



YASKAWA

Application Report Luggage Scanner Conveyor

Process Brief:

A manufacturer of CT (CaT) scanners has broadened their product offering by introducing a marketable, cost efficient, portable luggage scanner capable of producing a three dimensional image.

This unit's primary design goals were portability and enhanced graphic displays for improved visual accuracy. Its portability enables it to be used on sidewalks in front of airports, behind check-in counters, or in terminal corridors to scan carry-on luggage and similar type articles.

The unit is an improvement over their older past models. The "old" machines were large immobile devices located in series with the main airport baggage conveyor systems and cost in excess of \$1 million to install.

The Solution:

Yaskawa's V7 drive was the manufacturer's drive of choice for the unit's conveyor, based on its excellent speed regulation, low speed torque characteristics and its ability to eliminate conveyor "cogging".

Luggage is placed on the conveyor; an operator starts the conveyor, which quickly accelerates to full speed, 30 cm/sec (60 Hz). After an electronic eye determines the dimensions of the luggage, the machine scans the luggage interior in the opposite direction at a controlled 1.5 cm/sec.

The 30cm/sec speed regulation is not critical, since it is simply used to move luggage into and out of the machine. However, the 1.5 cm/sec speed regulation is critical to the actual scanning process and must be precise at luggage weights from basically 1 lb or less all the way up to 200 lbs. For this phase of the process, a 1 Hp, Yaskawa V7 ac drive, operating in a closed loop V/Hz mode is used. A 1000 ppr encoder, mounted to the conveyor belt motor, provides the speed feedback signal necessary for speed regulation. Tuning is simple and accomplished via the PID loop, standard with the V7.

Another V7 drive is applied on the rotating disc of the machine. The rotating disc weighs 1200 lbs and is 6 ft in diameter. It contains the x-ray equipment used to scan the entire piece of luggage on the conveyor to produce the three-dimensional inspection image. The V7 drive controls a two horsepower, four-pole induction motor with a 17.5:1 belt reduction to the rotating disc. This application previously used a servo, but because axis positioning is not required, Yaskawa recommended and the manufacture agreed, to convert the process to a standard AC motor and V7 drive. The V7 drive accelerates the motor to 100 RPM (1750 at the motor) in 45 sec, and provides controlled motor deceleration in the same amount of time. Dynamic Braking resistors were added to achieve the decel time required with this large inertia application. CASE application specific high carrier frequency software added for low audible noise operation.