



RAILWAY MAINTENANCE DECEMBER, 14TH 2022 Thank you

8 a.m Morocco Time / 3 p.m Philippines Time



for waiting ! The event will start in 00:00:00



PROGRAM



Webinar on Railway Maintenance December, 14th 2022



8:00 a.m (Morocco) - 03:00 p.m (Philippines) : Webinar Opening (5 min)

Raphaël RABIER, General Manager – IFF (Morocco) Anneli R. Lontoc, Undersecretary DOTr and Officer-in-Charge – PRI (Philippines)

Generalities of SNCF equipment maintenance (10 min)

Cyril VERDUN, Director of the Maintenance Engineering Department (MDI) - SNCF (France)

Implementation of predictive maintenance : Example of SNCF, The French National Railways (10 min)

Cyril VERDUN, Director of the Maintenance Engineering Department (MDI) – SNCF (France)

Q&A session

Rolling stock maintenance policy set by ONCF, the Moroccan National Railways office (10 min)

Abdelkrim EL MOUFADI, Production and Customer Manager- ONCF (Morocco)

Digital maintenance services at SIANA, the High-speed train maintenance company (10 min)

Abdelhalim NACIRI, Performance and Projects Director, SIANA (Morocco)

Railway System Maintenance - Example of the Philippine Railways (10 min)

Rizaldy L. FARIÑAS - Officer-in-Charge, Engineering Division - Light Rail Transit Authority (Philippines)

Q&A session

9:30 a.m (Morocco) – 04:30 p.m (Philippines) : Concluding words and closure (5 min) Karim Eddine CHENNOUF, President of the Management Board – IFF (Morocco)



WEBINAR OPENING

Rafaël RABIER

General Manager

IFF (Morocco)





WEBINAR OPENING

Anneli R. Lontoc

Undersecretary DOTr

and Officer-in-Charge of PRI

(Philippines)







Generalities of SNCF equipment maintenance





GENERALITIES OF SNCF EQUIPMENT MAINTENANCE

Cyril VERDUN

Director of the Maintenance Engineering Department (MDI) SNCF (FRANCE)





•01.•A SELECTION OF KEY INDICATORS







A SELECTION OF KEY indicators









15,000 TRAINS/DAY



(Passenger trains: 900 High Speed Trains, 6,000 Intercities & Regional Express Trains, 6,200 Commuter Trains for Paris Region but also 1,900 freight trains and works trains)





INTERNATIONAL DIRECTORATE

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Material Department - key figures

- **1.5 Billion € turnover in 2021** with SNCF Activities
- **111 M€ of external turnover in 2021** via MASTERIS, a 100% SNCF Material subsidiary
- 8,400 employees
- 1 "Factory of the Future" program of **400** million euros
- 2 core businesses: ENGINEERING and INDUSTRIAL, which are involved in the entire life cycle of all rolling stock.
- **17,000 rolling stock units** maintained by SNCF each year







Material Department - key figures





10 Industrial Technology Centres (IT)

- **1** logistics platform (CLI)
- **7** engineering clusters including:
 - 1 Railway Test Agency (AEF)
 - 1 Material Engineering Centre (CIM
- 10 Technicentres Industriels (TI)
- 1 Technicampus (Trainning centre)



Material Department If cycle of the Rolling Stock

Controlling the life cycle of equipment







Material Department - Strategy

- To position oneself in a rapidly changing <u>environment</u>
- Affirm a "<u>Customer</u>" oriented <u>positioning</u>
- <u>Clarify</u> our scope of responsibility for routine maintenance
- <u>Be innovative</u> to contribute to the SQCD* performance of Customers
- <u>Modernize</u> its industrial facilities (overhauls, upgrade / half-life maintenance)
- Open up to external markets
- Be a major player in SNCF's <u>environmental</u> commitment

* : SQCD : Safety, Quality, Cost, Availability



A MATERIAL department in a changing anvironment

Opening up to Intra-modal competition

Déc 2020

2

High speed in open access

TER and intercity trains



rail in monopoly or conventioned



Déc 2019experimentsDéc 2023Systematic competitive bidding

Next elections scheduled for March 2021

Today New lines

2023 TN lines excluding RER
2033 lines C, D, E
2039 Lines A &B

Industrial Engineering & Maintenance, potential competitors of M





SNCF ROLLING STOCK FLEET—KEY FIGURES



•02.•MAINTENANCE MISSIONS







MAINTENANCE: DEFINITION



Per NF EN 13306 X 60-319 standard:

"Combination of all technical, administrative and managerial actions during the life cycle of an item intended to <u>retain</u> it, or <u>restore</u> it to a state in which it can <u>perform</u> the required function."



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SNCF's maintenance POLICY

+ Ensure that rolling stock is in working order and compliant with:

. Safety and interoperability requirements

. Standards and regulations

. Agreed quality, availability and cost targets





MAINTENANCE MISSIONS

ROLLING STOCK MAINTENANCE

+ Establish protocols and carry out maintenance to ensure safety, reliability and availability of rolling stock for all rail operations units.

UPGRADE AND RENOVATION OF EXISTING ROLLING STOCK

+ Convert rolling stock to meet passenger requirements, new developments in technology, and new standards, and to extend its lifespan.

ENGINEERING AND TEST SERVICES

+ Carry out research and development work, technical inspections and approval of future rolling stock.

PROCUREMENT MANAGEMENT FOR NEW ROLLING STOCK

+ Help SNCF rail operations units identify their new rolling stock requirements; contribute expertise and design procurement strategies for replacement parts and relevant supply chains.







SNCF's Rolling Stock division is legally responsible as the "Unit in Charge of Maintenance" (ECM in French). The entire carriage maintenance process has obtained official certification as required under European regulations.







Rolling stock life cycle

SNCF'S ROLLING STOCK UNIT IS CLOSELY INVOLVED AT EVERY STAGE IN THE ROLLING STOCK LIFE CYCLE





And we spend +€2.7 bn every year to maintain SNCF rolling stock (about 10% of this value each years)

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MAINTENANCE TYPES

<u>Preventive</u>: before a failure occurs,



<u>Corrective</u>: after a failure occurs

By avoiding failures, we can limit the impact of service quality and the cost of "non-quality" on the rail system as a whole

MAINTENANCE IS NECESSARY TO COUNTERACT THE LOSS OF RELIABILITY CAUSED BY AGEING AND USE THAT MIGHT OTHERWISE UNDERMINE OPERATIONS

MAINTENANCE IS CARRIED OUT WHEN THE OPERATIONS NEEDED TO RESTORE VEHICULES TO GOOD WORKING ORDER COST LESS THAN PURCHASING NEW ROLLING STOCK (UNLIKE THROWAWAY ITEMS OR CONSUMABLES)



PREVENTIVE ACTION OPTIMIZES AVAILABILITY AND REDUCES COST TO THE CUSTOMER

+Preventive maintenance helps contain corrective maintenance requirements:

- . Either for operating safety (i.e., when the consequences of failure are deemed unacceptable),
- . Or on economic grounds (less costly)
- . Or, occasionally, on pratical grounds (i.e., when equipment is only available for maintenance at specific times)



+The challenge facing engineers is to strike an economically and technically viable balance between preventive and corrective maintenance.





ROUTINE MAINTENANCE

LEVELS 1 (In-service monitoring), 2 (check and Examinations) & 3 (periodical inspections)

ENSURING TRANSPORT SAFETY, ROLLING STOCK RELIABILITY AND PASSENGER COMFORT

- + Maintenance is performed by SNCF rail operations units, which can call on a network of dedicated technical centres that together cover the entire country.
- + Thanks to this dense network, maintenance can be carried out close to operations, avoiding empty trips and thus increasing fleet availability.
- + The key strengths of maintenance—which contribute to better safety, reliability and availability—are:
 - . Technical expertise
 - . Anticipating requirements
 - . Extensive use of feedback
 - . More integrated maintenance.









RENOVATION & MODERNIZATION OF ROLLING STOCK

LEVELS 4 (operations to overhaul) & 5 (major technical modifications / upgrade)

EXTENDING THE LIFESPAN OF EVERY TRAIN COMPONENT

- + Renovating and modernizing clients' rolling stock to incorporate the latest technology; innovating for greater safety, performance, comfort and eco-friendly mobility.
- + Modernization work is carried out in the Rolling Stock specialist units—SNCF's industrial *technicentres*, which have technical expertise and extensive industrial resources.







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PARTS REPAIR

high-tech parts with a very high price tag

- + Our technicians can carry out work on approximately 22,000 different listed rolling stock reparable parts (PRM in French).
- + PRMs are parts on which repair and restoration are both technically feasible and economically profitable.
- + These parts are repaired at our industrial technicentres.
- **↗** The main PRM categories are:
 - **オ** axles
 - **オ** bogies
 - **7** engines
 - **7** HVAC units
 - **オ** pantographs
 - **オ** electronic components









Procurement engineering

PROCUREMENT ENGINEERING OPTIMIZES THE ACQUISITION OF NEW ROLLING STOCK

- + Procurement engineering assists rail operations units in the purchasing process for new rolling stock.
- + This support includes defining requirements and drawing up specifications; tender negotiations; contract management; testing supervision and official approval.
- + Clients benefit from investment modelling software that collates the cost of initial acquisition, maintenance costs, their change over time, and energy consumption.





+ 5,500 listed suppliers

- + 160,000 Parts Number in portfolio (8,000 new PN created per year)
- + 17,000 purchasing orders per year
- + 1,000 contracts submitted to *technicentres*



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SNCF'S TECHNICENTRE NETWORK

+ 25 maintenance Technicentres

. Routine maintenance . Light repairs Technical centres carry out maintenance 24/7 to ensure operation is not affected.

+ 10 industrial Technicentres

- Renovation and parts repairs (axles, bogies, electronic components, etc.)
 Upgrades
- At mid-life, it takes on average 2 to 3 months to renovate/upgrade a locomotive or a motor unit.

And also:

- + The Technicampus ("University for Rolling Stock")
- + The Industrial Logistics Centre (CLI)
- + The Rolling Stock Engineering Centre (CIM) and the Rail Test Agency (AEF)
- + Technical fleet supervision team (STF)







Technicentres that belong to the Rolling Stock Directorate



ENGINEERING TRAINING: TECHNICAMPUS

- + SNCF's TechniCampus, our official "University for Rolling Stock", trains SNCF staff in different rail maintenance specialities.
- + Training courses offered:
 - technical subjects: welding, doors, axles, pantographs, brakes, electricity, railway technology, bolted joints, mechanics, ground-train communications, diesel engines
 - cross-disciplinary subjects: management, railway operation safety, staff safety, human and social operational factors, production management operational excellence, on-boarding programmes for new recruits in all areas, career development programmes.
- + The TechniCampus also manages apprenticeship programmes, from high-school leaving-certificate level to Masters equivalent.
- + Its courses make extensive use of innovative and interactive teaching methods and tools (e-learning, virtual reality, e-classes, role plays, etc.)
- + €16m annual revenue
- + Up to 300 employees trained per day
- + 160 courses
- + 35 teachers on staff
- + 38 classrooms
- + 1 workshop spanning 1,100 sqm for practical work
- + 80 railway models







MAINTENANCE ENGINEERING

FULFILLING OPERATOR NEEDS — ENHANCING ROLLING STOCK KNOW-HOW

- + Maintenance engineering employs more than 1,600 people.
- + It provides critically important expertise for rolling stock safety, reliability and development.
- + It designs the innovations and new features of the train of tomorrow: next-generation interiors, on-board video, WIFI, LED lighting, and more









MAINTENANCE ENGINEERING PLAYS AN ESSENTIAL ROLE IN DEFINING OPERATORS' SPECIFICATIONS, ESTABLISHING MAINTENANCE PROTOCOLS, AND CONDUCTING TESTS

- + The CIM (Rolling Stock Engineering Centre) draws up technical specifications for new rolling stock.
- + The AEF (Railway Testing Agency) carries out laboratory and testing for new & renovated rolling stock





CONCLUSIONS









OUR ASSETS

SNCF's V150 trainset set the world rail speed record of 574.8 kph

- + SNCF makes daily life easier by bringing people and goods together.
- . SNCF Group is known today for holding the world rail speed record.
- + We're working to meet the new expectations of today's clients
 - —in France and worldwide—who want convenient, accessible, personalized and socially responsible travel solutions.
- . SNCF has learned, through experience that innovation, technical expertise, industrial efficiency, and Life-Cycle Cost controls are the most powerful weapons.

TOGETHER THESE SKILLS CONTRIBUTE TO OUR CORE EXPERTISE IN ROLLING STOCK





Régiolis offers passengers choice and innovation





Implementation of predictive maintenance

Example of SNCF



PREDICTIVE MAINTENANCE The future is now!



Ingénierie du Matériel



ROLLING STOCK ENGINEERING

CHALLENGES

FLEET PERFORMANCE :

To remain competitive, SNCF Mobility and especially Rolling Stock has to create technological ruptures to enhance its fleet performance : Safety, Line Regularity / Reliability, maintenance Costs, trains and facilities Availability

 A technological rupture is already in place on rolling stocks: Franciliens, REGIOLIS and REGIO2N ; then RERNG, TGVM, AMLD: comfort, technical performances, on board computing and electronics, complexity...







Ingénierie du Matériel

- These connected trains, thanks to their network and data, offer new levers to optimise the maintenance, but as well to improve their performances and their operation conditions.
- For the older trains (RER Z2N, locomotives, Tram-train, Wagons, TGV), Rolling Stocks equipe them in **IoT** to imptove their connectivity.

PERCENTAGEBAR 99%





ROLLING STOCK ENGINEERING







ROLLING STOCK ENGINEERING

TELEDIAGNOSTIC & PREDICTIVE MAINTENANCE USE CASES **Compressor** Performance **Battery** Capacity ratio Pantograph Taring and up/down time HVAC Performance PERCENTAGEBAR 99%







adjustement

Traction

Brake

Toilette

Reservoir levels

Engine performance +

Brake performance

















– 81

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Ingénierie du Matériel



TELEDIAGNOSTIC & PREDICTIVE MAINTENANCE



CHALLENGES and SAVINGS

The performance in maintenance and operation will take place tomorrow by a real time knowledge of the train state. It's a main competitive challenge.

Ingénierie du Matériel

- SNCF Rolling Stocks Engineering belonged to the firsts to perveive this potential. We use our rolling stocks knowledge and the lever of the connectivity to propose maintenances Full Services contracts based on telematic datas.
- SNCF Rolling Stocks Engineering is really ahead on these deployments and SNCF subsidiaries and other railway companies (outside France) sollicite us more and more to help them in this area.
- We are perhaps the only ones to do predictive maintenance at this scale , in operation on 1 000 trains in SNCF (and this for 8 years).

The savings measured on the fleets on which we have applicated this steps are :



TELEDIAGNOSTIC & PREDICTIVE MAINTENANCE TOOLS AND POSSIBILITIES STILL GROWING



Ingénierie du Matériel

SNC

VOYAGEUR

PREDICTIVE MAINTENANCE

Today is already tomorrow!

To watch clic here

YouTube

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Q-A SESSION





Rolling stock maintenance policy

Example of ONCF, the Moroccan National Railways office





ROLLING STOCK MAINTENANCE POLICY SET BY ONCF

Abdelkrim EL MOUFADI

Production and Customer Manager

ONCF (MOROCCO)

IFF INPHILIPPINE SNOF MONCE STANADS

Plan

- ONCF Rolling Stock Fleet;
- Issues of Rolling Stock maintenance;
- Maintenance classification;
- ONCF RS maintenance policy model;
- Technical levels of maintenance;
- Structure of the ONCF RS maintenance activity.



Maintenance of ONCF Rolling Stock



- 2100 Km Classic lines
- 200 Km High Speed Line

Equipment

- 106 electric locomotives
- 111 diesel locomotives, including 52 mainline
- 37 multiple units
- 420 Corail passenger coaches
- More than 5000 freight wagons

Achievements

- 42 million passengers
- 30 million tonnes of goods

Regularity: (less than 5 min)

- Al Boraq 96 %
- Al Atlas 92 %
- Fast Shuttle Trains 90 %





The maintenance activity is a real strategic challenge for companies:

- The increasing mobility of people and goods, as well as the evolution of regulatory constraints, which imply unavoidable needs in terms of maintainability, availability, reliability and safety of the RS
- The need to improve the quality of service and availability of the RS, while reducing maintenance and operating costs





Description of a system

The Life Cycle

A system goes through several stages from the emergence of the need to the withdrawal of the service



In the design phase

• Participate in and influence the design of the equipment by ensuring that the objectives of standardising maintenance tools, improving maintainability, etc. are integrated.

□ In the operational phase

- Size the logistical resources (maintenance personnel, spare parts stocks, etc.),
- Adjust and adapt the maintenance policy according to the data (reliability, etc.) observed,
- Identify modifications to reduce maintenance costs and improve maintainability.





Basically, there are two types of maintenance:

- **1. Preventive maintenance**, which aims to initiate maintenance operations on a system before failures occur
- **2.** Corrective maintenance, which takes place after a fault has been detected and located, i.e. on a system that is already in a state of failure





Preventive maintenance :

Preventive maintenance can be carried out in a variety of ways and generally includes

Various routines on the equipment :

light monitoring interventions, and regular minor corrections or adjustments.

Systematic maintenance:

Maintenance that involves a schedule (set by time or number of operating cycles).

Requires rigorous monitoring of the number of hours or cycles of operation.

However, it requires a good knowledge of the reliability characteristics of the various components and sub-assemblies.

This type of maintenance is often applied to:

- To critical parts of equipment with high downtime costs.
- If the elements (or parts) to be changed are cheap or very difficult to access.

Conditional maintenance:

Maintenance that is more dependent on a predetermined type of event (diagnosis, sensor, signal or measurement) that reveals the state of degradation.

Preventive maintenance policy, allowing

The reduction of breakdowns and repairs in favour of activities and the control of costs



Maintenance classification



Predictive maintenance :

- Maintenance allowing the readjustment of maintenance operation forecasts to be carried out as a function of time or units of use, based on a permanent or periodic analysis of the state of each piece of equipment.
- □ Maintenance based on techniques for predicting breakdowns based on observable, recordable and revealing information on the state of degradation (periodic measurements, specialised sensors).

In other words, it is a dynamic monitoring that consists of :

- **Predictive detection**: Predicting future failure (detecting degradation instead of failure, in the case of classical detection)
- Predictive diagnosis (prognosis): The objective is to identify the causes and to locate the organs that have caused a particular degradation.
 Appearance of the Failure avoided Fail



Maintenance classification



<u>Corrective maintenance :</u>

Maintenance carried out after a breakdown or failure has been detected.

In practice, this means operating a system without maintenance until it "breaks down or fails".

These activities encompass two types of intervention:

✓ palliative interventions that restore the system to a temporary working condition

✓ curative interventions that repair the system in a way that is safe for use définitive.



Maintenance policy based on troubleshooting or repair which corresponds to a reactivity, to more or less random events and which is applied after the breakdown.



Maintenance classification



The choice of the appropriate maintenance policy for an RS maintenance strategy is the combination between the two types of maintenance which consists of:



□ Choose the best compromise between preventive and corrective maintenance according to the operational objectives: costs, unavailability, loss of image, safety, comfort, regularity

Optimization of maintenance according to the effect of failures



RS-ONCF Maintenance Policy Model



To provide "Passenger Division" and "Freight and Logistics Division" customers with reliable and available equipment to operate trains in the best conditions of safety and comfort while optimizing maintenance costs. The RS fleet is considered to be an asset of the activities supporting the maintenance budget.

Rolling stock is at the heart of customer requirements





RS-ONCF Maintenance Policy Model



The rolling stock maintenance policy is based **on preventive maintenance**, which is an optimal choice that best adapts to ONCF operating modes.

Periodicity of operations :

The maintenance schedule, which sets the frequency of operations according to the unit of use (time or mileage) is defined by a service order.

Consistency:

The scope of work of the different operations is defined on :

• Inspection and revision documents (Booklets)

RS maintenance rules are based on the data provided by the manufacturer's manual and then take into account the actual operating conditions and the material REX.



Technical levels of maintenance

Maintenance actions are classified into 5 technical levels of maintenance according to the volume and nature (complexity and level of qualification of personnel) of the work to be carried out (AFNOR NF X 60 000 standard).

Level	Consistency	Observation	Establishment/Means
1	In-service monitoring operations carried out before the departure, during or on arrival of a traffic (tests, trials, etc.).	 Operations carried out by: Operations staff Maintenance staff On-line monitoring equipment (DBC, DFB) 	Driving and operating unit or station visitors: Without pit, without footbridge
2	Checks, tests, rapid intervention operations on arrival at a Technicentre.	Operations carried out by maintenance staff	Techni-center for routine maintenance: Limited outdoor facilities on normal track or with pit and side walkway for visual inspections.
3	Periodic preventive inspections and removal of components according to time or route	Operations requiring the withdrawal of the commercial service & carried out by maintenance staff	Techni-center for routine maintenance: Important means: pit, overhead crane, roof access, side walkway, etc.
4	Major maintenance operations: overhauls	Operations requiring the withdrawal of the commercial service & carried out by maintenance staff	Industrial maintenance technician: Industrial workshops
5	Modernisation, transformation or major repair operations	Operations requiring the withdrawal of the commercial service & carried out by maintenance staff or contractors	Industrial maintenance or subcontracting technician-center. Industrial workshops.



An organisation in line with the office's ambitions				
	Material pole			
A LOSA				
3 Directions			2 depar	<mark>tments </mark>
Production & Client	Engineering & Projects	Industrial Excellence & Transformation	Management	Purchasing and logistics
Customer Interface (Passenger and Freight Coordination)	Supporting Acquisition and/or Rehabilitation Projects	Supports the implementation of operational standards and digital transformation	Human capital management Financing	Ensures the supply of materials
Technical management of the fleet Production management in the	System and technical engineering	Develops the safety aspect of railway operations	economic performance	
maintenance sites		Implements Quality, OHS		
Establishments	Webinar on Railway Maintenance - Dece	and Environmental monitoring		VCF MONCE STANAD

Material pole

Production & Customer Management

□6 Equipment maintenance facilities

□ 13 Technicentres :

- 8 Routine Maintenance Technicentres (Level 1, 2 and 3)
- **5 Industrial Maintenance** Technicentres (Level 4 and 5) Distributed across the network according to the main activities

4 Engineering departments: Linked hierarchically to the establishments and functionally to the Engineering and Projects Department







Direction Production & Client









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Digital maintenance services at SIANA

The Moroccan High-speed train maintenance company





DIGITAL MAINTENANCE SERVICES AT SIANA

Abdelhalim NACIRI

Performance and Projects Director

SIANA (MOROCCO)







THE 3 TYPES OF MAINTENANCE AT SIANA



Corrective maintenance Preventive maintenance Predictive maintenance









ONCE STANAD

OUR HIGH SPEED MAINTENANCE PLAN

Maintenance Level 2 by kilometers

Intitulé de l'opération	Périodicité en jours / KM	Temps de traversée	Nombre d'opération s réalisées par semaine
ES/EVP/EVR M	7500 KM	1,5h	13 à 16
ATS DT/EVR	60 000 KM	4,5h	1 à 2
ATS ME	60 000 KM	4h	1 à 2
Contrôle magnétoscopique	100 000 KM	6h	3 à 6
ATS Mot de traction	150 000 KM	1,5h	0 à 1
ATS US	480 000 KM	-	-
ATS GB	450 000 KM	0,5h / essieu	0 à 1
ATS TJAC	-	2h	10 à 20

Maintenance Level 3 by time

Intitulé de l'opération	Périodicité en jours / KM	Temps de traversée	Nombre d'opérations réalisées par semaine
TS6	182	12h	0 à 1
TS12	365	14h	0 à 1
VL	9 mois	15 jours	1
VG	18 mois	30 jours	1
GVG	36 mois	45 jours	1

Maintenance Level 2 by time

Intitulé de l'opération	Périodicité en jours / KM	Temps de traversée	Nombre d'opérations réalisées par semaine	
OP10	10	01h	7 à 9	
ATS0	18	2,5h	5 à 7	
OP37	37	6h	2	
ATS Pollen	37	3h	2	
OP52	52	10h	1 à 2	
OP90	90	2,5h	1	
Remplacements Filtres Extérieurs	90	2,5h	1 à 2	
Remplacements Filtres Intérieurs	90	2,5h	1 à 2	
Remplacements Filtres Extrémités	90	0,5h	1 à 2	
ATS90 isolateurs	90	4h	1	
ATS 111	111	2h	0 à 1	
OP168	168	8h	0 à 1	
ATS Nettoyage toiture	183	8h	0 à 1	
ATS 222	222	2h	0 à 1	
ATS ASC	365	8h	0 à 1	
Reprofilage	-	2,5h / essieu	6 à 10	

Maintenance Level 1

Intitulé de l'opération	Périodicité en jours / KM / Nb de voyages	Temps de traversée
Contrôle à l'Arrivée	Chaque entrée Site / Station de maintenance	30min
Vidange WC et Remplissage des réservoirs d'eau	10 voyages	20min
Nettoyage demi tour gare	1 voyage	15min
Remplissage de sable et Lave Vitre	Chaque entrée Site / Station de maintenance (Sur critère)	
Relevé VCT	Chaque entrée Site / Station de maintenance	30 min
Examen Sortie Atelier	Avant chaque sortie de rame	30 min
SPA PRESS		



Our Indusrial Excellence Program 4.0



Programme d'Excellence Industrielle SIANA



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OUR INDUSRIAL EXCELLENCE PROGRAM « ITKANE 4.0 »






PILLAR 6 : INNOVATION & DIGITALIZATION





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DIGITALIZATION









CMMS (COMPUTERIZED MAINTENANCE MANAGEMENT SYSTEM)

F	nipements Transus Stock Achat	Resources Comples Analyse Système	
Indicateurs champs non renseigné Intervention		A \	0 11
	Indicateur		Valeur
Interventions terminées sans commentaire Interventions sans affectation des ressources			2 780 99
Tableau de bord			0 #
	Indicateur		Valear
Mes Di non pris en compte			0 0
Mes D en attente information Mes D en cours			0 0 <mark>0</mark>
Favoris	H	Tableau de bord ACHAT	0 #
Arborescences du parc équipements	>	Indicateur	Valeur
Deskande des sourcefiere		Lix a prendre en compte pour approcescon (mon service) Mes Dá non snitúes	2
Recherche des occupations	>	Liste des DA non soldées (mon service)	74
Recherche des comptes-rendus d'intervention	>	Tableau de bard travaux	0.11
Créer une DA	\$	Tableau de bord Bayadax	50 as
		Indicateur	214
Saisir une DI sur matériel roulant	>	Di affectée au service maintenance à prendre en compte	1
Saisir une DI sur matériel fixe	`	Intervention en préparation	69
		Interventions validées	115
Saisir une DI sur MCO	>	Intervention en cours	583
-		Interventions terminées	69
		Taux de traitement (%) des DI SEF (mois courant)	0 🕍
		laut de tratement (ho) des Li Pors SEP (mois courant) Dalai fraunaci de tratement des DI SEE (mois nourant)	U 14
		Nombre de signalements production train (mois courant)	13
		Nombre de DI imputable à la production train (mois courant)	13 9

System allowing computerized management of maintenance (stock, installation, preventive maintenance, purchases)

CMMS allow us :

- To manage preventive and corrective maintenance interventions
- To manage inventory and purchases,
- □ To have the history of interventions,
- □ To manage supliers or co-contracting companies,
- □ To have the state of trains health
- To plan their replacement according to the life cycle's train







PILLAR 6 : INNOVATION





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Projet 1



ASCT

Commercial Train Service Agent

- **Ecosystem Application :** Mobile and web for
 - Sending reports from high-speed trains in real time
 DIGITALIS
 Electronic archiving and insertion of reports in the CMMS (Computerized Maintenance Management System)







Video de demonstration : Commercial Train Service Agent











Operation carried out by maintenance technicians to check visually all components under the train, on the sides or on the train roof.

SAFaE « Train driving assistance "

Driving assistance by detecting road signs and sending audio or visual information to drivers











Demonstration Video : Train Exit Check

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II - Conce Stand

Componstration Video : SAFaE Train Drinving Assist

Vitesse / Speed





clideo.com



Railway System Maintenance

Example of the Philippine Railways





EQUIPMENT MAINTENANCE

Rizaldy L. FARIÑAS Officer-in-Charge, Engineering Division Light Rail Transit Authority (Philippines)







The **Department of Transportation (DOTr)** is the primary policy, planning, programming, coordinating, implementing and administrative entity of the executive branch of the government on the promotion, development and regulation of a dependable and coordinated network of transportation systems, as well as in the fast, safe, efficient and reliable transportation services.



The Light Rail Transit Authority (LRTA) is a wholly owned government corporation and is primarily responsible for the construction, operation, maintenance and/or lease of light rail transit systems in the Philippines.



The state-owned Philippine National Railways (PNR) is the sole operator of the most extensive intra-island railway on Luzon, the largest island in the Philippines.



The Light Rail Manila Corporation (LRMC) is a joint venture company that assumed operations and maintenance of LRT-1 in September 2015 through a PHP 65-billion 32-year concession agreement with the DOTr and LRTA.

Southeast Asia

Metro Manila





LRMC

LRT Line 1

- opened on 01 December 1984
- 19.65 km, 18+3 stations
- fully elevated, double tracks



LRT Line 2

- Opened on 05 April 2003
- 17.6 km, 11+2 stations
- elevated & underground, double tracks



MRT Line 3

- opened on 15 December 1999
- 16.9 km, 13 stations
- elevated & underground, double tracks



PNR Commex

- founded on 24 November 1892
- 56 km, 28 stations
- at-grade, double tracks

Types of Maintenance

Preventive Maintenance (PM)

- to prevents faults/error
- routine inspection and planned schedule
- based on Original Equipment Manufacturer (OEM)

Corrective Maintenance (CM)

- corrects when fault/error occurs
- unforeseen incidents

Note:

DOTr and LRTA procures Maintenance Contractor to perform all maintenance activities of MRT/LRT rail systems.



Rolling Stock System



Rolling Stock routine inspection, preventive maintenance and overhaul activities Light Maintenance: every 28 days, 168 days, 45 days, 60 days, 90 days Heavy Maintenance: every year or 120kms, R2, R3, R5, R8 & R12

Tracks and Permanent Ways

Characteristics

- ballasted tracks (LRT1, MRT3 & PNR)
- plinthed tracks (MRT3, LRT2)
- standard gauge 1,435mm (LRT1, LRT2, MRT3)
- narrow gauge 1,067mm (PNR)

- daily foot patrol and inspection
- PM & CM works during Engineering hours (11PM-3AM)



Power Substation and Overhead Catenary System (OCS)

Characteristics

- 11 rectifier substation in LRT1
- 7 rectifier substation in LRT2
- 750 VDC (LRT1, MRT3)
- 1500 VDC (LRT2)

- daily foot patrol and inspection (OCS)
- equipment monitoring (substation)
- PM & CM works during Engineering hours (11PM-3AM)



Telecoms & Signaling System

Equipment

- Signaling System
- Radio/Telephone System
- CCTV System
- Public Address System
- Operation Control Center

- daily inspection & equipment monitoring
- Schedule PM & CM works



Buildings & Facilities (Infrastructure)

Equipment

- Elevators
- Escalators
- Air Conditioning System
- Water Supply System
- Other EMS

- daily inspection & equipment monitoring
- Schedule PM & CM works



Automated Fare Collection System

- Single-ticketing system for the LRT1, LRT2 and MRT3
- Concession Agreement between DOTr and the AF Payments Inc. (AFPI)
- Maintenance activities performs by AFPI personnel



Annual System Maintenance

- DOTr, PNR, LRTA and LRMC suspends operation due to the observance of Holy Week starting Maundy Thursday until Easter Sunday.
- Holy Week Maintenance activities includes replacements of rails and catenary contact wires (OCS), general cleaning and repainting of equipment and structures among others.







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Q-A SESSION





CONCLUDING WORDS AND CLOSURE

Karim Eddine CHENNOUF

Chairman of the Management Board IFF (Morocco)



