

## How are large means of transport washed and sanitized?

PNR designs and manufactures two cleaning and sanitation systems for large means of transport

### SCENARIO FOR THE SECTOR

The external washing of large public or commercial means of transport -**such as trains and trucks**- is an important application for PNR products. It's a highly specialized field that requires **high quality technical solutions that our company is able to provide.**

In general, it is possible to identify **three cleaning phases** for commercial vehicles such as trucks and trains:

**1 | PRE-WASH:** in this phase a pressure washer -which could be fixed, mobile, with hot or cold water- is often used;

**2 | MAIN WASH:** softened dirt is removed from the vehicle with shampoo or foam. This is the phase during which the roof, sides and even the underbody of buses, trucks and trains are cleaned;

**3 | VEHICLE CARE:** an additional program such as waxing can extend the life of the vehicle by protecting the paint from external agents.

Phase 2 **different system configurations** are:



**PORTAL:** the vehicle is stationary and the brushes move around it;



**TUNNEL:** the vehicle is in motion and it moves forward, coming into contact with the brushes - that are still.

These systems can be equipped with rails and guides for washing the vehicle underbody;



**SINGLE BRUSH SYSTEM:** the scrubbing brush is mounted on a mobile trolley which an operator moves along the sides of the vehicle;



**BY HAND:** in particular for airplanes, washing is often still done by hand since it is not recommended to pass the vehicle through the washing tunnel due to the presence of wings and tail.

It is also not possible to use automatic brushes due to the danger of scratching sensitive parts such as sensors and radios.



## Trains' underbody: a challenge for cleaning

PNR develops an effective washing system for trains' underbody



### THE PROBLEM OF OUR CLIENT

An essential factor for the optimal functioning of a railway system is good maintenance and the internal and external washing of trains is an extremely important component. During its operation, a train is subject to **atmospheric agents** such as rain and snow and often dirt accumulates in the rails and consequently also on the train's underbody (the part below the train).

The customer who contacted PNR needed a **bespoke system for cleaning the trains' underbody**, a difficult point to reach with traditional drive-through commercial vehicle washing systems.

### PNR SOLUTION

PNR has developed a **13 nozzles-manifolds system** to be installed on the tracks where the trains are serviced, for a total of 3 manifolds. Each one is placed a few meters away from each other. The selected nozzles are **K-type high impact flat jet**.

The train, travelling on the tracks, meets one after the other the three manifolds that have respectively **degreasing, rinsing and finishing actions**.

### ADVANTAGES FOR OUR CLIENT

PNR solution can be mounted on the same tracks in which the drive-through washing is carried out, this allows to **optimize times by reaching a high level of cleanliness**.

**INDUSTRY**  
transport / rail



**APPLICATION OF PNR PRODUCTS**  
underbody washing



**PROBLEM OF OUR CLIENT**  
washing in hard-to-reach places



**PNR SOLUTION**  
washing system with manifolds  
and high impact nozzles



**FOCUS ON THE PRODUCT**

**K FLAT FAN NOZZLE**

HIGH IMPACT

The K flat fan nozzle of this type is designed with a spoon-shaped deflected surface to concentrate the liquid flow and produce a narrow-angle flat fan spray with a high impact value. For this feature they are widely used in all working environments requiring powerful jets.

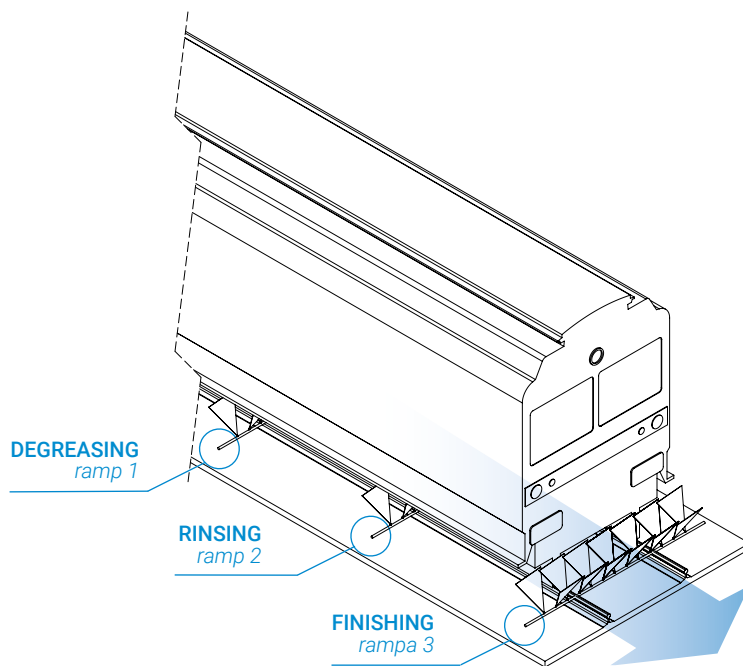
Compared to the standard cat-eye-shaped flat fan nozzle tips, K nozzles have a larger and free inner passage and are less subject to clogging, provide high performance cleaning efficiency and have an extended operating life.



**13-NOZZLE MANIFOLD**  
NO JETS OVERLAPPING

**WASHING SYSTEM FOR TRAINS' UNDERBODY**  
TECHNICAL SPECIFICATIONS

- 1 | DEGREASING RAMP | 13 KPN 1200 B1 NOZZLES**  
FLOW RATE @6BAR: 13X 2,8 L/MIN | 0,6 L/SEC  
SPRAY ANGLE: 50°  
MATERIAL: AISI 303  
THREAD SPECIFICATION: 1/4 BSPT
- 2 | RINSING RAMP | 13 KPN 1390 B1 NOZZLES**  
FLOW RATE @15BAR: 13X 8,7 L/MIN | 1,9 L/SEC  
SPRAY ANGLE: 50°  
MATERIAL: AISI 303  
THREAD SPECIFICATION: 1/4 BSPT
- 3 | FINISHING RAMP | 13 KPN 1200 B1 NOZZLES**  
FLOW RATE @6BAR: 13X 2,8 L/MIN | 0,6 L/SEC  
SPRAY ANGLE: 50°  
MATERIAL: AISI 303  
THREAD SPECIFICATION: 1/4 BSPT



**UNDERBODY WASH**  
TRAIN PASSING ALONG THE THREE MANIFOLDS