually read the labels on each product to confirm the dates, while managing hundreds of different items in a very short period of time.

Because of the intense pace of operations, the variety of products, and the constant pressure to meet flight schedules, mistakes can happen. Sometimes an expired product might go unnoticed. In other cases, products that are still within the valid date might be discarded too early, which leads to unnecessary food waste.

Airline catering can be imagined as a giant kitchen combined with a logistics warehouse. It operates continuously, preparing, assembling, and dispatching meals for aircraft departing to destinations all over the world. Every process must be efficient, accurate, and safe to ensure that each passenger receives a high-quality meal during their flight.

2. The Current Challenge

Every item prepared for a flight must be checked to confirm that it is still within its expiration date before being packed into trolleys or drawers. This rule applies to all products, from sandwiches and salads to bottled drinks and packaged snacks. Ensuring food safety is one of the most critical responsibilities in airline catering, as even a single expired item could lead to customer complaints or safety risks.

Today, this validation process is mostly manual. Employees need to pick up each product, locate the printed expiration date, and confirm that it is still valid. This step is repeated hundreds or even thousands of times every day across many different types of products and packaging formats. Because of the limited time available before flights depart, these checks must be performed quickly, often under pressure and in busy production environments.

This manual approach has several limitations. It is slow and repetitive, and the constant need for visual inspection can lead to human errors. Employees may overlook a date that is printed too small or located in a hard-to-read position on the packaging. In other cases, products that are close to expiry may not be identified or prioritized for use, which results in unnecessary waste when they are later discarded.

Some catering units have developed workarounds to increase control. For example, one of our facilities tracks each product by LOT number, which represents a specific batch with a known expiration date. They know which LOTs are currently flying on board. For instance, if LOT A, B, and C of powdered milk sachets are being used, and tomorrow is defined as the cut date for LOT A, employees must remove all powdered milk sachets from LOT A that come back from flights and were not consumed. These returned items are collected in bins, checked again date by date, and separated by LOT. LOT A is discarded, while LOT D (the new batch) is added into circulation.

Although this process provides better traceability, it is extremely labor-intensive and inefficient. It requires careful coordination, manual sorting, and physical checks, which consume significant time and resources. It also depends on accurate record-keeping and consistent employee attention, which is difficult to maintain during peak operational hours.

There is currently no real-time system that gives supervisors an overview of product freshness across the entire operation. Decisions about replacing or using stock are mostly reactive rather than proactive. The lack of automated tools makes it challenging to balance food safety, efficiency, and sustainability.

In summary, the current process relies heavily on manual labor and human judgment. It consumes valuable time, increases the risk of mistakes, and limits the ability to manage inventory efficiently. A smarter, data-driven way to track and control expiration dates could help ensure both safety and sustainability while improving productivity across catering units worldwide.

3. Your Mission

Your challenge is to imagine how technology could transform this manual and repetitive expiration management process into a smarter, faster, and more reliable system. The goal is to ensure that only safe and fresh products are loaded onto flights, while reducing the time, effort, and waste currently involved.

You are invited to design an innovative solution that supports catering teams in automatically checking, tracking, and managing expiration data across thousands of products every day. Think of a tool or system that can operate in a busy catering environment, where employees are constantly handling large volumes of food and beverage items, each with different expiration dates and batch codes.

Your concept can include any combination of digital intelligence, sensors, computer vision, automation, or data analytics. What matters most is that your solution helps teams make faster and better decisions, reducing the risk of expired products while avoiding unnecessary disposal of items that are still valid.

In addition, you can explore ideas that start further upstream in the process. For example, products could be identified, labeled, or digitally marked already during receiving, production, or packing, so they can be recognized and tracked more easily in the later stages. This could make it possible for downstream processes, such as assembly or dispatch, to automatically detect items that are close to expiry and take immediate action without manual checking.

In scope:

- Automating expiry checks using artificial intelligence, barcode or QR scanning, or computer vision
- Predicting which products will expire soon and suggesting the best sequence for usage or replacement
- Creating a visual dashboard that provides real-time visibility of product freshness across storage areas, trolleys, or flights
- Designing a smart packing or storage system that alerts employees when an item is outdated or approaching its expiry date
- Exploring upstream solutions such as smart labeling or digital identifiers that improve traceability across the full process

Out of scope:

- Changing suppliers, recipes, or packaging design
- Modifying airline catering contracts or flight menus

You do not need to design an entire enterprise system. A focused prototype, working concept, or data model that clearly shows how the idea could function in a real catering environment is enough. The emphasis is on creativity, practicality, and the ability to show how technology can make this complex and time-sensitive process easier, safer, and more sustainable.

4. Inspiration and Example Ideas

There are many possible ways to approach this challenge. The best ideas often combine technology, process understanding, and creativity to solve a real operational problem. Below are some examples to help you get inspired. You can use them as a starting point, adapt them, or come up with something completely different.

a. Computer vision app

A mobile or tablet application that uses a camera to automatically read and verify expiration dates on product labels. Employees could simply point the camera at a batch of items, and the app would highlight which ones are expired or close to expiry. This could drastically reduce the time spent on manual visual checks while increasing accuracy.

b. Predictive freshness dashboard

A digital dashboard that aggregates data from multiple sources such as scanning systems or production records. It could display the freshness status of products by category, location, or flight. The dashboard could predict which items will expire soon, allowing planners to prioritize their use before the cut date and reduce waste.

c. Smart shelves or bins

An Internet of Things concept where shelves or bins are equipped with sensors or RFID readers that identify products as they are placed or removed. The system could provide real-time visibility of which LOTs or expiration ranges are currently in use and alert employees when stock needs to be rotated or removed.

d. AI-based forecasting tool

A data-driven model that predicts product demand and consumption patterns based on flight schedules, menu rotations, and historical usage. By anticipating which items are likely to remain unused before expiry, the system could improve ordering decisions and minimize product loss.

e. Upstream tagging or digital identifiers

A system that assigns each batch or LOT a digital tag, for example QR code, RFID, or printed visual marker, as soon as it is received or produced. These identifiers could be recognized automatically in every subsequent process step, from packing to flight loading. This would make it easier to trace and control expiry-related data without relying on manual paperwork or memory.

f. Integrated traceability platform

A combined software solution that links different parts of the catering process, from receiving to dispatch. It could track the movement of each LOT and automatically flag any products that are nearing expiration across all stages of the operation.

A strong idea does not need to use advanced technology. Even simple, well-designed digital tools can make a big difference in a fast-paced environment. The key is to focus on usability, efficiency, and impact, showing how your solution would realistically help catering employees work smarter and safer while reducing food waste.

5. Supporting Mock Data

To help you design and test your ideas, you will receive a simplified dataset that simulates real expiration tracking data from an airline catering environment. This data can be used to train models, visualize expiry timelines, or prototype digital dashboards and alerts.

Each row in the dataset represents one product currently stored or in circulation within a catering unit. The dataset contains information such as the product name, LOT number, expiration date, and quantity. It is designed to provide enough structure to work with while keeping the scenario manageable and realistic.

Column	Description
Product_ID	Unique identifier for each product. Example: SNK001, DRK023, MLK105.
Product_Name	Name of the item, for example Snack Box Economy or Powdered Milk Sachet.
Weight_or_Volume	Indicates the weight or volume of the product, for example 180g or 200ml.
LOT_Number	Identifies the batch or LOT to which the product belongs. Each LOT has a known expiration date.
Expiry_Date	The expiration date of the product, formatted as YYYY-MM-DD.
Quantity	Number of units currently available in stock or returning from flights.

You can use this dataset to create analytics, visualizations, or predictions. For example, you might build a dashboard showing how many items are approaching expiration within the next three days or design an alert system that flags LOTs that will soon reach their cut date.

However, using the dataset is optional. You may choose to approach the challenge from another angle, such as designing a scanning interface, developing a recognition algorithm, creating an upstream labeling concept, or building a sensor-based detection system. The goal is to propose a solution that addresses the problem effectively, whether it is data-driven, hardware-based, or purely conceptual.

Remember that this mock data represents only a small portion of what a real catering unit manages daily. In reality, there are thousands of items, multiple LOTs per product, and constant stock movement between areas such as production, assembly, dispatch, and inbound return. Your solution should be designed with this complexity in mind while remaining practical and user-friendly for employees working in fast-paced environments.

6. What Makes a Great Solution

Judges will evaluate your project based on several key dimensions that reflect both creativity and real-world applicability. Your idea does not need to be fully functional or perfect, but it should demonstrate clear thinking, innovation, and a strong understanding of the problem.

a. Innovation

How original and creative is your solution? Does it bring a new perspective or use technology in a novel way to solve the challenge of expiration management? Judges will value ideas that think beyond the obvious and show a clear improvement over current practice.

b. Feasibility

Could your solution realistically work in an airline catering operation? Consider the environment: limited space, strict hygiene requirements, and high time pressure. A great solution will balance ambition with practicality, showing that it could be implemented without disrupting existing operations.

c. Efficiency

Does your idea make the process faster or reduce the amount of manual work? Time is critical in catering units, where every minute counts. Solutions that simplify tasks, reduce the need for repetitive checks, or optimize how employees use their time will score highly.

d. Sustainability

How well does your solution help reduce food waste or improve resource management? Airline catering handles large quantities of perishable goods every day. Reducing unnecessary disposal of still-valid products can have a significant positive environmental and financial impact.

e. User Experience

Is your solution intuitive and easy to use for catering employees? Keep in mind that users work under pressure, often wearing gloves or using shared devices. A clear, simple, and visual interface that minimizes steps and training will make your idea much stronger.

A great solution is one that combines **innovation**, **feasibility**, and **impact**. It does not need to be complex or expensive. Even a simple idea that helps employees make faster, safer, and smarter decisions can have a major effect on operations worldwide. The key is to think about how your concept could fit naturally into the daily workflow of a catering team while solving a real and meaningful problem.

7. Real-World Impact

Imagine your solution being used in large airline catering facilities around the world. Every day, thousands of employees prepare meals and load trolleys under extreme time pressure. If even a small part of this process can be made smarter, safer, and faster, the impact can be enormous.

A successful system could allow employees to instantly verify the freshness of items without having to read each date manually. They could scan, tag, or place products in a smart zone and immediately see whether they are safe to load. Supervisors could receive automatic alerts about products or LOTs that are approaching their cut date, allowing them to act before waste occurs.

With better visibility and prediction, catering units could plan their inventory more intelligently. Products would be used in the right order, fewer items would be discarded unnecessarily, and the overall operation would run more smoothly. Over time, this could save hundreds of work hours each week while also reducing food waste and improving quality assurance.

Beyond airline catering, the same type of solution could be applied in many other industries that manage perishable goods, such as supermarkets, restaurants, hospitals, or logistics centers. The ability to track freshness accurately, automate checks, and prevent waste has global relevance and can contribute directly to sustainability goals.

By developing a creative and realistic approach to expiration management, you are helping to shape the **future of smart catering operations**. Your idea could inspire real pilots and digital solutions that make a measurable difference in how food safety, quality, and efficiency are managed worldwide.

8. Tip for Participants

Do not worry if you have never visited an airline catering facility. You can think of this challenge as a large-scale **inventory freshness management problem** that must work with extreme precision and speed. The same logic applies to supermarkets, food warehouses, or restaurant supply chains, but in this case the process must happen within very short time windows and under strict quality standards.

Focus on understanding the core issue: how to ensure that every product loaded on a flight is safe, fresh, and traceable, without slowing down operations or increasing waste. Whether your solution relies on artificial intelligence, computer vision, sensors, data visualization, or a completely new idea, what matters most is how it improves the way people work.

Try to visualize the environment in which your solution would operate. Employees move constantly between preparation areas, packing zones, and loading docks. They work in cold rooms, handle sealed packages, and coordinate with multiple teams. Your design should fit naturally into this reality, helping them perform checks faster and with confidence.

Think creatively and stay open to different perspectives. Some of the best ideas come from combining technologies or rethinking a step that everyone assumes must be done manually. A small improvement in one part of the process can create a big ripple effect across the entire operation.