

# TOUGH JOBS



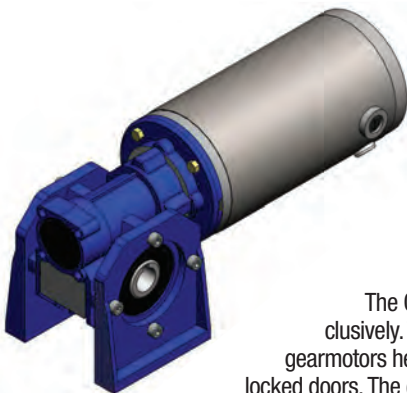
## Detention Doors Test Limits

Imagine the sound of “lock down” as a series of automated prison doors close in orchestrated succession. Critical applications like these get intense attention at Groschopp. Think about it—automated doors in elevators, hospitals, prisons and the like must open and close without fail—hundreds of times a day, week after week.

Reliability in a secure setting like prisons couldn't be much more critical, and such was the case with this OEM. They needed robust gearmotors with a high enough starting torque to move heavy prison doors weighing from 200 to 1200 pounds, but still fit into a very tight envelope. Designing a solution for this OEM challenged the team with a space issue, along with the need to supply power at a right angle (RA) to the motor placement.

An often overlooked “design advantage” of an application such as automatic doors is the intermittent nature of their operation. This usually allows a smaller (and less expensive) motor to be specified and is an important factor in motor sizing, particularly when dealing with a tight envelope. Since cooling is often not a primary concern with intermittent duty, it eliminated the need for cooling fins on the gearbox.

The team was able to apply a customized PMDC (permanent magnet DC) motor, since brush wear would be minimal, which provided the needed high starting torque and smooth continuous operation. Back-driveability was also required so the doors could be manually operated in the event of a power outage. A 5:1 ratio RA gearbox was matched to the motor, and allowed for custom mounting feet.



The resulting gearmotor fit neatly into the available space, and provided necessary torque to move heavy doors, while operating smoothly and reliably. The OEM's test door setup has performed with this gearmotor for 1.6 million cycles without failure, and has proven to be highly reliable in the prisons.

The OEM has used Groschopp's motors exclusively. Their service representative said, “These gearmotors help keep dangerous criminals behind locked doors. The consequences of failure are severe.”



## FOCUS ON: AUTOMATED DOORS

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### The Challenge

- An OEM making automated prison doors needed:
- Gearmotor with sufficient torque to smoothly operate doors weighing 200 - 1200 pounds
- Exceptional reliability for high security application
- Power output at right angle to the motor
- Back-driveability for potential manual operation
- Small package for tight installation

### The Solution

- PMDC motor with high starting torque
- Right-angle speed reducer without heatsink
- Compact, optimized gearmotor package
- Rigorous testing to 1.6 million operations

The Groschopp solution resulted from extensive specification development with the OEM to determine the motor's power to size ratio, minimizing the package size by optimizing the motor selection. Testing under demanding load conditions proved the design.

### TOUGH JOB

## Design Checklist

#### Motor/Gearbox Torque

With door applications, starting torque is critical to initiate door movement. PMDC motors characteristically have high initial torque, with a linear speed torque curve, making it a perfect option. For motor speed/torque curves, visit [www.groschopp.com](http://www.groschopp.com)

#### Noise

Noise is especially important in residential and institutional applications, so be sure to determine both the acceptable frequency range of the sound, as well as decibel range.

#### Duty Cycle

To optimally size a gearmotor, understand the application duty cycle. Intermittent duty applications allow for a smaller package, as the gearmotor mass correlates directly to dissipated heat.

**Each automated door application presents different challenges, such as noise, size, and cooling.**

**Read more about other applications at**



#### LEARN MORE:

For more information on optimizing motor and gearbox selection, see our engineering resources at [www.groschopp.com](http://www.groschopp.com)

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