SkyLinker Airservice

Upcoming Tasks Page

Upon completing the LDND module and now the user has his complete data with their next due, a new feature can be used which is in the upcoming tasks page.

on this page, the user can enter a date in the future, or even after a certain number of flight hours or flight cycles, and then see the tasks that will be due at this specific time, so he can prepare the aircraft for these task maintenance procedures or even utilize his flight schedule based on this information.

Required inputs from the user

- Choose the Airline

- Choose the Aircraft

- Choose the duration either by:

    i. Enter a date in the future

    ii. Certain amount of flight hours

    iii. Certain amount of flight cycles

    iv. Combination of the three

Mailing System

To maintain operator awareness, an automatic mailing system has been integrated into the website. This system continuously monitors the upcoming tasks due within the next month and automatically sends notifications to authorized users at the beginning of each month, ensuring timely action and oversight.

LDND Page

LDND page is dedicated to viewing the LDND database, but with better visualization.

Also, there is an option for authorized users only to update tasks Last-Done, and these changes will be recorded in the recent actions in the admin panel.

- The data visualized in table format.

- An option to hide/view columns for better visualization.

- Search fields are available for fields like MPD Item Number and Task Card Number.

- Filtering fields are available for fields like Airline, Aircraft Package, Airline Due, MPD Due….. etc.

- Option to update single task last done data.

- Option to update package last done data.

Important:
- Only registered users can access the LDND page for better illustration of their data.
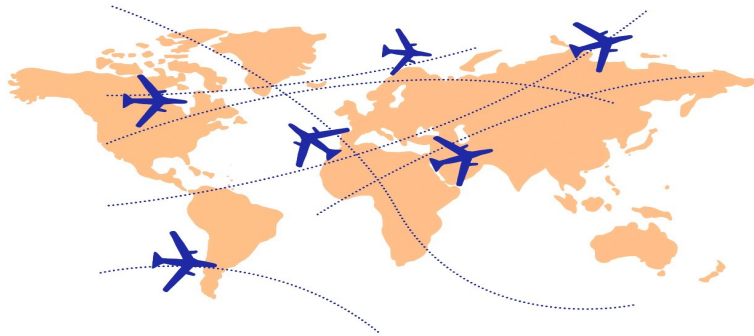- Only authorized users can modify the LDND database.

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Airline Schedule Optimization

> ## Itinerary Builder

The purpose of this module is to generate all possible non-stop, single and double stop itineraries for the airline.

I. Upload an Excel file containing the flight schedule data

Flight No.	Origin	Departure	Destination	Arrival
1	LAX	ORD	8:00	10:00
2	ORD	BOS	11:00	13:00
3	LAX	BOS	10:40	15:00
4	BOS	ORD	17:00	18:00
5	ORD	LAX	19:20	20:20
6	BOS	LAX	20:00	22:00

Note That: the file must be in Microsoft excel format

<u>User Current Status:</u>

- All of the data submitted by the user are stored in his database in the LDND section on the website.

- Only authorized users can interact with the database whether by *Adding, Editing or Deleting*

- The user now has complete knowledge of their tasks next due and can keep modifying their last done and monitoring their next due.

- The user now knows the current status of tasks whether they are due or not based on the airline program or the MPD threshold. *(Airline Due/MPD Due)*

<u>Important:</u>

- Only registered users can access the LDND page for a better illustration of their data.
- All of these data are necessary as they will be used in further modules.
- Maintenance related procedures are critical, therefore any misinformation entered by the user could lead to unexpected errors or miscalculations.

Excel Sample

In case the user has a ready database about his tasks and their last done.

Like the AMP, there is an Excel sample the user can download and fill out with tasks MPD Item Number and their corresponding last done data to ease the process.

Required data from the user

- The user chooses the Airline and the Aircraft Name *(either one aircraft or more),* to which this Last done data is related.

- User can add tasks by:

i. Uploading single task's last done data by choosing its MPD Item Number and add its last done date, last done flight hours and last done flight cycles.

ii. Uploading the whole package last done data by choosing the package *(retrieved from AMP database)* and adding its last done date, last done flight hours and last done flight cycles

iii. Uploading the Excel sample file after filling it out with the last done data.

II.   Upload an Excel file containing the coordinates of the stations (airports)

Name	Latitude	Longitude
LAX	33.94159	-118.409
ORD	41.61708	-98.9433
BOS	38.72814	-90.3822

III.   Enter the turnaround time and connection time in minutes, and enter the distance ratio

Turnaround time: time between landing and takeoff.

Connection time: time required for a passenger and baggage to make a connecting flight at an airport.

Distance ratio: a user-defined limit on how far an itinerary can extend from its origin to its destination. It's a multiplier applied to the direct distance between the two points, setting a maximum allowable distance for the itinerary.

IV. Click on Get Itineraries to show the output

Note that:
- If there are no feasible single stop or double stop itineraries there will be no output, in this case, try to change the constraints specified in step 3.
- If the model doesn't recognize the uploaded Excel files, you'll be required to enter the number of columns that indicate each of the flight no., origin, departure, … etc.

Marketshare

The marketshare module is basically based on statistical models to serve the airlines economically and help them forecast important data.

Upon using this module, the airline should be able to know the following:

- Categorize the markets from markets with low competence to monopolistic markets.

- Give a good illustration of the market share of each competitor within a specific market.

- Scientifically calculated recommendations about whether to enter a market or not.

- Forecast the demand for all the itineraries based on their characteristics.

The user has to follow the following procedures

I. Upload an Excel file containing historical data

The model begins by asking the user whether he has historical data that includes the passenger's choice of old itineraries and the characteristics of each itinerary serving the markets.

In case the user doesn't have historical data, pre-calculated coefficients will be used in the forecasting process

The data required is in the following table:

Admin Panel—LDND

Managing task due dates in aircraft maintenance is critical, as missing deadlines can result in severe consequences, including grounding aircraft or halting airline operations. Ensuring timely task completion is essential for safety, compliance, and airworthiness. Calculating the next due date for tasks is a primary focus of maintenance management, aiming to minimize human error and save time and effort.

The Last Done—Next Due module is done per aircraft, as each aircraft has certain applicable tasks, production date, current flight hours, current flight cycles….. Etc.

The user now should only provide the last time he had performed a certain task in terms of date, aircraft flight hours and aircraft flight cycles and the system will automatically add all the data related to the airline and to this aircraft and calculate the task next due.

How it works

- When choosing an airline, all its operation data is retrieved.

- Upon choosing the aircraft by its name, the one to which the tasks relate, all its unique data is retrieved.

- Tasks are automatically linked to those who exist in the AMP database so if they're not there, go add them to the AMP first.

AMP Page

AMP page is dedicated for only viewing the AMP database but with better visualization.

- The data visualized in table format.

- An option to hide/view columns for better visualization.

- Search fields are available for fields like MPD Item Number and Task Card Number.

- Filtering fields are available for fields like Airline, Aircraft Applicability….. etc.

Important:
- Only registered users can access the AMP page for a better illustration of their data.

Itinerary No.	Airline Name	Origin	Departure
Arrival	Duration	Level of Service	First Stop
First Transit Time	Second Stop	Second Transit Time	Itinerary Price
Itinerary Distance		Destination	

II. Upload an Excel file containing itineraries data

Then the user is asked to list the current itineraries serving the market for himself and his competitors. The data required should be the same as historical data.
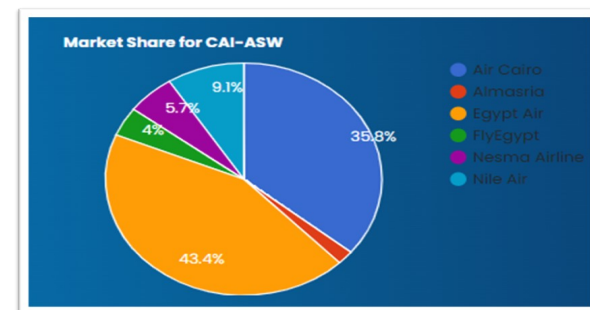
III. Download Unconstrained Demand Excel File

The website formulates an Excel file for the user containing the unique markets that exist in the uploaded data, and then the user is asked to download this file, as it should be filled out with the unconstrained demand for each market.

IV. Re-upload The Unconstrained Demand Excel File

After filling out the data, the user is asked to re-upload the file

V. View the results

Fleet Assignment

Fleet Assignment is the process of assigning certain fleet types from the airline's available fleets to a certain flight leg.

There are several types of modules under the fleet assignment umbrella; they differ in the complexity of constraints and the required inputs. More complex constrains result in more accurate results.

Properties	FAM	IFAM	ISD-IFAM
Itinerary Based	✗	✓	✓
Allow optional flights decision	✓	✗	✓
Dynamic Demand Correction	✗	✗	✓
Level of Complexity	Low	Mid	High

Solvers Details

Upon using this module, the airline should be able to know the following:

- Each flight is assigned to a certain fleet type.

- The total cost and profit

Due Clearance

The next step for the user is to calculate the next due dates for the tasks. To ensure a safe clearance between the actual task due date and the calculated due date, users can set a margin of safety in terms of days, flight hours, or flight cycles. This margin allows for a buffer to accommodate any unexpected delays or issues, enhancing the reliability and safety of the maintenance schedule.

Required data from the user

- Days Clearance

- Flight Hours Clearance

- Flight Cycles Clearance

User Current Status:
- All of the data submitted by the user is stored in his database in the AMP section on the website.

- Only authorized users can interact with the database whether by *Adding, Editing or Deleting.*

- User's next step is to navigate to the Admin Panel *(LDND section)* for further required data.

Important:
- Only registered users can access the AMP page for a better illustration of their data.
- All of this data is necessary as it will be used in further modules.
- Maintenance related procedures are critical so any misinformation entered by the user could lead to errors.

Required data from the user

- The user chooses the Airline and the Aircraft Name *(either one aircraft or more),* to which this MPD related.

- User can add data by doing the following:

i. Uploading a single MPD Item Number with all its corresponding data.

ii. Uploading the Excel file after filling it out with the MPD data.

Ensure Adequate Packaging

To ensure an efficient packaging system, users have 4 options when adding data to our database:

- Manual Packaging of a Single Task: Users can manually package each task when adding it individually.

- Uploading an Excel File with Pre-Packaged Tasks: If users have all their tasks already packaged, they can upload an Excel file with the "package" column filled. The system will retain the existing packages without making any changes.

- Uploading an Excel File without Packaged Tasks: If users have no pre-packaged tasks, they can upload an Excel file with the "package" column empty. The system will automatically package tasks based on interval-related categories (Daily, Weekly, Service, Ls, Cs) and leave the remaining tasks un-packaged.

Recommended Approach for Uploading an Excel File: Users who know the packaging for special tasks can upload the file with the "package" column filled only for these tasks. The system will then auto-package the rest of the tasks based on their intervals.

Important Terminologies

Recapture Ratio: How good are your itineraries compared to competitors, indicating their ability to attract passengers in case of cancellation.

Decrease in Demand Percentage: An approximate percentage for the reputation effect or any other decrease in demand on your itineraries due to the cancellation of one of your flights.

Increase in Demand Percentage: An approximate percentage for how many substitutable, high-quality itineraries you have for the same market, e.g., if one itinerary is cancelled, another will recapture 20% of its passengers.

The user has to follow the following procedures

I. *Upload an Excel file containing flight legs data*

The user is asked to upload an Excel file containing flight legs with their characteristics *(sample preview and download are options).*

II. *Entering Fleet Details*

At this step the user should specify the following:

- The number of owned fleets

And for each fleet he should enter:

- Fleet type

- Number of aircraft in the fleet

- Number of seats in this aircraft

- Operating cost per mile

III. Select Required Solver

Choosing the solver occurs at this step, which will determine the required input at the next step.

IV. User Selected FAM

a) The user should decide if he has optional flights or not, if yes, the flight numbers will automatically appear for him to select from.

b) Press optimize and the results are shown with the option to download optimization report and files to be used in aircraft routing.

V.   User Selected IFAM

a) The user should determine the value of his recapture ratio.

b) Upload an Excel file containing itineraries data with their characteristics.

c) Press optimize and the results are shown with the option to download optimization report and files to be used in aircraft routing.

VI. User Selected ISD-IFAM

a) The user should decide the value of his recapture ratio.

b) The user should decide the increase in demand percentage.

c) The user should decide the decrease in demand percentage.

Converting MPD to AMP

- The process of converting the MPD to AMP basically depends on taking a group of tasks and grouping them into a package.

- It is useful to know that tasks are grouped into packages based on the intervals provided in the Operator Page.

- For some special tasks it is not beneficial to group them in packages based on their intervals, airlines prefer to put them in special packages like Out of Phase, Airworthiness Limited Item (ALI) or other packages. The reasons for that are:

i. The packaging of some tasks can cause a significant loss in viable remaining flight hours/cycles.

ii. Some tasks require extra attention from engineers.

- Special tasks are usually handled and packaged manually by experienced planning engineers.

Our Packaging System

Our system is designed to automate the packaging process for maintenance tasks that can be grouped by their intervals, while leaving special tasks unpackaged. It is prudent to allow planning engineers to manually package these special tasks, ensuring that they receive the necessary attention and expertise.

Excel Sample

In case the user has a ready database about his AMP, there is an Excel sample the user can download and fill with tasks MPD Item Number and their corresponding AMP data easing process.

Admin Panel—AMP

The Maintenance Planning Document (MPD) is a crucial file provided by the manufacturer to airlines operating their aircraft. This document outlines the necessary tasks required to maintain the aircraft's airworthiness.

Typically, a single MPD can cover multiple aircraft types. For example, one MPD might be sent for the Boeing 737-600, 737-700, and 737-800, despite these being different models.

The MPD contains several important pieces of data, including:

- MPD Item Number

- Task Card Number

- Task Threshold

- Task Repeat

- Zone

- Applicability

At this section of the admin panel the user has to do the following:

- Export the standardized Excel file sample made based on the MPD sent to the airlines by the manufacturer.

- Ensure that the sample file contains all MPD essential data.

d) Upload an Excel file containing itineraries data with their characteristics.

e) The user should decide if he has optional flights or not, if yes, the flight numbers will automatically appear for him to select from

f) Press optimize and the results are shown with the option to download optimization report and files to be used in aircraft routing.

Note that:

- For all the Excel files that require to be uploaded, a sample preview of the required data and a download option for this sample is available to fill out with your own data.

Aircraft Routing

The Aircraft Routing module on the website is designed to help airlines optimize their flight schedules and aircraft maintenance plans. Below is a step-by-step guide to using this module:

I. *Upload Flight Schedule*

II. *Enter Key Fields*

Turnaround Time: (minutes) which is the minimum time required for an aircraft to be ready for its next flight.

Maintenance Hubs: Select the check box beside the hub(s) where the user wants to perform aircraft maintenance.

III. *Specify The Number of Flights*

The website will then calculate the maximum number of flights per day that the uploaded schedule can operate. The user has two options:

Option A: Select to use the calculated maximum number of flights per day in the model.

Option B: Specify a different number of flights per day if the user prefers a custom setting.

Admin Panel

The administration panel is:

- A highly secured page, as it can only be accessed by knowing its URL for example: *www.SkyLinker.com/admin*

- The word *"admin"* can be replaced by a secret word for the registered users.

- It's necessary to enter the user name and the password of the authorized user to access it.

- Different types of authority can be given, for example, the CEO of the airline can be a super-user *(have the authority to do anything on the database),* but an employee can be a view-only user *(can look on the database only but can't interact with it)*

- To enhance security and minimize the risk of data theft or leakage, it is recommended to add only the most important or classified databases through the admin panel. Consequentially, the AMP and LDND databases can only be added via the admin panel but can be accessed and viewed by authorized users on specific pages of the website.

- For additional security and database monitoring, a *recent actions* section records every change made to the database, along with the time and user responsible for the change.

- APU HRS to A/C HRS: this field represents the ratio of flight hours the APU makes to the number of flight hours the aircraft makes.

- Number of Engines

  Based on the number of engines the aircraft has, a number of requirements relative to each engine is required

- Engine Serial Number

- Engine Flight Hours

- Engine Flight Cycles

User Current Status:
- All of the data submitted by the user is stored in his database in the Aircraft Data section on the website.

- This database can only be accessed through the admin panel.

- Only authorized users can interact with the database whether by *Adding, Editing or Deleting*.

- User's next step is to navigate to the Admin Panel for further required data.

Important:
- Only registered users can access the Aircraft Data page.
- All of the data is necessary as it will be used in further modules.
- Maintenance related procedures are critical, therefore any misinformation entered could lead to unexpected errors or miscalculations.

IV. Enter Routing Cycle

Period over which the aircraft routing will repeat.

V. Enter Fleet Size

VI. View Output Schedule

The output is displayed as a schedule with the following columns:

⬈ Aircraft Routing ⬈

Optimization Results.

Objective Value: 12.0 Stops.

ROUTENUMBER	DAY	FLIGHTNUMBER	ORIGIN	DEPARTURE	DESTINATION	ARRIVAL	DURATION	FLEETTYPE
2	1	125	JFK	07:25:00	SFO	09:55:00	5.5	757-200
2	2	105	SFO	09:50:00	JFK	18:20:00	5.5	757-200
2	3	138	JFK	12:30:00	BOS	14:00:00	1.5	757-200
2	3	118	BOS	15:00:00	JFK	16:30:00	1.5	757-200
40	1	114	MIA	14:30:00	JFK	17:30:00	3.0	757-200
40	2	133	JFK	18:05:00	ATL	20:35:00	2.5	757-200
40	3	110	ATL	08:10:00	JFK	10:40:00	2.5	757-200

Objective Value indicates the number of stops the aircraft will make at the selected hub(s) for maintenance.

Each route number will correspond to the same routing number over the N-day cycle.

Maintenance Management

Airlines often encounter significant challenges in their maintenance departments, particularly in managing the daily workflow of assigning maintenance tasks to engineers to ensure aircraft airworthiness.

A single aircraft can have over 2,000 tasks to manage, and for an airline with a fleet of 50 aircraft of various types, the complexity increases exponentially. Efficiently coordinating and scheduling these tasks is crucial to maintaining operational safety and efficiency.

SkyLinker-AirService provides the solution for airlines, all the airline have to do is know how to:

- Navigate between pages

- Prepare and upload necessary data

Pages in the website related to maintenance management:

- Operator

- Aircraft Data

- AMP (Approved Maintenance Manual)

- LDND (Last Done—Next Due)

- Upcoming Tasks

Aircraft Data Page

This page contains all the data regarding the already submitted aircraft in the Operator page.

As the user is dealing with database that is most likely to be huge, the first thing the user has to clarify on this page is:

- Select his Airline Name *(submitted on the Operator page)*

- Choose the Aircraft Name to which this data is being filled *(submitted in the Operator page)*

Required data from the user

- Choose Airline Name

- Choose Aircraft Name

- Current Date: this field is automatically filled with today's date but it can be modified.

- Current Flight Hours: This field represents the number of flight hours the aircraft did at the Current Date field.

- Current Flight Cycles: This field represents the number of flight cycles the aircraft did at the Current Date field.

- APU Serial Number

- APU Flight Hours: This field represents the number of flight hours the APU did at the Current Date field.

- APU Flight Cycles: This field represents the number of flight cycles the APU did at the Current Date field.

Based on the number of aircraft the airline have, a number of requirements relative to each aircraft are required
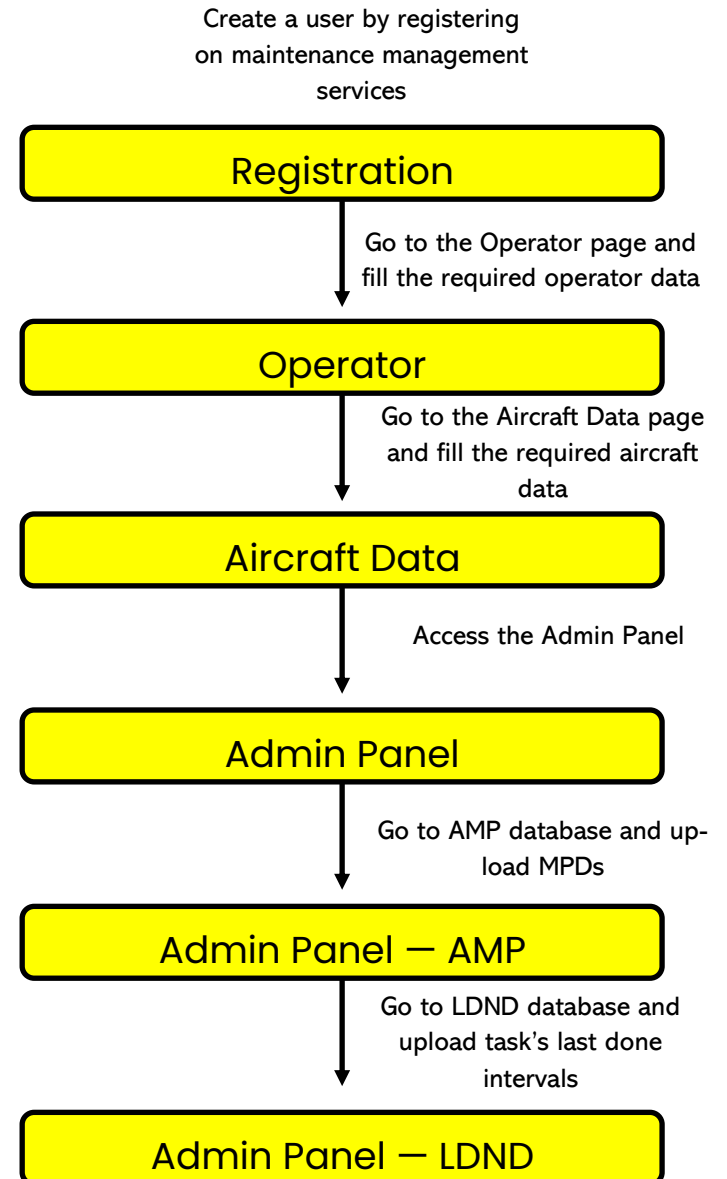
- Aircraft Production Date

- Aircraft Name

- Aircraft Type

- Aircraft Serial Number

- Aircraft Line Number

- Aircraft Block Number

User Current Status:

- All of the data submitted by the user is stored in database at the Operator section on the website.

- This database can only be accessed through the admin panel.

- Only authorized uses can interact with the database whether by *Adding, Editing or Deleting.*

- User's next step is to navigate to the Aircraft Data page for further required data.

Important:

- Only registered users can access the Operator page.
- All of the data is necessary as it will be used in further modules.
- Maintenance related procedures are critical, therefore any misinformation entered could lead to unexpected errors or miscalculations.

Create a user by registering on maintenance management services

Registration

Go to the Operator page and fill the required operator data

Operator

Go to the Aircraft Data page and fill the required aircraft data

Aircraft Data

Access the Admin Panel

Admin Panel

Go to AMP database and upload MPDs

Admin Panel — AMP

Go to LDND database and upload task's last done intervals

Admin Panel — LDND

Operator Page

This page contains comprehensive data on the operational activities of the airline's aircraft. To maintain airworthiness, numerous maintenance tasks are performed at various intervals based on time, flight hours, or flight cycles. Airlines typically organize these tasks into two main types of maintenance packages:

L packages and C packages

L packages encompass tasks with short intervals that require minimal time and no special tools. In contrast, C packages involve more extensive tasks, such as overhauls, which are conducted at longer intervals. Tasks with similar or closely aligned intervals are grouped together into these maintenance packages for efficiency.

Airlines usually have the following packages:

- **Daily package:** usually for tasks made on a daily basis.

- **Weekly package:** usually for tasks made on a weekly basis.

- **Service package:** tasks lie between weekly tasks and the L1 package tasks.

- **L packages** (ex: L1, L2, L3 … and their number and intervals depend on the operator)

- **C packages** (ex: C1, C2, C3 … and their number and intervals depend on the operator)

Required data from the user

- Airline Name

- Flight Cycles Per Day: also known as utilization cycles and it is the number of cycles operated per day.

- Flight Hours Per Day: also known as utilization hours and it is the maximum number of hours operated per day.

- Daily Package Interval in Days

- Weekly Package Interval in Days

From their name, daily and weekly packages don't have flight hour or flight cycle intervals

- Service Package Interval in Days/ Flight Hours/ Flight Cycles

- Number of L Packages

- L1 Package Interval in Days

- L1 Package Interval in Flight Hours

- L1 Package Interval in Flight Cycles

- Number of C Packages

- C1 Package Interval in Days

- C1 Package Interval in Flight Hours

- C1 Package Interval in Flight Cycles

- Number of Aircraft