

Rust-protecting a Volvo

One of the many reasons why the Volvo has become such a popular and sought after car is because it has been built for Swedish conditions and above all, to stand up to the Swedish climate. Volvo cars are given extremely effective protective treatment against the depredations of rust. Of all the makes of cars in Sweden it is the Volvo PV 544 which best withstands the ravages of rust.

In the autumn 1957 Volvo brought into use a new plant for rust-protective treatment or phosphating as it is known in the trade. At this time the roto-dip plant, which had been in use for more than 10 years, had served its purpose.

This roto-dip was one of the very first to be built. The basic principle of this was that the car bodies, mounted on jigs, were fed cross-wise on to a conveyor and, while slowly rotating, were passed through a series of degreasing and phosphating baths. The bodies were dipped in each bath at the same time as jets were sprayed over them. The last section consisted of a paint bath (without sprays) where the whole body was dipped into synthetic primer and an oven where it was dried off.

This plant had a capacity of 11 bodies per hour.

In the meantime Volvo's production increased by leaps and bounds and the capacity of the roto-dip became more and more insufficient. It was not possible to alter the speed of the conveyor. Finally it was decided to install a completely new plant and to use only sprays in the various processes. Dipping was resorted to only to cover the lower

portion of the body. In this way Volvo went over to the current type of plant used by the most modern car factories in Europe and America.

By the use of spraying the process times in the various sections can be cut down by less than half. The mechanical arrangement is simpler. The speed of the conveyor is adjustable so that the out-put of the plant can be exactly suited to production demands. This, and other things, means that the new plant, which occupies about the same floor space; has a production rate more than three times as great.

The bodies arrive at Volvo sprayed with a rust-preventive medium which protects them on their long journey from the pressed steel works in Olofström. When the bodies come into the factory they are first hung on a roof conveyor and pass through a section where adjustments and finishing work on the sheet metal is carried out. (The bodies are conveyed rear end first through the plant.)

Fenders, front ends and hoods, which have been placed inside the bodies, are now fitted into place and the rust-preventive medium is washed off externally, after which the bodies are dried. The bodies are then minutely examined and any spots requiring further treatment are marked. These are usually very small unevennesses in the sheet metal which would be difficult or impossible for a layman to detect. Further on there are inspectors who check the work and who make any further marks which may be necessary. At the end of the conveyor through the adjusting section there is a semi-auto-

matic change-over mechanism where the bodies are transferred to another roof conveyor which carries the bodies through the phosphating plant.

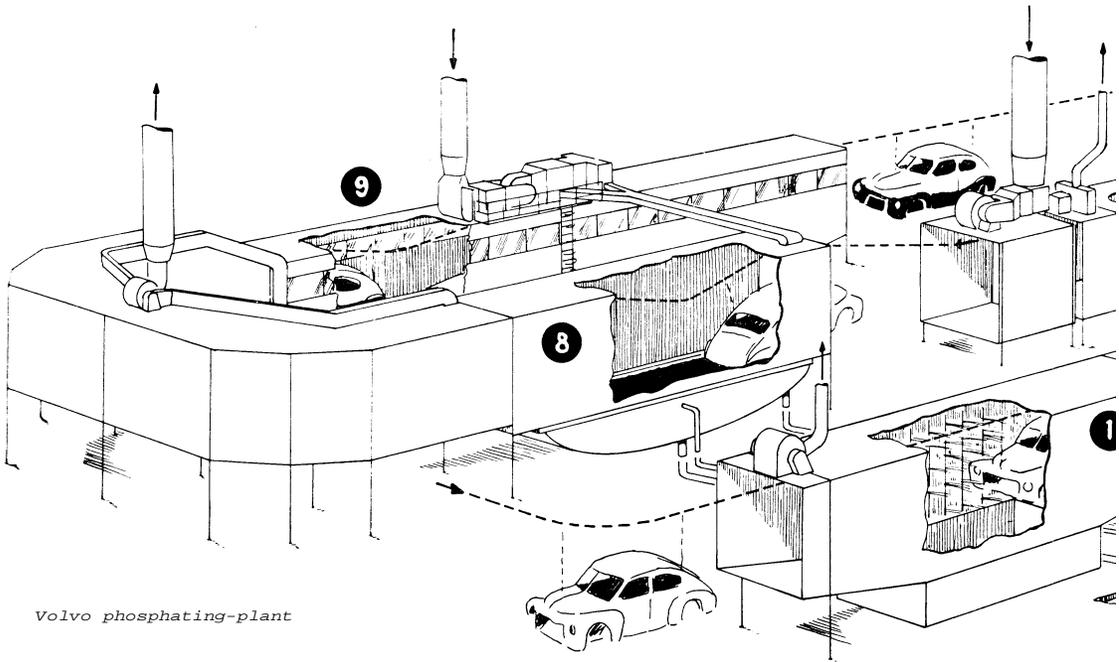
Before a body enters the phosphating section all rust-preventive medium is washed off internally and is also washed externally once again in order to facilitate the phosphating process.

The phosphating machine is 65 meters (213 ft) long and consists of six spraying zones and intermediate draining-off zones. In each spraying zone there are several rows of spraying nozzles which are mounted so that the body is covered from every direction. The liquid runs off the bodies down into tanks where it is kept at the desired temperature by means of heating tubes. The liquid is then returned to the nozzles by means of pumps.

The various spraying zones are of different lengths. The first zone (1)

where de-greasing is done is 8 meters (26 ft 3 ins) long and holds 12,000 liters (3,168 U.S. galls). The fourth zone where phosphating is done is also 8 meters long (26 ft 3 ins) and holds 10,000 liters (2,640 U.S. galls). The other zones are used for washing off and are 6 meters (19 ft 8 ins) long and hold 7,000 liters (1,848 U.S. galls). The capacities of the pumps are suited to the lengths of the various zones. For example, the pumps in the de-greasing zone have an output of 4,000 liters (1,056 U.S. galls) to about 300 nozzles. The spraying pressure used is usually between 1.5 and 2.0 kg/cm^2 (21.3 and 28.4 p.s.i.).

During its course through the machine the conveyor is protected from the sprays by special shields. While running it is only the ends of the machine which are open. In order that checks can be carried out on the bodies



Volvo phosphating-plant

during their passage through the machine, some of the draining-off zones are provided with glass covered inspection holes. The functions of the various spraying zones are as follows:

1. De-greasing zone. Temperature 60' C (140' F). The bath consists of a solution of weak alkaline phosphates and wetting agent. There is also an additive which gives a fine crystalline film to the subsequent phosphating. The total concentration is unusually low - only 0.2 %.

2. Rinsing zone. Water only. Temperature 45-50' C (113-122' F).

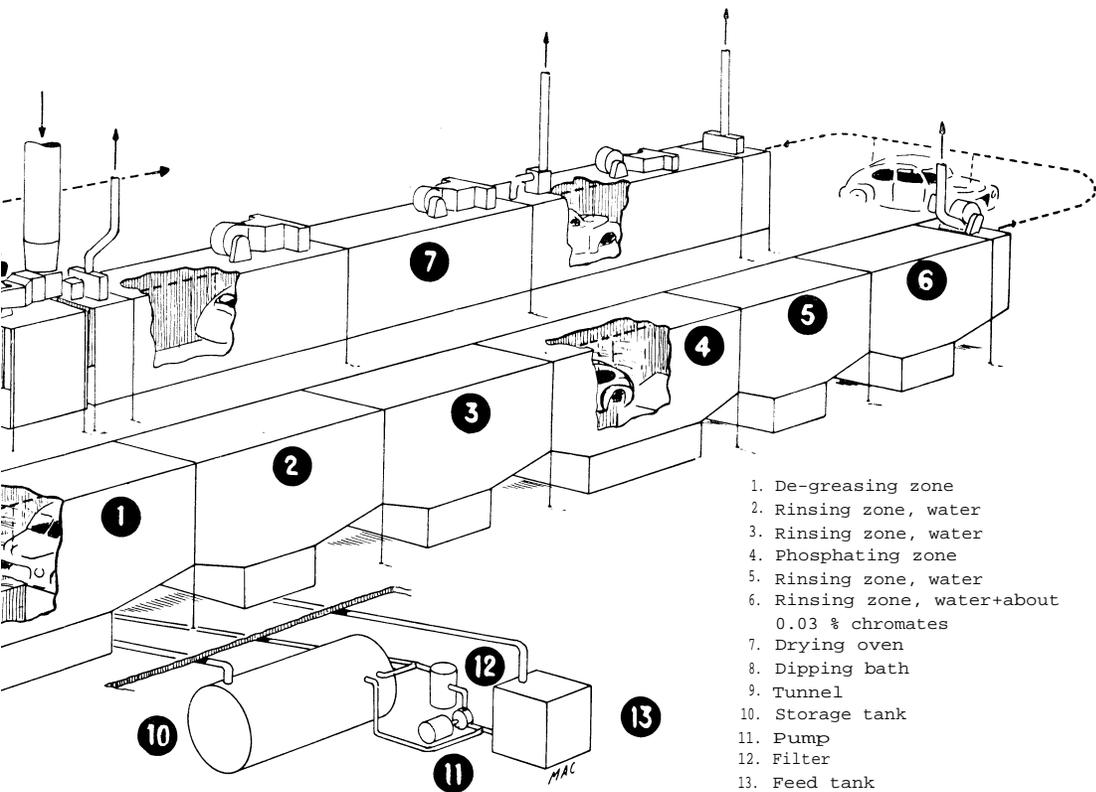
3. Rinsing zone. Conditions as above.

4. Phosphating zone. Temperature 55' C (131' F). The bath consists of an acid zinc-phosphate solution. The pres-

ence of acid causes the surface of the sheet steel to become receptive to the crystal which are precipitated and which gives a phosphated metal its characteristic appearance. The phosphate film weighs about 2 grammes per square meter which means an average thickness, in round figures, of 0.001 mm (.00004 in). The film of phosphate increases the adhesion of the paint and also gives a certain amount of rust protection as well as ensuring that the surface is completely free from grease.

5. Rinsing zone. Water only. Temperature 45-50' C (113-122' F).

6. Rinsing zone. In order to increase rust protection the water here contains about 0.03 % chromates (a type of



1. De-greasing zone
2. Rinsing zone, water
3. Rinsing zone, water
4. Phosphating zone
5. Rinsing zone, water
6. Rinsing zone, water+about 0.03 % chromates
7. Drying oven
8. Dipping bath
9. Tunnel
10. Storage tank
11. Pump
12. Filter
13. Feed tank



A body being disked before phosphating

chrome-salt). Temperature 45-50° C (113-122° F).

After the sixth zone the bodies leave the machine and after a turn enter a 47 meter (154 ft) long drying oven (7). Here all traces of moisture are removed and the bodies pass through to a dipping bath (8) containing air-drying synthetic primer. The under parts of the bodies are dipped so that all nooks and crannies receive a thorough coating of paint which would be difficult to attain by ordinary spraying. When the plant is not running the paint escapes down to a storage tank (10) from where it is conveyed by a pump (11) via a filter (12) to the paint bath. This pump

and filter are used to circulate the paint when the plant is running. After the dipping bath the bodies pass through a tunnel (9) where they are given a slow longitudinal pitching motion by the conveyor so that all surplus paint can run off. Then there is another change-over mechanism, similar to that describes previously, where the bodies are fed on to the third conveyor which transports them through a long tunnel to the painting department.

The bodies are now fully ready for painting and after any dust, which may have settled on them, is removed, they pass in to the section where they receive the undercoat.