



XIII
INTERNATIONAL
WINTER ROAD
CONGRESS

QUÉBEC, FEBRUARY 8 TO 11, 2010



Québec 

SUSTAINABLE WINTER SERVICE FOR ROAD USERS

*The application of the cavitation cleaning
vehicle in snow and ice operations*

.....KO.....

East Nippon Expressway Company Limited

Engineer

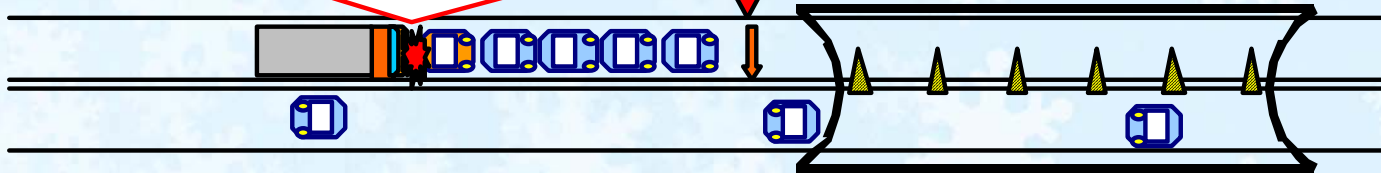
E-mail address s.okoshi.aa@e-nexco.co.jp



1. Introduction.

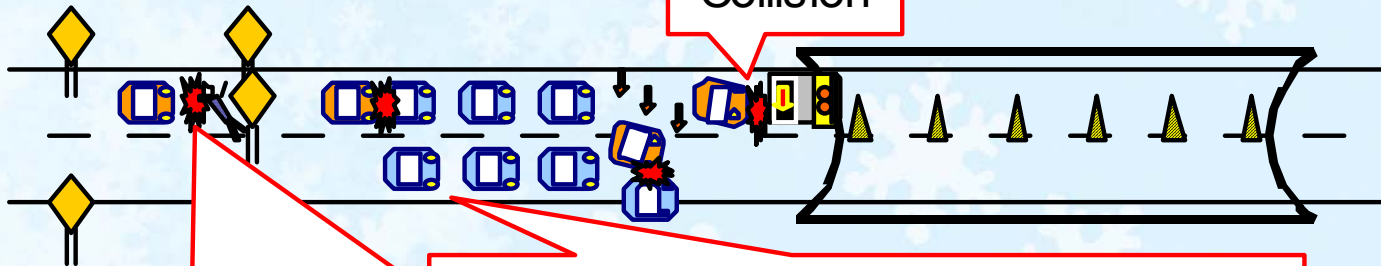
- Tunnel with two-way traffic

Accident involving vehicle at tail of line of congested traffic



- Tunnel with one-way traffic

Collision



Congestion caused by lane restriction

Accident involving vehicle at tail of line of congested traffic

Fig.1- Lane restrictions lead to traffic congestion and accidents

1. Introduction.



Fig.2-Old-style cleaning using a rotating brush @ 2km/h



Fig.3-High-speed cavitation cleaning 50km/h

2. The cavitation jet

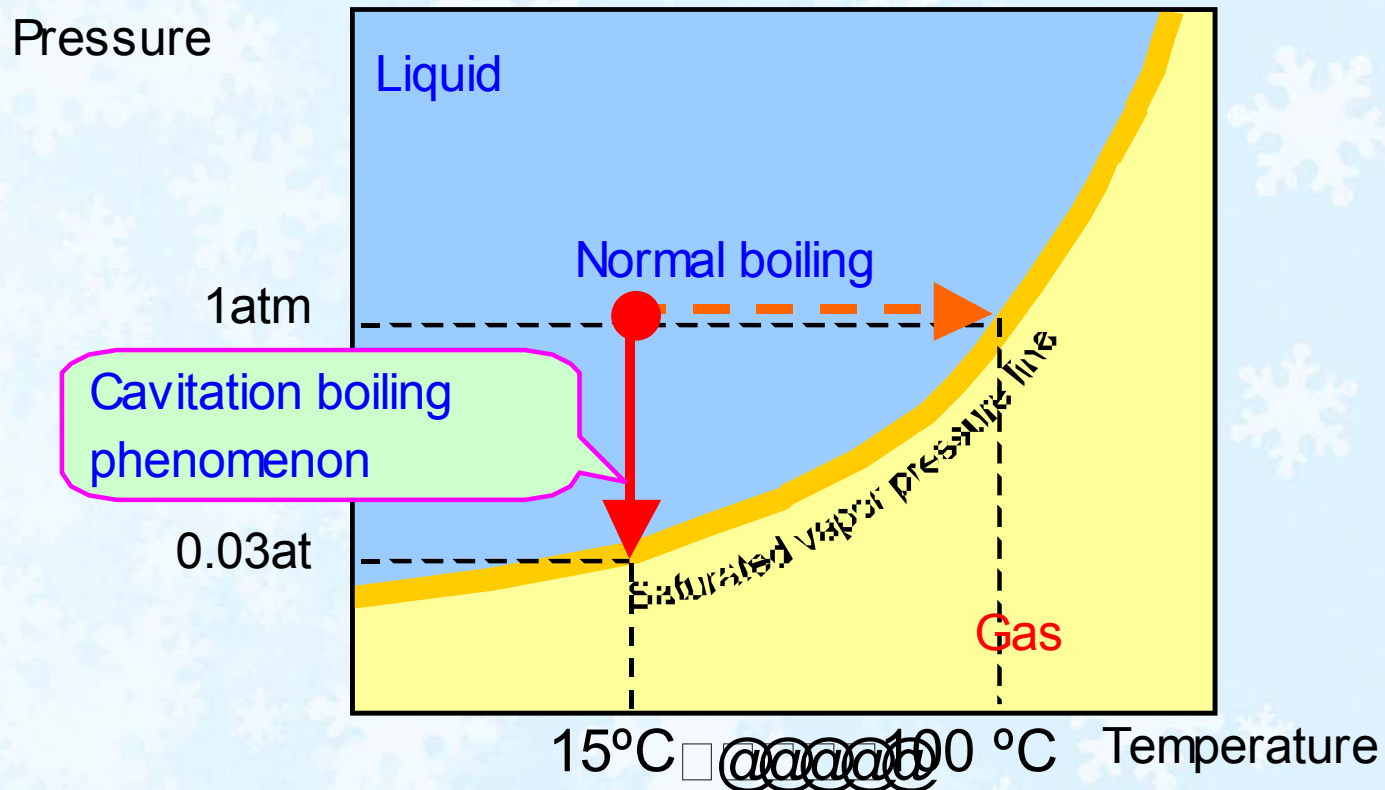


Fig.4-Cavitation and saturated vapor pressure

2. The cavitation jet

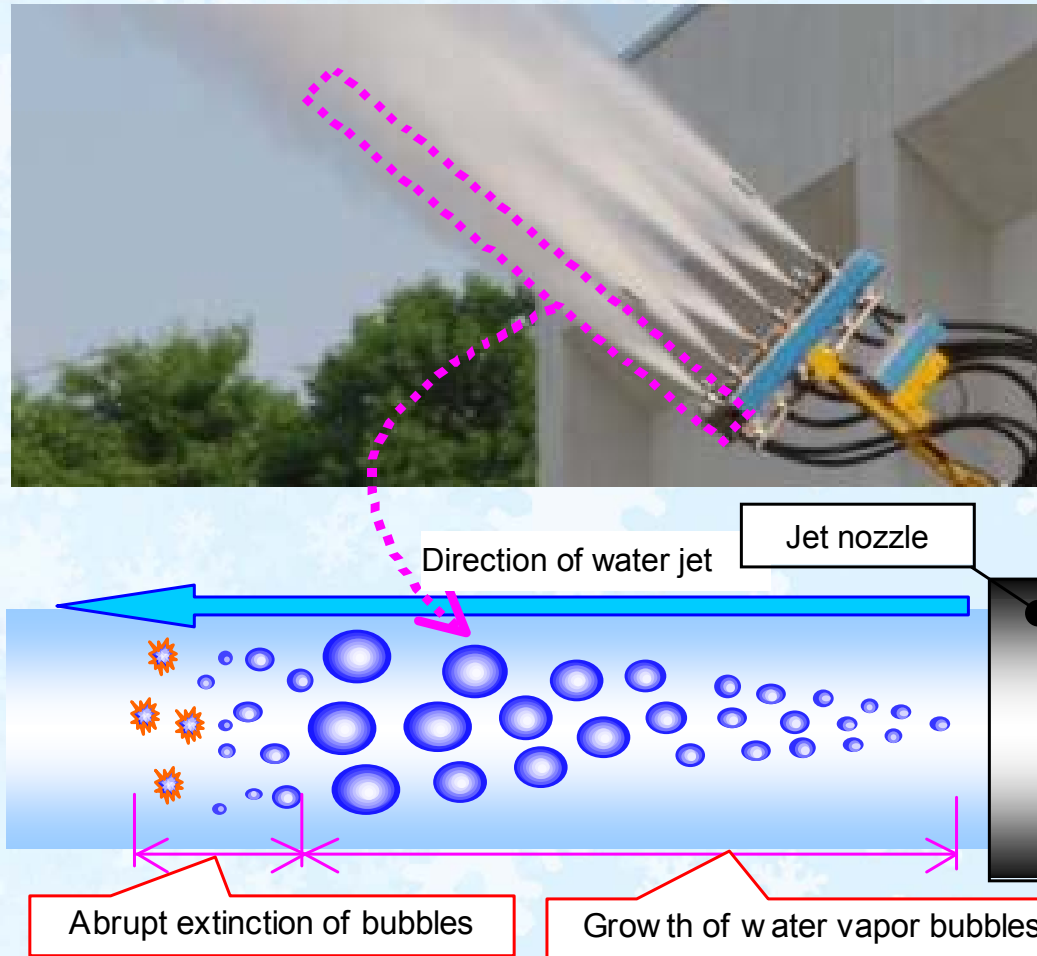


Fig.5-Generation and extinction of cavitation bubbles

3. Cavitation generator

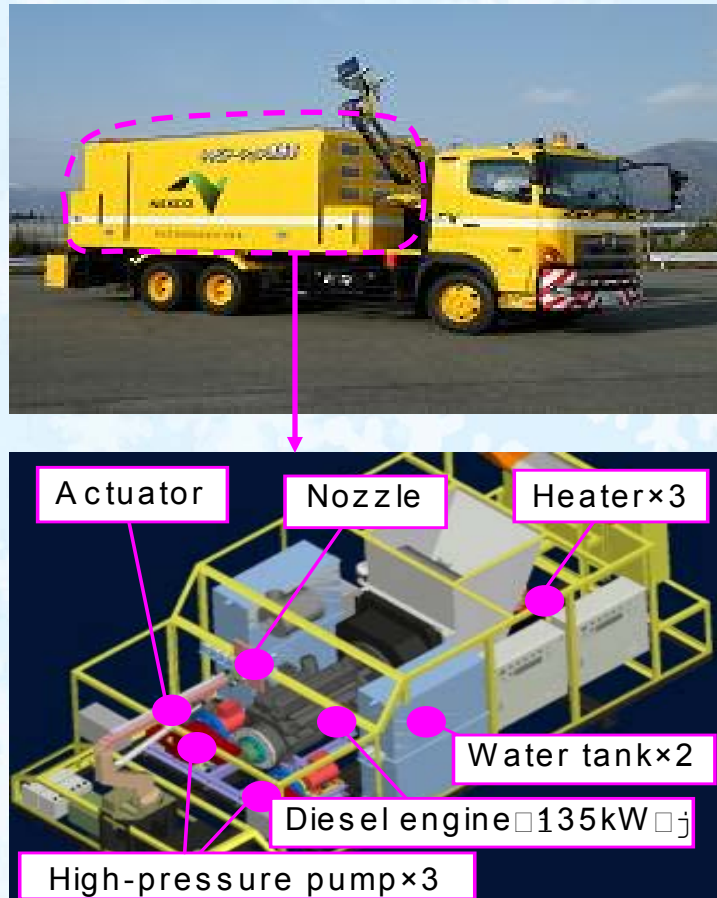


Fig.6-Inside the cavitation cleaner

4. Development of the high-speed cleaner.

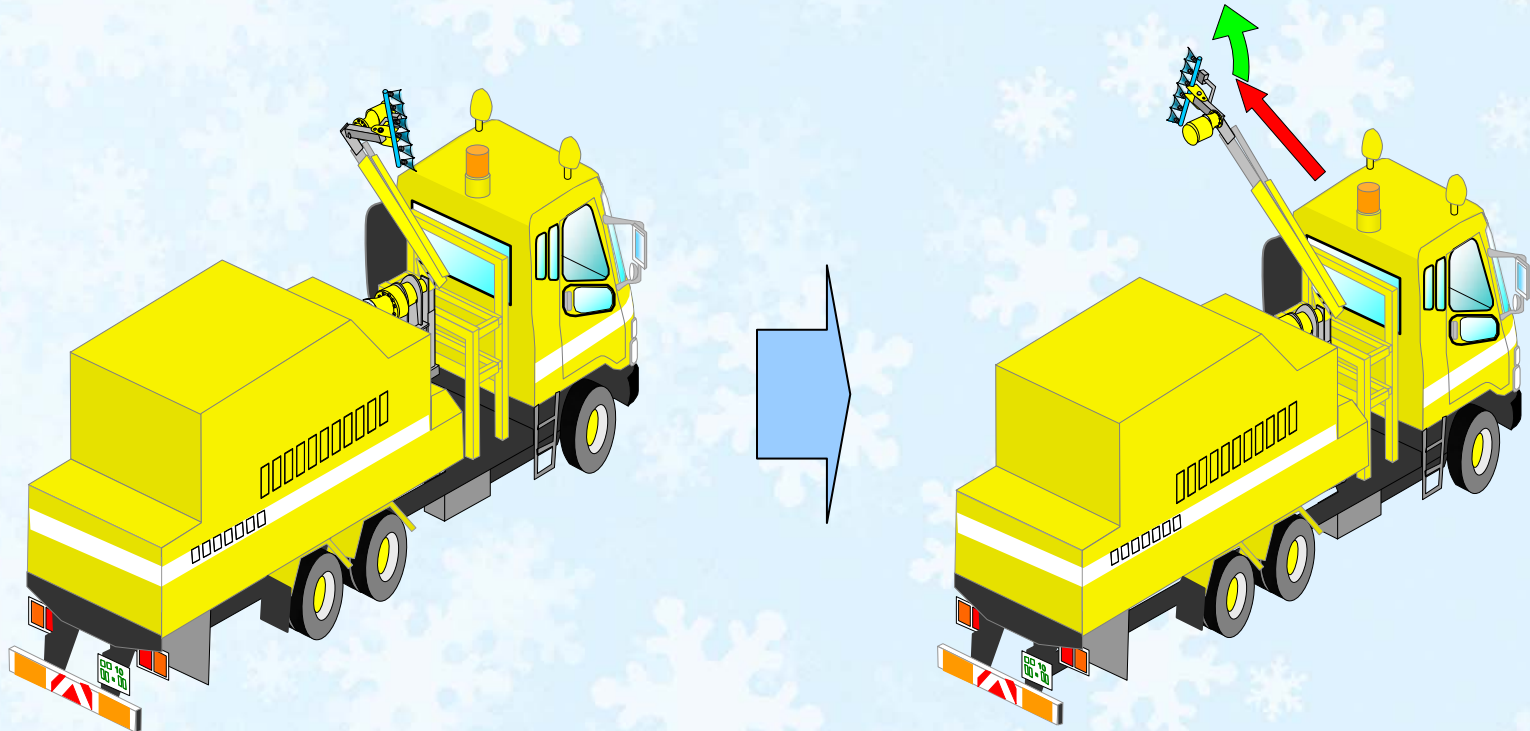


Fig.7-Illustration of cleaning arm operation

4. Development of the high-speed cleaner

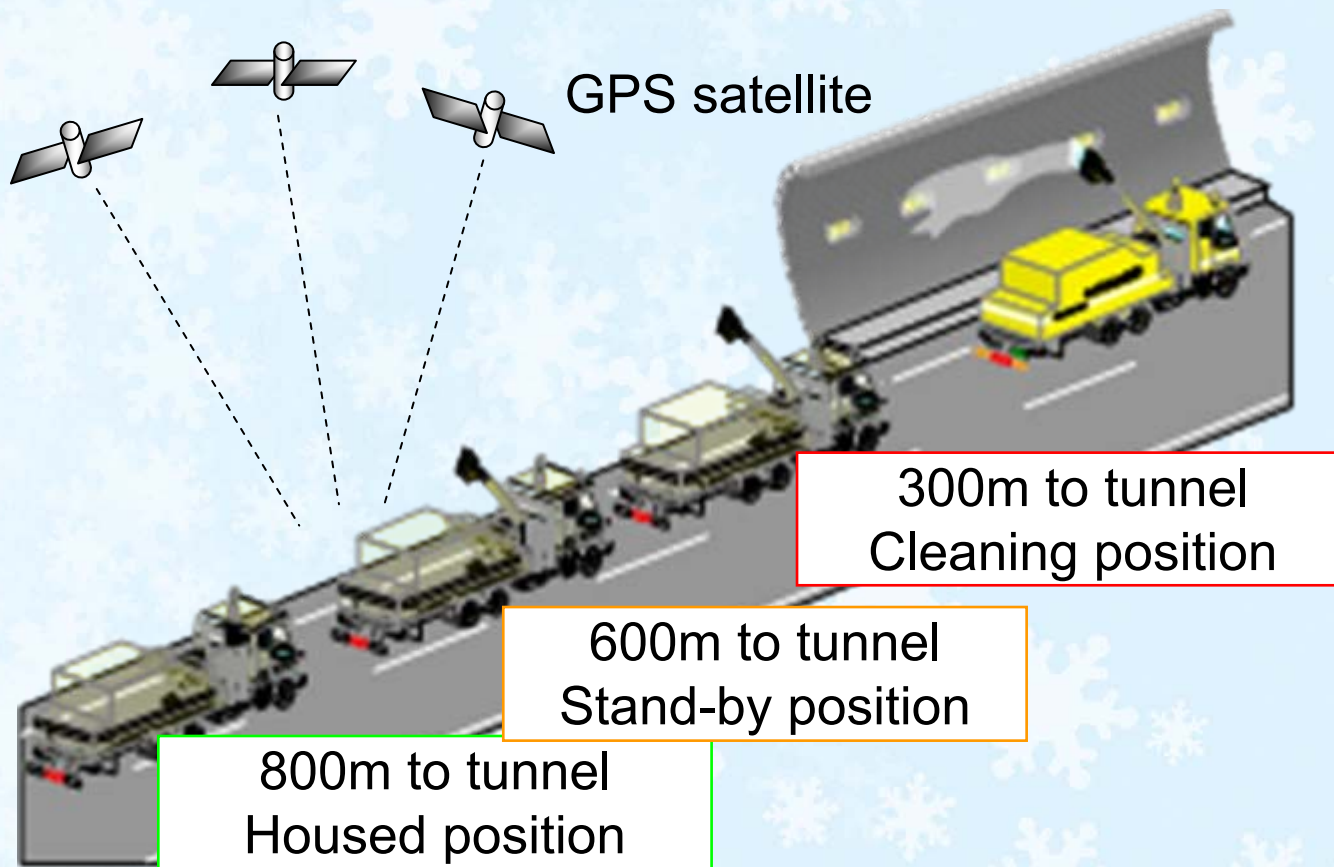


Fig.8-GPS-linked automatic position control device

5. Development of a lane marking cleaner attachment



Fig.9-Lane marking cleaner attachment in operation

5. Development of a lane marking cleaner attachment

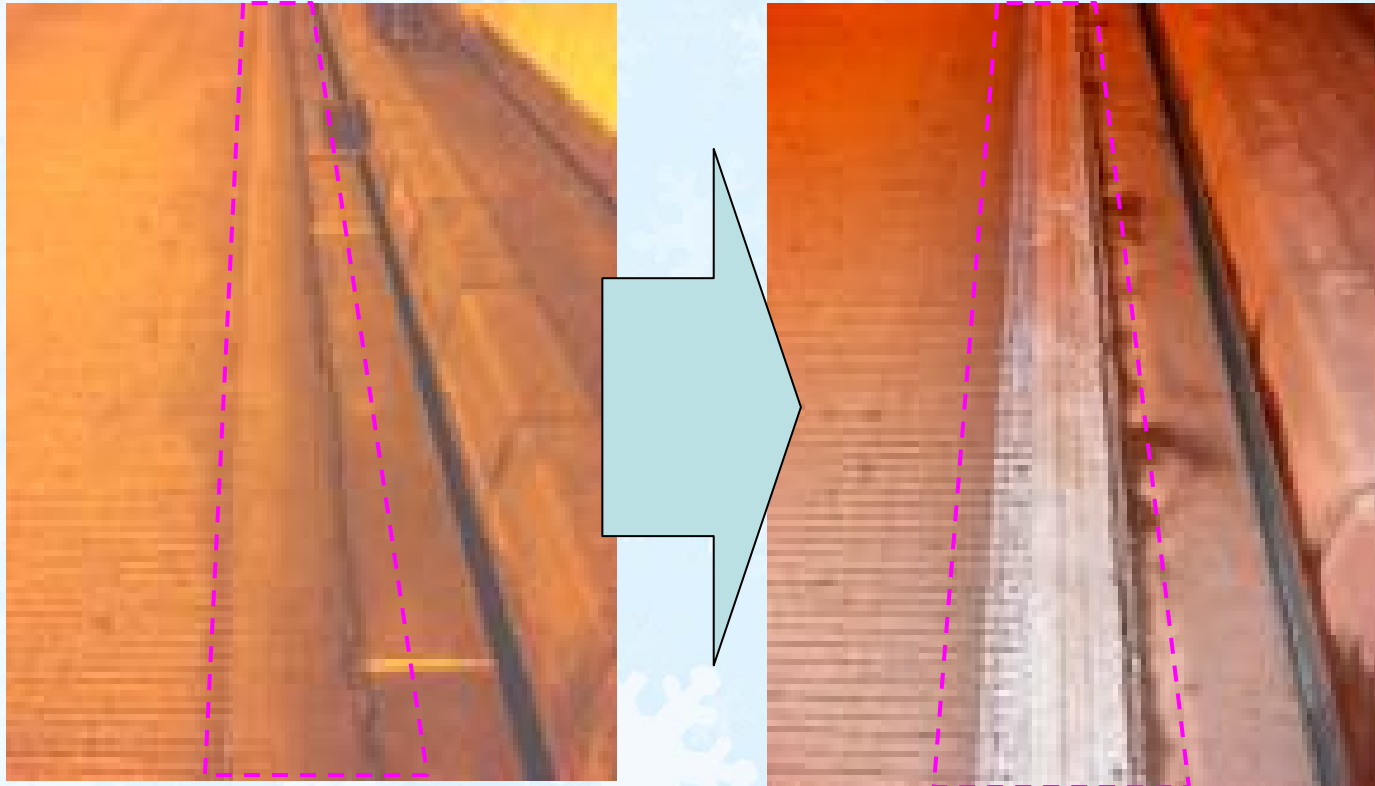


Fig.10-Lane marking before and after cleaning

6. Device to break up snow and ice frozen hard onto the road surface □

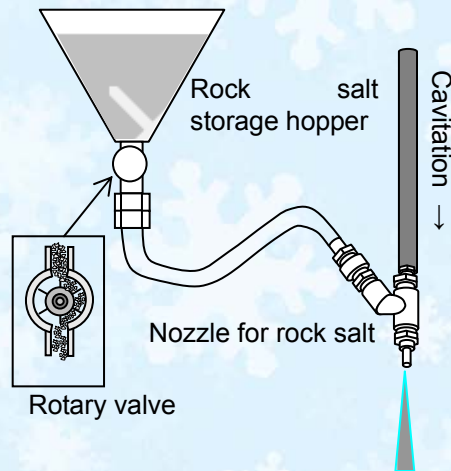
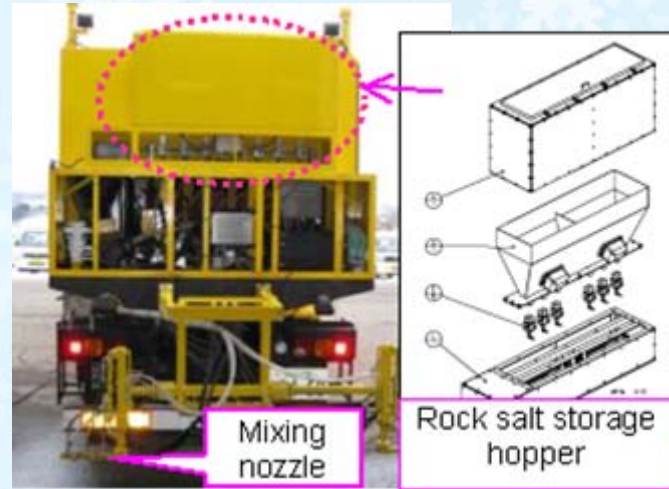
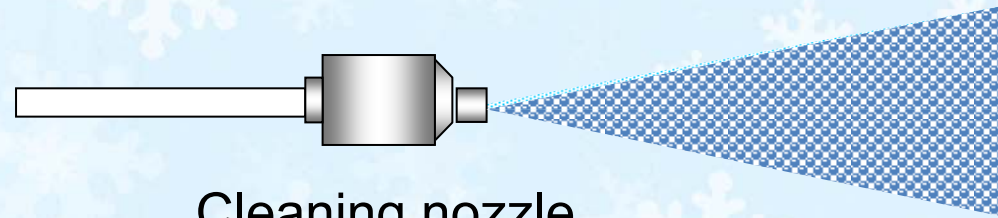
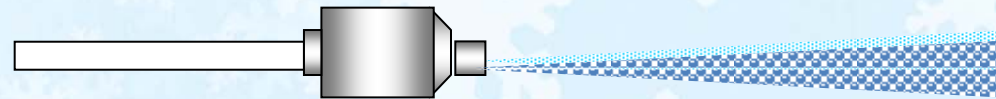


Fig.11-Rock salt feeder

6. Device to break up snow and ice frozen hard onto the road surface □



Cleaning nozzle



Straight nozzle

Fig.12-Improvement of the cavitation nozzle

6. Device to break up snow and ice frozen hard onto the road surface □

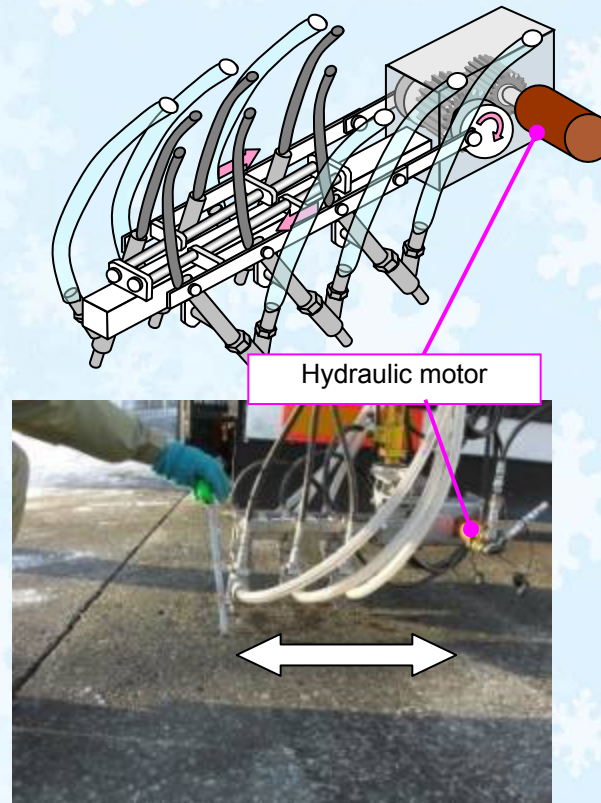


Fig.13-Mixing nozzle swing

6. Device to break up snow and ice frozen hard onto the road surface□



Without swing



With swing

Fig.14-Break-up of snow and ice frozen hard onto the road surface

6. Device to break up snow and ice frozen hard onto the road surface□



Fig.15-The cavitation jet being emitted from a swinging nozzle

Thank you for your kind attention.