

# Route Optimization

Modelling Week

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# Contact

- **Internship:** [https://www.accenture.com/es-es/careers/jobdetails?SRC=PSEARCH&id=R00003481\\_es&title=DIXCOVER APPLIED+INTELLIGENCE](https://www.accenture.com/es-es/careers/jobdetails?SRC=PSEARCH&id=R00003481_es&title=DIXCOVER_APPLIED+INTELLIGENCE)

➔ For more information contact with **Alba Matallana** by LinkedIn.



**LinkedIn Accenture  
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<https://es.linkedin.com/company/accenture-espana>



**Twitter Accenture  
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@AccentureSpain

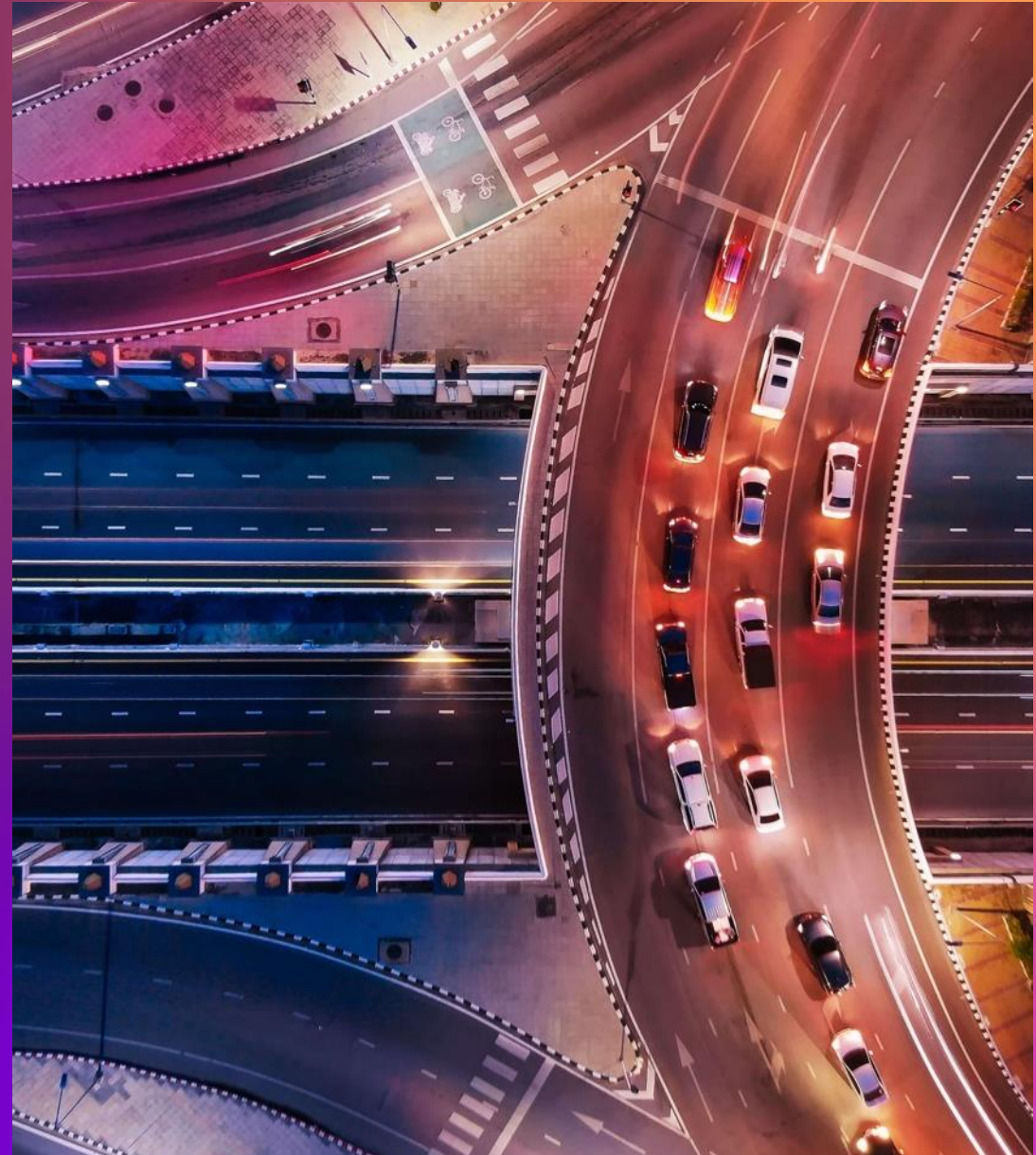


Alba Matallana QR Profile  
for more details



# Problem description

Route optimization with electric vehicles



# Parcel delivery company

**Goal:** Optimizing delivery routes with electric vans



**Delivery area**  
Zona30 Madrid

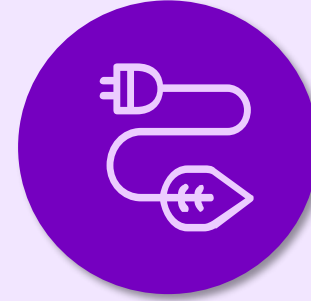


**Vans**  
1 electric van



**Logistics Center**

- **Part 1:** 1 logistics center inside Zona30
- **Part 2:** 3 LC



**Electric Chargers**  
Located in every logistics center



**Logistic details**  
Schedule  
Speed  
Delivery time

# Vans



## Electric vans

1 electric van

## Capacity

The maximum load a van can carry is **500kg**.

## Autonomy

- **Without load** the maximum distance that vans can travel is 300 km.
- **With max load** the maximum distance that vans can travel is 210 km.

**Linear relationship** between **transported weight** and **maximum distance**.



# Logistics Center

## Part 1



### 1 Logistics Center

The company owns 3 logistics centers located inside Madrid Zona30. **For Part1 only 1 LC will be considered**

### Electric chargers

LC is provided with **1 electric charger**

### Charger:

- 3h for full battery recharging

**For any shorter time, the charge will be proportional.**

Logistics Center A

1 charger





# Logistics Center

## Part 2



### 3 Logistics Centers

The company own 3 logistics centers located inside Madrid **Zona30**.

### Electric chargers

All the logistics centers are provided with **1 electric chargers**

### Charger type:

- **Fast charger:** 1h for full battery recharging
- **Slow charger:** 3h for full battery recharging

**For any shorter time, the charge will be proportional.**

### Logistics Center A

1 fast charger

### Logistics Center B

1 slow charger

### Logistics Center C

1 slow charger



# Additional Information



## Work Schedule

- **8:00 am to 7:00 pm**
- Van should start and end the day in a logistics center

## Delivery

- **It is possible to deliver more than one package in the same stop if and only if all the packages are delivered in the same location.**
- The delivery time once the van is in a certain position depends on the weight of the package:

< 5kg

5 min

< 20kg

7 min

> 20kg

15 min

- The average speed of the van is **50 km/h**

# Data

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## Input

### File 1

Centers.csv  
Coordinates of  
the Logistics  
Centers

### File 2

Packages.csv  
List of packages  
to be delivered  
and the logistics  
center where they  
are stocked

### File 3

Positions.csv  
Coordinates of  
the delivery  
locations

## Output: Delivery route

```
id_pos;hora_llegada;hora salida;ids_paquetes
```



**Thank you.**