The study of Thailand's rail vehicle regulatory safety standards and electronic applications for rail vehicle approval and registration

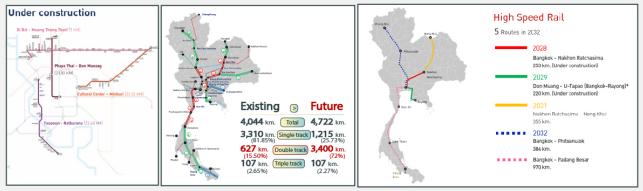
Chandrangsu T. and Rumpirujipong K.
Department of Rail Transport, Ministry of Transport, Thailand

Abstract

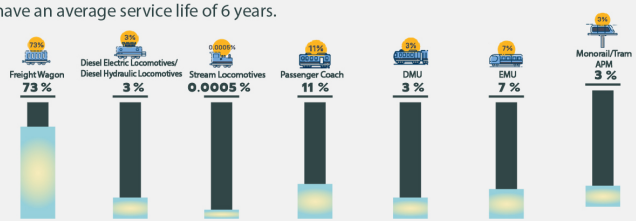
The lack of supervision on rail vehicles conditions can lead to accidents and passenger services disruption. This study is done to determine the type and specification of rail vehicles suitable for Thailand rail infrastructure leading to safety, energy saving, and sustainability; moreover, the result is used as information for regulating rail vehicles in Thailand. Furthermore, in order to efficiently regulate the safety standard for rail vehicles, the Department of Rail Transport, Thailand's rail regulator, has developed an electronic service platform (e-License R) to facilitate required data integration from rail operators.

1. Introduction

In the last decade, the Ministry of Transport (MOT) of Thailand has accelerated the development and improvement of railway infrastructure. The rapid development of rail infrastructure in Thailand is leading to the emergence of various forms of rail vehicle systems in the near future, with different types of tracks and specifications. This will include a wider variety of technologies, which will diversify the rail vehicles even more than before.



In 2023, Thailand had a total of 10,534 rail units of different types in service. Currently, all rail vehicles are maintained by vehicle operators or owners. Data reveals that the average service life of all types of rail vehicles is approximately 23 years. Current Rail vehicles from the intercity and commuter rail systems, owned by the SRT, have an average service life of 30 years, while vehicles in the urban rail system have an average service life of 6 years.



2. Literature Review

The registration regulations of foreign countries

JAPAN | USA | AUSTRALIA | CHINA | EU

3. Methodology

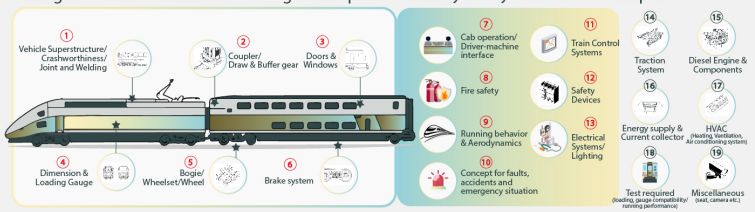
3.1 Classify the Type and General Specification of Thailand Rail Vehicles

The main factors used to classify rail vehicles are the service distance (km), the average distance between stations (km), passenger capacity (people per hour per direction), and the maximum operating speed (km/h)

Main Characteristics	Intercity and Commuter Rail System				Urban Rail Transit System			
Type of Services	Intercity & Regional	Commuter	High Speed	Freight	Heavy Rail	Monorail	Light Rail Trams	APM
Distance of Service (km)	> 50	20 - 100	> 100	> 100	20 - 40	10 - 30	5 - 15	5 - 15
Distance between Stations (km)	10 - 20	2 - 5	50	N/A	0.5 - 1.2	0.5 - 1.2	0.3 - 0.5	0.3 - 0.5
Maximum Service Speed (km/h)	120 - 160	160	250	60 - 100	80	80	80	80
Maximum Weight (ton)	20	20	25	20	20	N/A	N/A	N/A
Width of Track (m)	1.000	1.000 & 1.435	1.435	1.000	1.435	N/A	N/A	N/A
Passenger Capacity (person/track/h)	5,000 - 20,000	10,000 - 20,000	10,000 - 20,000	N/A	> 20,000	10,000 - 20,000	5,000 - 15,000	3,000 - 5,000
Routes in Service (Currently in service or commence by 2023)	State Railway of Thailand Tracks: Nortern, Northern, Southern, Eastern, Mae Klong and Double track Railway Project	Airport Rail Link, Red Line	High Speed Rail Bangkok-Korat-Nongkhai and High Speed rail Link 3 Airports	State Railway of Thailand Tracks	Green Line Blue Line Orange Line and Purple Line	Yellow Line Pink Line	N/A	Gold Line
Operators	SRT	Asia Era One, SRTET	SRT, Asia Era One	SRT	BTS, BEM	NBM, EBM	N/A	BTS
Types of Rail Vehicles	Locomotive, DMU, Passenger Coach, BMU, Power Car	EMU, DMU, BMU	EMU	Locomotive, Freight Wagon, Tank Wagon, Special Wagon	EMU	Monorail	Street Wheel-rail and Rubber Tire Trams	APM

3.2 Risk assessment process

The process of risk assessment and evaluation for Thailand rail vehicles applied Hazard Identification (HI) method in conjunction with Failure Mode Effect Analysis (FMEA). The top 19 components are identified and ranked by level of risk scores that could cause serious incidents and service disruption. Only the 1st to 13th set of components are identified as the most critical components that when damaged would contribute to the highest impact on railway safety and service disruption.



3.3 Registration process and drafted Ministerial Regulation

- Rail Operator **Requesting** rail registration to rail regulator and providing independent inspector
- Independent inspector **Checking and testing** according to related standards and certification process
- Rail Operator **Submitting** supplementary proposal to regulator
- Regulator **Checking** supplementary proposal
- Regulator **Processing** rail vehicle registration and issuing rail vehicle registration number

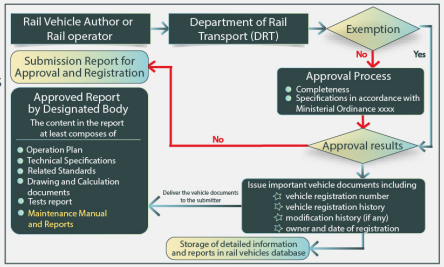
To ensure traceability of vehicles and their vehicle history, the drafted Ministerial Regulation includes additional inspection processes for registered rail vehicles
These processes mandate inspections as followed:

- Before the end of **8 years** from the date of registration (i.e. after overhaul).
- In case of **major damage** caused by accidents.
- Important components **affecting the safety** performance of rail vehicles are to be installed

3.4 Issuing related standard

DRT – R – 002 - 2564
(Recommended General Standard for Rolling Stock) the standard gives recommendations and minimum requirements, consisting of 19 components

Drafting inspection standards
for rail vehicles, which will be conducted by inspectors or certified bodies.



3.5 Development of an electronic service platform

DRT has developed an electronic service platform (e-License R) to facilitate required data integration from rail operators prior to submitting requests for rail vehicle approval and registration. This process is conducted in accordance with the laws, regulations, rules, standards, and internationally accepted guidelines, with a focus on cybersecurity and ensuring reliability and safety.

4. Conclusion

The DRT, the rail regulator in Thailand, has classified the types and given specifications of rail vehicles suitable for Thailand's rail infrastructure in order to assess rail vehicle conditions through registration and to ensure the traceability of vehicles and keeping the records. Consequently, the inspection and certification process before the registration of rail vehicles has been established. Additionally, rail transport regulations and standards have been drafted according to the registration process. To facilitate rail operators in registering their rail vehicles, the e-license R system has also been developed.