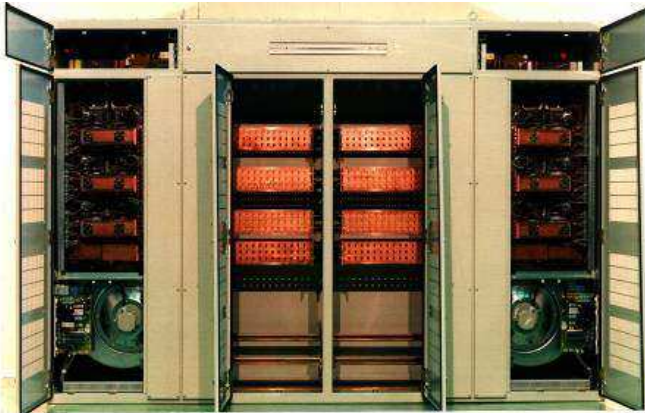


CREATING OVERALL SAVINGS BY: VOLTAGE CONTROLLED RECTIFIER (VCR) FOR DC TRACTION POWER SUPPLY



Cabinet containing 2 pieces of 6-pulse Voltage Controlled Rectifier "VCR"-bridges

WHERE?

STOCKHOLM (SWEDEN), BUSAN (KOREA), DALLAS (USA) AND SINGAPORE

WHEN?

FROM THE 1980'S UNTIL TODAY

WHO?

STRUKTON RAIL SWEDEN

"With our product Rectifiers for direct current power supply (VCR) have we created a product for overall savings, i.e. for energy, investment and maintenance savings."

Ulf Urbanek, Head of Power Supply

THE CHALLENGE

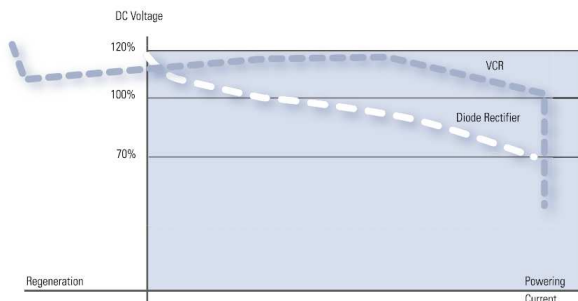
A mass transit rail system is a considerable infrastructure investment that must be properly planned and evaluated with respect to the environment, financial resources and transportation demand. With these regards the most suitable system solution is a Direct Current train system either in the shape of an underground system or a light rail system. To supply the trains with electrical power a reliable and high efficient DC traction power supply system is essential.

THE MEASURES

Technology

Rectifier bridge: The Strukton Rail "VCR" is usually equipped with two controlled 6-pulse thyristor bridges (see above picture), forming a 12-pulse rectifier unit. Even though the bridge has a compact design, it is easy maintained. The bridges are "forced air cooled".

Control: The output characteristics can be adjusted and optimised to the demand of the traction power system it is installed in. An example of output characteristics of a VCR compared with a diode rectifier is shown in the picture below.



Conclusion: The Voltage Controlled Rectifiers makes it possible to optimise the investment in the traction power system and to minimise the impact on the environment. The capitalised saving in energy and maintenance costs provide further arguments to justify investing in this advanced but still proven technology.

THE RESULTS - THE BENEFITS:

Energy savings: The use of Voltage Controlled Rectifiers enables an increase of the DC bus voltage compared to other types of systems. The higher voltage results in a lower current which give less power losses. The possibility to equip the VCR with regeneration saves even more energy. Excess braking energy from trains (not consumed by other trains), is transferred back to the AC grid, instead of being consumed in braking resistors and/or mechanical brakes

Investment savings: With the controlled output voltage, the substations can be positioned at a longer distance compared to ordinary traction power substations. Even though the VCR is more expensive than an ordinary diode rectifier, money is saved in the total system, such as land costs, building costs, installation costs, etc.

Maintenance savings: The maintenance cost for a VCR substation is almost the same as for an ordinary substation. When the traction power system has fewer substations the maintenance costs will be lower. If the substations are equipped with regeneration the trains don't need to use mechanical brakes as much as in an ordinary system, which saves cost on maintenance. The current limiting functions in the VCR protects equipment and cables from being overloaded. This reduces maintenance and gives the components a longer lifetime.

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