Wheels India Ltd, Chennai

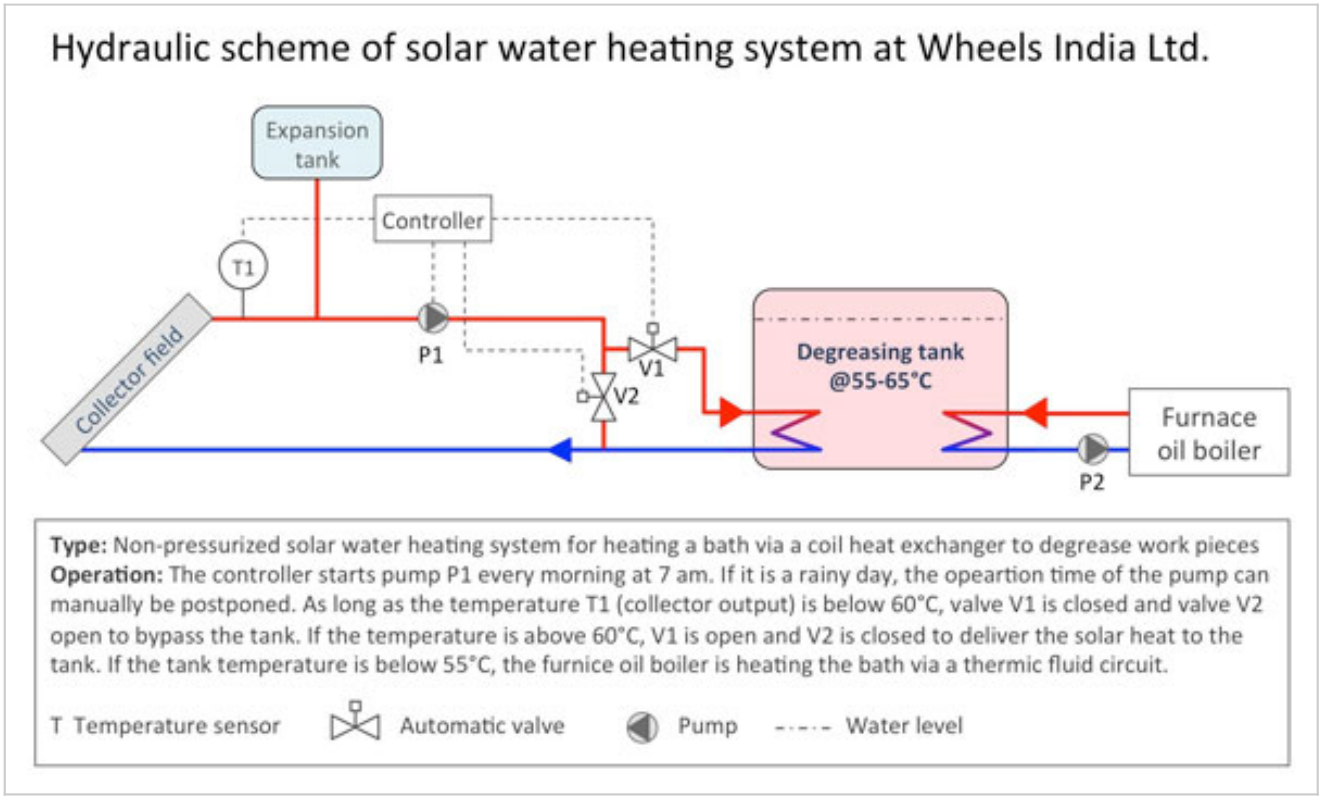
General Information

Description of the company	:	Wheels India Limited is a vehicle wheel manufacturer established in 1962, which is promoted by the TVS Group. In 2012/2013 the turnover was about INR 2200 cr (EUR 280 Mio).
Type of Industry	:	Automotive supply industry, manufacturer of metal wheels.
Location of the company and the solar plant	:	The solar system is installed at the location of the company: Wheels India Ltd., MTH Road, Padi, Chennai – 600050.
Heat demanding processes	:	The wheels after casting are cleaned and washed in 4 tanks: (1) Hot water at 55˚C, (2) Knock-off degreaser at 70˚C, (3) Degreaser I at 60˚C and (4) Degreaser II at 60˚C.
Conventional heat supply	:	Heat is supplied by a furnace oil boiler via a thermic fluid circuit.
Conventional fuel used	:	Furnace oil which costs about INR 55 (EUR 0.70) per litre.
Motivation to use solar thermal energy	:	Increased fuel costs and concern towards climate change led Wheels India Ltd to explore solar heat systems for hot water need. The company is using about 3000 litres of furnace oil per day, which costs approximately INR 165,000 (EUR 2000) per day. The installation of solar water heaters has made them to save about 380 litres a day, saving around INR 20,000 (EUR 250) per day.

Description of the solar thermal system

Type of solar plant	:	Evacuated Tube Collectors (ETC) plant with 1365 m2 cross collector area to heat up tanks for washing and cleaning metal vehicle wheels.

Year of installation	:	The solar system was commissioned in April 2013.
Solar collector field	:	There are 4 separate solar thermal systems installed to heat up the 4 wheel tanks separately. The total 105 ETC collectors with a gross area of 1365 m2 are divided in following systems: System 1: 20 ETC collectors connected to hot water tank at 55°C System 2: 44 ETC collectors connected to knock-off degreaser tank at 70°C System 3: 16 ETC collectors connected to degreaser tank I at 60°C System 4: 25 ETC collectors connected to degreaser tank II at 60°C The collectors are connected in series except system 2, where two series of 22 ETC collectors are connected in parallel. Each ETC collector has a manifold in the centre and on both sides 40 evacuated glass tubes. The gross area is about 13 m2 per collector. The tubes are filled with heat transfer fluid of a glycol mixture and the solar heat is transferred in the manifold by a heat exchanger to the demineralized (DM) water which is circulating to the tank.
Water storage	:	The tanks are used as storage, therefore no other storage is necessary
Hydraulics	:	Non-pressurized system, the DM water circulates in closed loops and transfers the solar heat to the tanks by immersed coils which are acting as heat exchangers. The open expansion tank is balancing the dilatation of the DM water.

Hydraulic scheme and description of operation	:	
Supplier of the solar system	:	The solar system was designed, delivered and commissioned by: Aspiration Energy Pvt Ltd., No. 7, 2nd Trust Link Road, Mandaveli, Chennai - 600028. www.aspirationenergy.com
Data recorded	:	The temperature values of collector inlet and outlet are recorded periodically, which are used for calculating the fuel savings. Other data such as pressure, tank temperature and totalizer readings are also noted.

Energy balance

Heat demand	:	3000 litre furnace oil per day and about 900,000 litre/year With specific gravity of 0.95 kg/litre and caloric value of 10,000 kcal/kg of furnace oil this corresponds to 33 MWh/day and 9900 MWh/year
Solar radiation-on site	:	The average irradiation on a horizontal plane is 5.23 kWh/m2 per day or 1900 kWh/m2 per year at the site

Useful solar energy delivery	:	The solar thermal energy delivered to the tanks is calculated with about 995 MWh per year. This corresponds to 729 kWh/m2 gross collector area per year. The solar yield is calculated by assuming an average temperature difference of collector inlet and outlet and a fixed heat flow over 6 hours per day and 300 days per year within the solar circuits.
Fuel saved by solar energy	:	It is calculated that the solar system is displacing about 101 tonnes of furnace oil per year.
Emissions saved	:	The CO2 emissions saved by the solar system are about 240 ton CO2 per annum.

Economy

Investment costs	:	Total investment costs for the solar systems are INR 2.1 crore (INR 21 Mio = EUR 0.26 Mio) minus subsidies and tax benefit. This corresponds to about INR 15,000 (EUR 190) per m2 gross collector area.
Subsidies and tax benefits	:	Subsidy: INR 43 Lakhs (INR 4.3 Mio = EUR 54,000) which corresponds to 20.5% Tax benefit: INR 66 Lakhs (INR 6.6 Mio = EUR 83,000) which corresponds to 31.4% Subsidy and tax benefit is reducing the total investment costs.
Economics of the solar system	:	The projects works under RESCO model. This means that Aspiration Energy invested in the solar system and receives 70% of the monthly savings over 5 years. If Wheels India would have invested in the solar system and not used the RESCO model, the payback time would have been about 2 years. (RESCO = Renewable Energy Service Company)

Experiences

Operation experience	:	"We saved 116 KL of Furnace oil during 2013-2014 due to the Solar system, 8% more than what was estimated during the proposal stage. We have now identified a few more applications with similar saving potential." - Mr Rajaram Vice President Manufacturing
Statement of the owner	:	"When I saw the proposal for 630 KW Solar Thermal system, I found the ROI really attractive. The fossil fuel saving was 360 litres per day. The ROI is quite low for a Solar project of this size." - **Mr Srivats Ram** Managing Director "We were the first to attempt integration of a Roof Top Solar Thermal system with an Industrial Process heating application that runs 24/7. We recently did a workshop to all TVS Group companies explaining about our experience, practical problems and implementation challenges faced and how we overcame them, so that others coming after us can plan their projects better."- **Mr Velumani** GM Plant Engineering