ENERGY EFFICIENCY COMPARISON

The experiment was conducted to **compare efficiency, losses and overall energy cost between two conveyor drive design configurations:** a conveyor powered by **a conventional external motor/gearbox** and a conveyor powered by **the VDG drum motor,** a one-component conveyor drive design with all drive components enclosed inside the drum.

Each conveyor is powered by a **1 horsepower electric motor** and set up to run and test **under loaded conditions**. Both drives are geared for a conveyor belt velocity of 30 rpm and are mechanically connected to a DC dynamometer. To obtain accurate load measurements and eliminate belt slippage, the torque is transmitted through the black timing belt.

Both drives were subjected to two loading test criteria for measuring energy consumption in watts, capacity in percentage (based on the rated current of the electric motor) and annual energy cost (based on $0.12 kWh, 24 hrs/day, 365 days/yr).

TEST CRITERIA 1:
Energy consumption, capacity and annual cost of operation are measured with both drives loaded to produce 87 ft-lbs of torque.

TEST CRITERIA 2:
Torque, capacity and annual cost of operation are measured with both drives at 100% motor load.



Test 1: 75 ft-lbs of Torque

DRUM MOTOR:	MOTOR/GEARBOX:
Energy Consumption = **577 Watts**	Energy Consumption = **721 Watts**
Energy Cost = **$612/yr**	Energy Cost = **$755/yr**
Motor Load = **12%**	Motor Load = **22%**

Test 2: 125 ft-lbs of Torque

DRUM MOTOR:	MOTOR/GEARBOX:
Energy Consumption = **657 Watts**	Energy Consumption = **810 Watts**
Energy Cost = **$691/yr**	Energy Cost = **$852/yr**
Motor Load = **47%**	Motor Load = **100%**

The tests revealed that the conveyor powered by the **VDG Drum Motor saves 23% energy** when compared to the conventional conveyor drive. The drum motor, while producing the same torque as the motor/gearbox, is operating at a fraction of its full capacity, extending the life span of the drive as well as reducing maintenance.

Additionally, all components of the drum motor are housed internally within the drive shell, eliminating safety hazards and increasing operator safety. Overall, the drum motor is more efficient, takes up less space and will outlast a conventional drive configuration.

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