

Case Study

SMTUC

Passenger Transport of Coimbra

SMTUC	Bus TIPOLOGY	RESULTS
6 Months DURATION	Coimbra, Pt LOCATION	12% Reduction IN MAINTENANCE COSTS
50 of 110+ VEHICLES MONITORED	14.4 AVG. FLEET AGE	8% Reduction IN FUEL COSTS
		350 h Reduction IN VEHICLE DOWNTIME
		92 T Reduction IN CO2 EMISSIONS

Intro to SMTUC

A public transport company based in Coimbra, Portugal. The company fleet is composed by 111 buses with an average age of 14,6 years.

Besides its aged fleet, SMTUC also presents a structural problem as a continuous renovation of its fleet is not performed. No new vehicles are acquired since 2011 due to acquisition costs. Maintenance is therefore critical to ensure SMTUC's fleet is able to meet its objectives.



Stratio in SMTUC

Through the usage of Stratio's continuous monitoring of fleet health condition, SMTUC performed a leap forward from reactive maintenance to predictive maintenance.

As predictive maintenance was implemented, the number of mechanical occurrences immediately dropped when compared to previous years, as shown in the illustration below.

Stratio's monitoring allowed for the reduction of vehicle problems in SMTUC day-to-day operations occurring multiple times. Stratio also allowed for an optimization of SMTUC's HR allocation and strategy for the acquisition of vehicle components.

Major savings were achieved on fuel and maintenance costs, improving the company management KPIs for the current year.

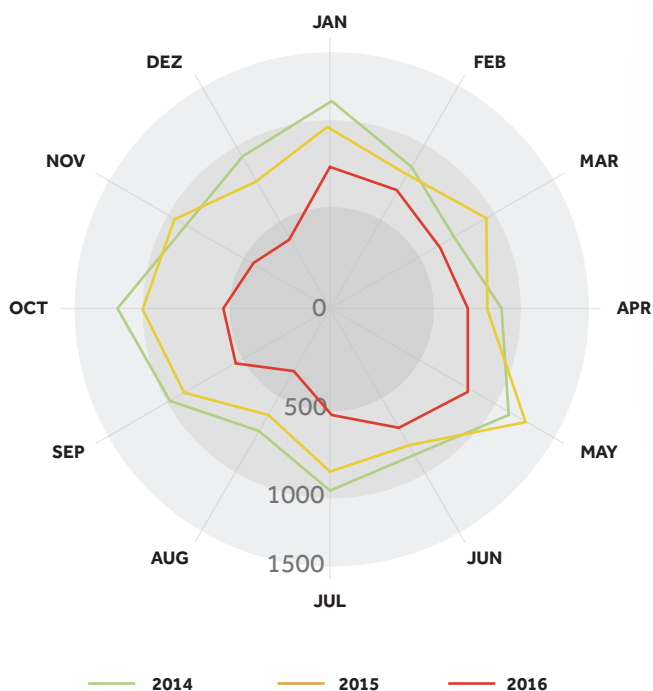
Savings on Maintenance Costs

One of the major problems detected by Stratio was, for example, lubricating system problems on a OM 906 Mercedes Benz engine. Typically this problem leads to the complete engine failure due to break of the engine block.

SMTUC's maintenance team was able to correct this issue for around 7000€, without the need to remove the engine from the chassis, reducing in half the vehicle off road time due to intervention.

Taking in consideration the average price of this engine in Portugal (25900€) and the average assembly time on a repair shop (estimated in over 70 hours), and the need of specialized HR which in the market costs around 40€/hour, the direct saving on this case alone is estimated to be above 21.000€.

PROBLEM OCCURRENCES COMPARISON



PROBLEM

Lubricating Problems
OM 906 MERCEDES BENZ

28.500€
ESTIMATED COST OF REPAIR

7.000€
PREVENTIVE REPAIR COSTS

RESULTS

21.500€
DIRECT SAVINGS

Savings of Maintenance Costs Through the Analysis of Dynamic Viscosity and Oil Temperatures

Through the constant monitoring of oil temperature variation and real-time comparison with other relevant sensor data it was possible to determine the best dynamic range of viscosity in the engine. Temperature on the head of the engine cylinder has a variation in relation to the cylinder base of around 50°C.

By analyzing the variations in the temperature and viscosity of the oil, it is possible to establish a relation with the fuel consumption and the occurrence of failures. When the oil has a high dynamic viscosity, it increases fuel consumption, however, when the value drops to values near 3.5 mPa.s, there is a possibility of a seized engine. Thus, it is essential to maintain a dynamic viscosity value within the limits so that fuel consumption is not high and the engine is not damaged internally.

DYNAMIC VISCOSITY CHART



Fuel Savings Through an Optimized Vehicle Operation

Reduction of fuel consumption was achieved through the optimization of the engine coolant fan. The engine coolant fan has the capacity to work in a variable range, and adapt the energy consumption to the needs of the system.

It was verified during the pilot that none of the 20 vehicles presented an engine coolant fan working in a variable range. The fan was constantly working at full power. Data analysed by Stratio on the engine coolant fan correlation to fuel consumption made possible the following savings:

WITHOUT REPROGRAMMING

VEHICLE IN OPERATION

55 L / 100km

AVERAGE FUEL
CONSUMPTION

13.7 L / 100km

ENGINE COOLANT FAN

VEHICLE ON IDLE

3.6 L / h

AVERAGE FUEL
CONSUMPTION

0.9 L / h

ENGINE COOLANT FAN

WITH REPROGRAMMING

5.48 L / 100KM

REDUCTION IN LITRES

0.36 L / H

REDUCTION IN LITRES

12 hours /day

AVERAGE OPERATION TIME

190 km /day

AVERAGE DISTANCE

12.31 L / DAY

REDUCTION IN LITRES
WITH ENGINE FAN
REPROGRAMMING

20 Vehicles

MONITORED BY STRATIO

6 months

PILOT DURATION

1846.5 L

TOTAL FUEL SAVED

1661.85 €

TOTAL MONEY SAVED

Savings Through the Optimization of Idle Time

Stratio identified that in average, SMTUC vehicles operated around 44% of the time on idle. Given the type of operation (passenger transport) this value was expected to be around 30%. The reduction of idle time based on Stratio outputs allowed for the reduction of 12.000 litres of fuel during the pilot, which based on SMTUC fuel price agreements, provided a saving of around 10.800€ and a direct average reduction of GHG emissions of 92.32 T CO₂.

PROBLEM

44% of idle time
AVERAGE SMTUC VEHICLES

-15% idle time
REDUCTION WITH STRATIO

RESULTS

10.800€
IN FUEL LITRES SAVED

TOP ANOMALIES DETECTED BY STRATIO

During the 6 months of testing

	ANOMALY DETECTED	SYSTEM RECOMMENDATION	ESTIMATED REPAIR COST	REPAIR COST USING STRATIO
1	Engine temperature too high, close to 110° Celsius.	Immediate immobilisation of the Bus.	Engine replacement 27.000.00€	Radiator repair 1.000.00€
2	Oil pressure too low.	Immediate immobilisation of the Bus.	Engine replacement 26.000.00€	There was a plastic film clogging the oil pump. No costs
3	Camshaft Seized	Urgent analysis of the Bus, avoiding total failure.	Engine repair 7.000.00€	Small Engine Intervention 1.500.00€
4	Wiring problems, damaged shielding leading to failure of the 4th and 6th cylinder.	Immobilization of the vehicle. Analysis of ECU shielding and the contact thereof with the coolant.	Engine repair 15.000.00€	Small Engine Intervention 2.500.00€
5	Working time at Idle too high on the order of 40%.	Indication of incorrect use of the vehicle. Reduction by 12%.	Fuel Lost 67.716€ / 50 Vehicles 300.659€ / Year Entire Fleet	No cost
			ESTIMATED REPAIR TOTAL COST 75.000.00€	TOTAL REPAIR COST 5.000.00€