WELCOME TO THE GRID: INDUSTRIAL FIREFIGHTING TRAIN

Throughout the service area of Port of Rotterdam, rail emplacement yards are keystones in the tight-fitting distribution web for (dangerous) goods to the European hinterland. Due to the high-risk nature of shunting goods back and forth, these yards must naturally meet all required safety standards. For one of the shunting yards in the Rotterdam harbour area, an unusual solution has been found by rail infrastructure and asset manager ProRail to re-open one of their prime industrial shunting sites after more than 18 months of restrictions....

September 2019, dark clouds gather above Waalhaven port in Rotterdam. Local authorities have halted the shunting of hazardous substances on one of in total six industrial emplacement yards. Research has shown that fire water facilities do not meet the authorities' requirements. And because of that, the fire brigade cannot perform an effective intervention in case of an emergency. As shunting yards have an increased spill and spill fire risk, they must demonstrate readiness to intervene in these situations. Direct consequences: all shunting of dangerous good must be relocated to other sites, meaning extreme additional costs, disgruntled stakeholders, liability, indemnity, and more. Above all: no direct solution for the problem within sight.

As of April 1 (that is no joke), rail yard Waalhaven Zuid restarted to shunt goods. A brand-new firefighting train stationed at the emplacement yard has convinced authorities that emergency preparedness is now adequate enough for re-opening. A temporary solution that is, as ProRail continues to work on a structural solution.

EMERGENCY RESPONSE TRAIN

The firefighting train measures 67 meters long, divided in 3 container carriers and 1 locomotive in the middle. The carriers hold five tanktainers with a total fire water storage capacity of 150,000 litres. Inside a 40 ft container the extinguishing pump system and 8,000 litres of foam concentrate are situated together with all control systems.
At both ends of the train small platforms house foam monitors with a capacity of 4,000 litres per minute and over 80 meters in throwing distance. Handlines can be attached near the platforms for manual foam application.

The purpose of the train is to perform a cooling and/or extinguishing intervention of up to 30 minutes at the most difficult-to-reach areas of the emplacement yard. It is that explicit purpose for which the authorities halted the shunting processes mid-2019. In the middle of the rail yard an emergency road is situated to be used by the ProRail incident crew and Unified Fire Brigade Rotterdam during emergency situations. With water supply not being optimal from the emergency road, the most southern rail tracks are not within reach. With the train situated on a service track at the south side of the yard and manned 24-7, this problem is now temporarily resolved.

PRESSURE COOKING

Due to the enormous stakes at game, the lead time for this project was extremely short. H2K and Kappetijn Safety Specialists were asked by ProRail to investigate concepts to improve firefighting possibilities from the south end of the yard. Though an emergency response train seemed an incredibly bold idea at the beginning, in the end it proved to be the only effective measure to achieve the demanding requirements within the set timeframe.

Next, an intensive period of conceptualising, designing and engineering started. Only few

organizations have the means in-house to fully engineer and manufacture a new concept like this within 5 months' time. Sounds like plenty of time, is not. The project team partnered with Kenbri Fire Fighting and rail workshop Shunter to construct and assemble the firefighting systems and mount these on rail-driven carriers.

In the meantime, H2K and KSS prepared commissioning of the train in consultation with the local authorities. Operating procedures were written, an intervention crew assembled, education and training organised, preparing of site acceptance tests, writing of ITPM-policies, application for temporary permits and exemptions, guaranteeing occupational safety, the list goes on.

In March 2021 a series of acceptance tests have been performed together with the Unified Fire Department Rotterdam to demonstrate operational readiness of the train. Upon receiving the 'OK' by the authorities, the train has been on active duty since April 1.

Fire and rescue trains

The idea of a firefighting train derives from methods for emergency response in mountainous countries such as Norway, Austria and Switzerland. In these countries 'fire and rescue trains' have proven useful over decades. These trains are mainly used for safely delivering emergency crews on-site in tunnels and evacuating passengers. Additionally, equipment for technical rescue and small-scale firefighting are onboard.

With the commissioning of this firefighting train in Rotterdam, a new application can be added to the list of uses. The train is deployable for purely industrial scenarios: coverage of unignited spills, extinguishment of spill fires up to 160 m2 and cooling of irradiated surrounding objects. Because industrial emergency response is based on lengthy intervention approaches, the throwing distance of 80 meters allows for the train to keep its distance. To further guarantee safety of operating personnel both the train and its water/foam monitors can be remotely controlled. Maybe the train can be enlisted in the Guinness Book of Records for being the longest, most water carrying, remote controlled firefighting robot?

POWERHOUSE TROUBLESHOOTING

Why did the H2K-KSS combination work so well for this project? From the very start, the project was to be settled on the boundary of theory and practice. Theory, because the sought-after solution needed to be integrated in an existing framework of regulations and enforcement. Practice, because more than ever it was desirable to present a practically workable solution, where there would be no doubt about the proven effect.

Remote controlled 4,000 L/min monitors are mounted on platforms at both ends of the train, handlines can be attached for manual foam application

To thrive in this high-pressure environment, it helped that both H2K and KSS are 'network organizations', capable of mobilizing people and resources together with relevant partners in an extremely short timeframe. From day 1 onwards, all effort has been to work towards a robust, safe and proven system as a solution. And in the end, all parties delivered.

ProRail continues to work on a structural solution for improvement of water supply and accessibility, but until then the train and its crew will remain on duty.

Interested to see the firefighting train in action? Watch the mini documentary at www.h2k.nl or www.kappetijn.eu.
Want to know more about this project? Get in touch with H2K or KSS.

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STATS	
TYPE	Emergency response train
PURPOSE	Spill coverage, firefighting, cooling
IN USE SINCE	April 2021, manned 24-7
LENGTH	67 meters (3 container carriers and 1 locomotive)
WEIGHT	Over 330 tons (when filled)
STORAGE CAPACITY	150,000 L water 8,000 L foam concentrate
FOAM SYSTEM	Diesel powered pump with FireDos proportioner
MONITORS	2x 4,000 L/min Akron StreamMaster
DEPLOYMENT TIME	Max 20 minutes after alarm
CREW	1 train driver and 2 operators
SPECIALTY	Both train and monitors are fully remote controllable

TIMELINE	
2019	
SEPTEMBER	Authorities halt shunting of dangerous goods at shunting yard Waalhaven Zuid
2020	
NOVEMBER	First brainstorm on technical solutions and project planning
DECEMBER	Conceptualisation firefighting train
DECEMBER	ProRail management roadmaps April 2021 for 'resumption of all shunting'
2021	
JANUARY	Design, engineering, construction
FEBRUARY	Construction, delivery of train to ProRail
MARCH	Commissioning and testing
APRIL	Train operational and on duty