

HASTAG (Zürich) AG, Wil

By renewing the motor of the conveyor belt system leading into the gravel plant in Wil ZH, HASTAG (Zürich) AG has reduced the facility’s energy consumption by around 10%, saving 4 000 francs per year.

HASTAG (Zürich) AG counts among the leading companies in the construction material sector in Northeast Switzerland. One of its core activities is the production of sand and gravel, which serve as aggregates for concrete, road surfaces, foundations and other construction materials. At the Wil ZH gravel plant, gravel is mined and processed in an open-pit gravel quarry. The raw gravel is extracted from the deposit site using a water jet and subsequently transported to the adjacent gravel plant where it is washed, sorted and crushed to the desired grain size. The raw gravel stockpile and the gravel plant are connected via a conveyor belt that is 153 metres long and transports approx. 700 tonnes of raw gravel per hour to a height of 46 metres.

This very same conveyor belt once made history: It supplied the material for the construction of the Grande Dixence dam in the Swiss canton of Valais. Upon completion of the dam 50 years ago, the conveyor was disassembled

and later reinstalled in the newly built in Wil ZH gravel plant. After a first retrofit in 1981, the 900-mm-wide belt was powered by a 150-kW electric motor via a gear with turbo coupling, and featured a mechanical drum brake for emergency braking. This drive no longer met today’s requirements, especially because the steep incline of the conveyor belt increased the risk of the transported material spilling into the lower transfer station when the emergency brake is activated and the belt reverses.



The conveyor belt viewed from above

Comparison before / after

	Before	After
Motor	WEG Jara 315 S M1080	SIEMENS 3-MOT 1CV43148
Performance	150 kW, built in 1981	160 kW, IE4
Operation time	approx. 2200 h/a	approx. 2200 h/a
Specific energy consumption	0.176 kWh per conveyed tonne	0.158 kWh per conveyed tonne
Energy consumption per year	263 350 kWh/a	236 269 kWh/a

- Tonnes conveyed per year: approx. 1.5 million
- Energy savings per year: 27 080 kWh/a
- Cost savings per year: 4 062 francs
- Investment costs: 17 000 francs
- Payback: 4.2 years

In order to minimise this risk, the drive unit was replaced with an IE4 motor featuring a non-reverse mechanism and a soft starter. Since there is no 150-kW category for induction motors today, the engineers had to decide to either decrease or increase the motor size. During any of the regularly occurring emergency brakes, a 132-kW motor would not have enough power to safely restart the belt loaded with around 12 tonnes of gravel. For that reason, the decision was made to instead install a 160-kW IE4 asynchronous motor by SIEMENS. Measurements showed that due to its greater level of efficiency (under both partial and full loads), the new IE4 motor uses approx. ten per cent less energy than its predecessor.



The old motor, kept as a back-up

The conveyor belt is fitted with its own power meter and a belt scale; this allows the operators to precisely monitor the system's energy consumption. Before the retrofit, the conveyor belt used an average of 0.176 kWh of energy per transported tonne of gravel. After the retrofit, this figure decreased to just 0.158 kWh per conveyed tonne. Initially, the operators expected energy savings of just two to three percent. The actual cutback of around ten per cent has far exceeded their expectations.



The new motor in operation



«As a company certified in accordance with ISO 50001, we strive to continuously optimise processes and machines for the long term.»

Kurt Fehr, Head of Production at ZH Nord

Topmotors

About one-third of the electricity consumption in Switzerland comes from the industry. Roughly 70% is due to electric drive systems. Topmotors' priority is to create a positive effect by encouraging the use of highly efficient motors, as well as by committing to intelligent controls. All the Topmotors events, together with practical information, can be found here: www.topmotors.ch



View of the gravel quarry from the upper transfer station