The heart of your building™

Advanced Magnetic Materials and their Applications 2007

Permanent magnet motors in elevator applications

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KONE *KEY FIGURES 2006*

Sales	EUR 3,601 million
Operating income	EUR 360 million
Order intake	EUR 3,116 million
Personnel	29,000

Market capitalization	EUR 5,382 million
Share holder base	approx. 14,000

- KONE delivers 40,000 new elevators and escalators per year
- Approx. 600,000 elevators and escalators under maintenance contract

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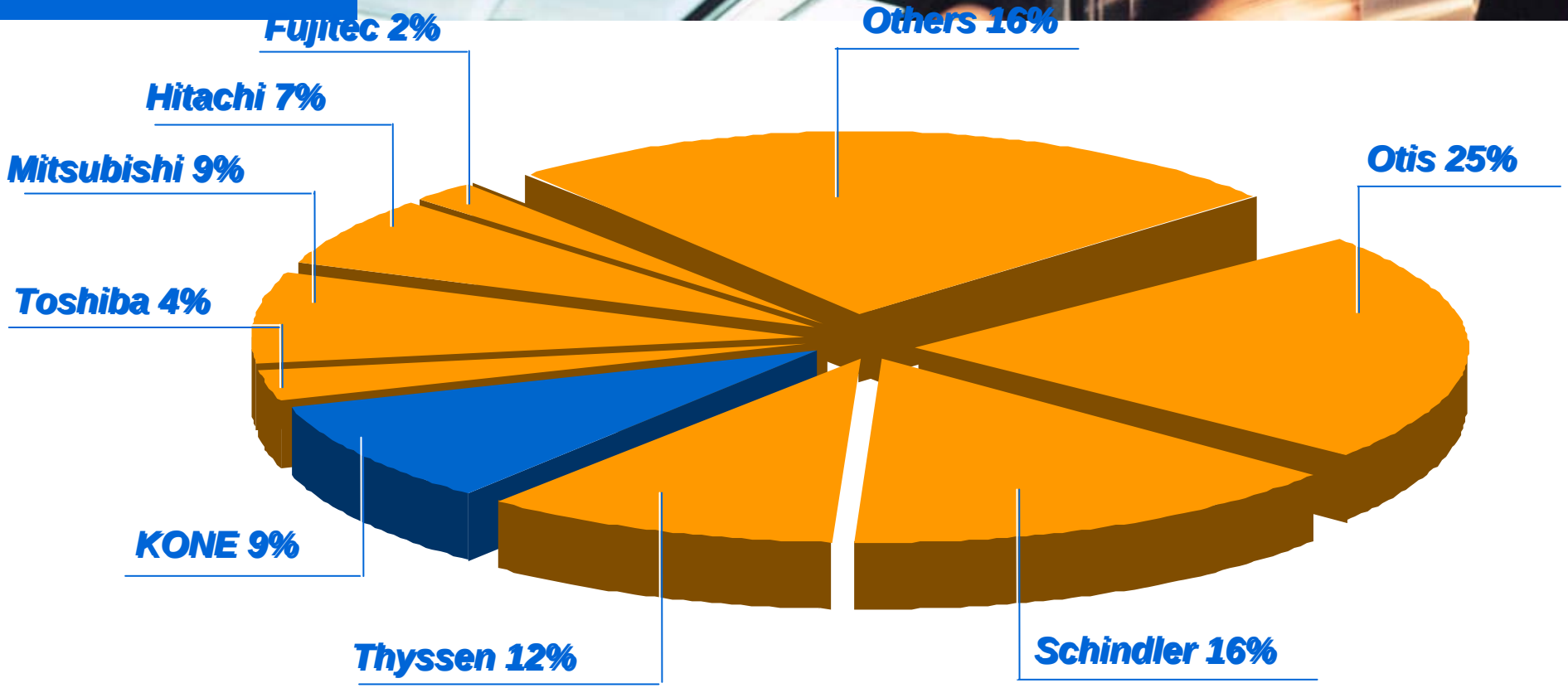
Market Shares 2003



Based on publicly disclosed sales figures and analysts' estimates

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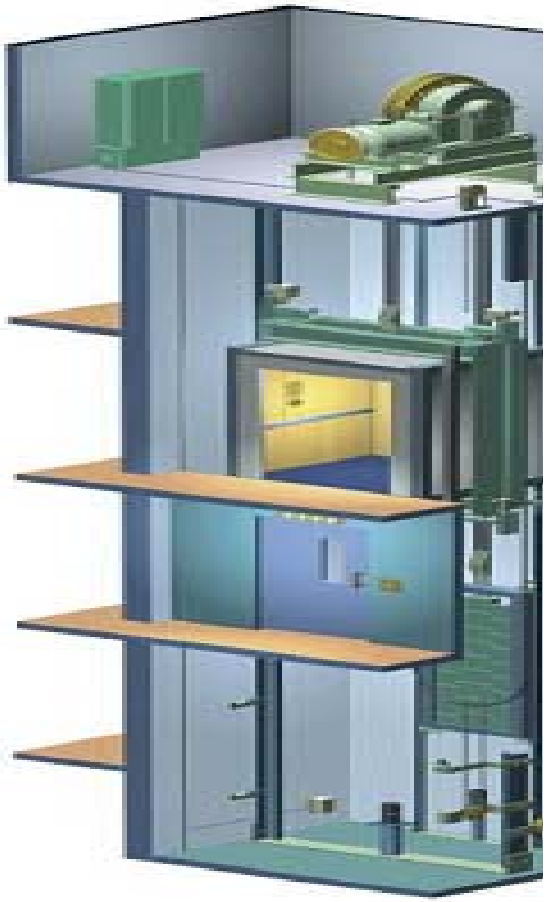
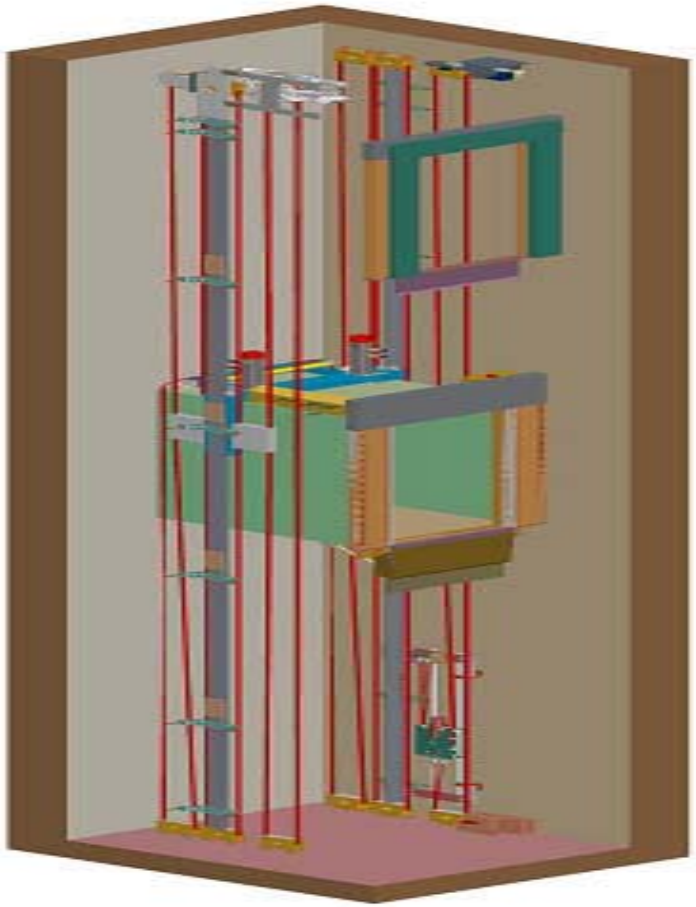
Elevator technology evolution





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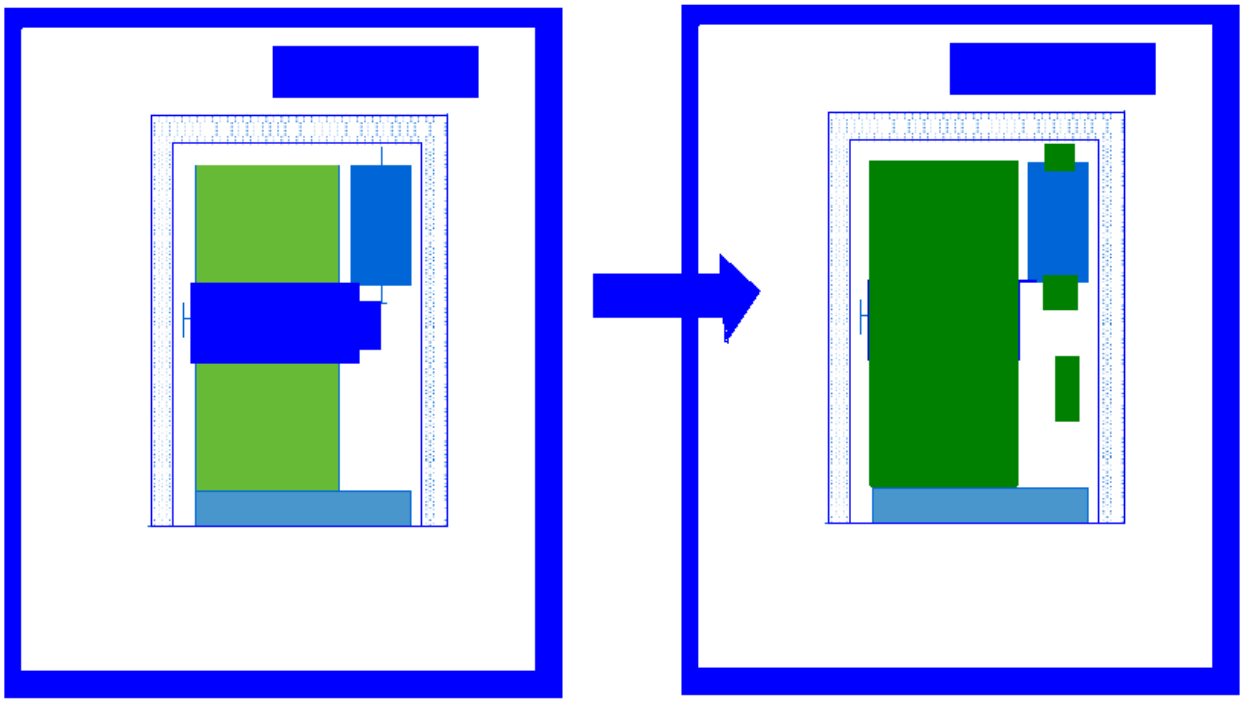
OTIS Sky Linear



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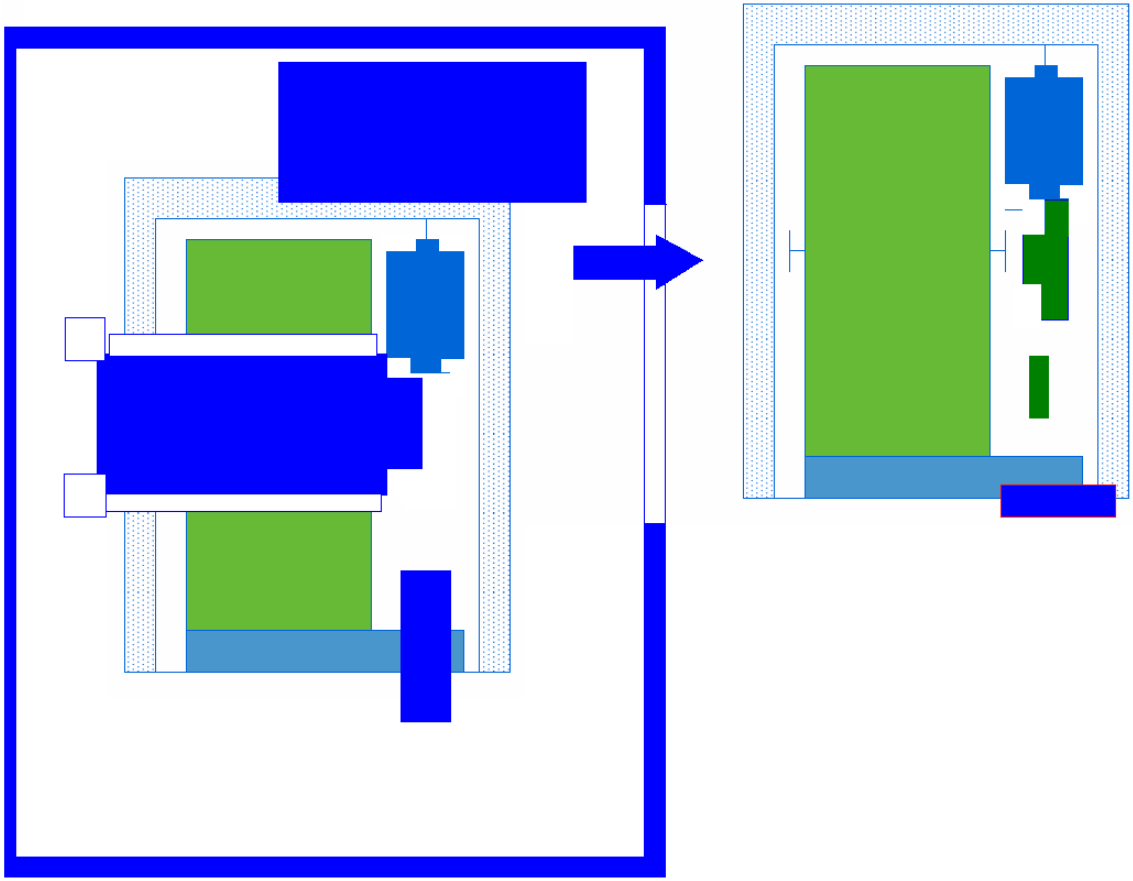
KONE MonoSpace™



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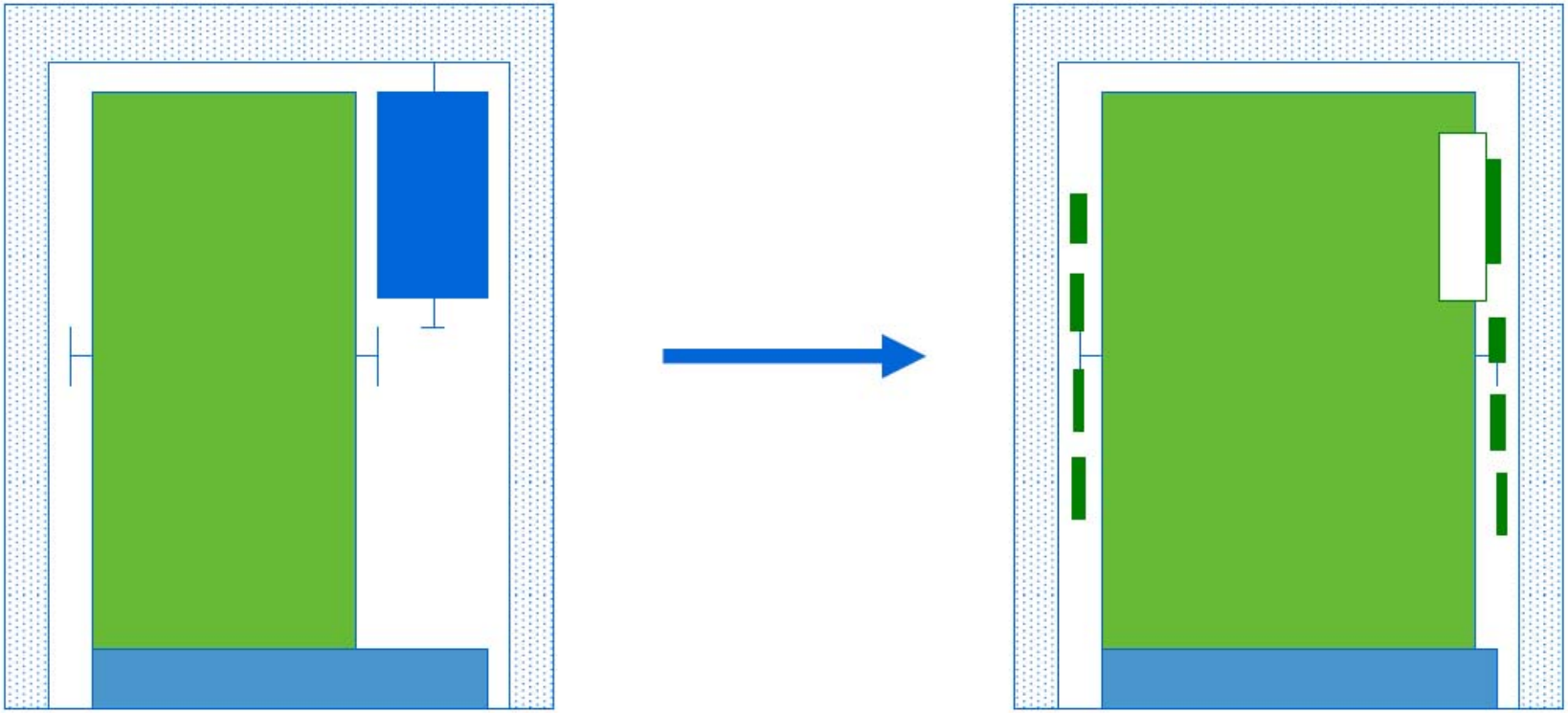
KONE MAXISPACE™



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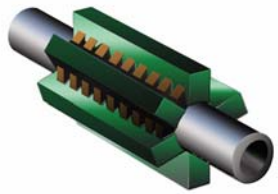
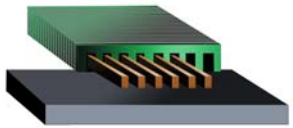
Linear Induction Motor

Normal rotor

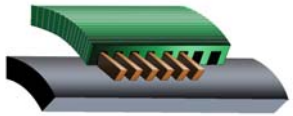


OTIS LIM

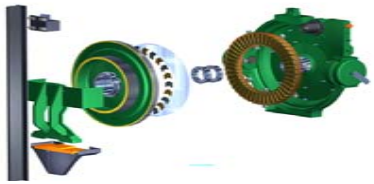
Linear motor



Curl Linear motor



Uncurl rotor



KONE Ecodisc

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Kone Technology

Selected technology (reasoning)

- Permanent magnets (space requirement, efficiency)
- Sintered NdFeB magnets (feasible cost, temperature & energy product)
- Magnet shape optimized for (good ride quality, small torque ripple & noise)
- Axial flux synchronous motors (space & manufacturing easines& no existing manufacturing for radial flux macines)

Technology co-operation

- HUT, LUT, VTT, TUT, Magnet Technology Center

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KONE EcoDisc® – the money-saver

The revolutionary EcoDisc® weighs less than half of a conventional geared traction machine, has only one moving part, and is roughly twice as efficient.

EcoDisc® efficiency is three times that of a hydraulic power unit and it uses 60% less energy – a saving which can represent half or more of the annual cost of elevator maintenance.

Comparing the EcoDisc® with typical conventional hydraulic and 2-speed traction elevators confirms clear technological advantages:

Item	Hydraulic	Traction	EcoDisc®
Speed (m/s)	0.63	1.0	1.0
Load (kg)	630	630	630
Motor size (kW)	11	5.5	3.7
Main fuse size (A)	50	35	16
Energy consumption (kWh/y)	7200	5000	3000
Thermal losses (kW) *)	3.8	3.0	1.0
Oil requirements (l)	200	3.5	0
Weight (kg) **)	650	430	230
Typical noise level (dba) ***)	65-70	65-75	50-55
Typical machine-room (m^3)	5	12	0

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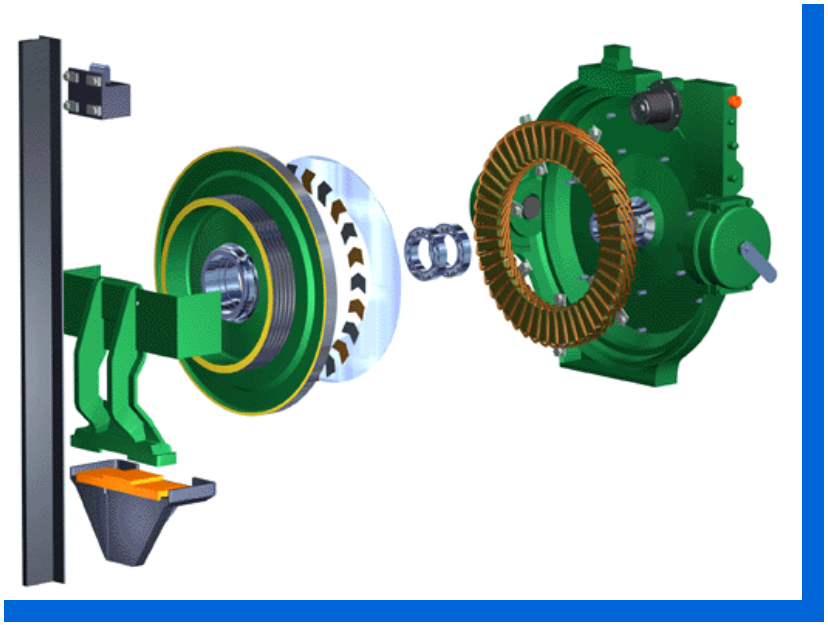
Single EcoDisc™ Construction

- *"Rotational Linear Motor" combined with synchronous axial motor technology.*
- *NeFeB permanent magnets.*
- *Machine sizes MX05, MX06, MX10, MX20 for MonoSpace™*



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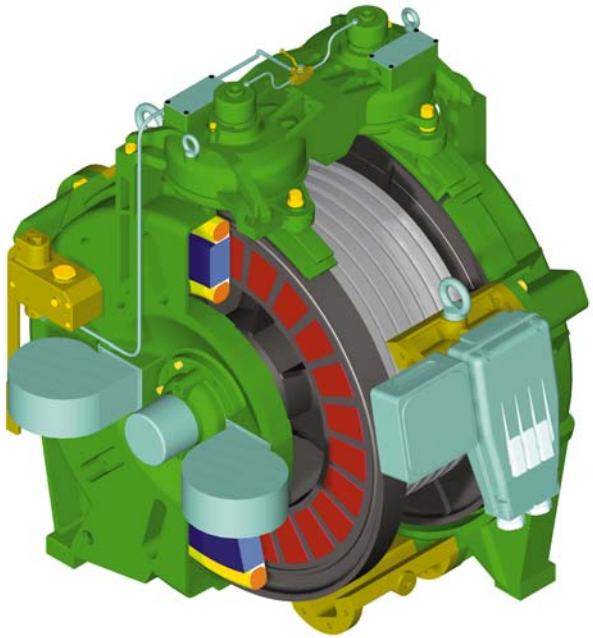
Elevator technology evolution

- ***In big motors, increasing the diameter of the stator results in uneconomical construction.***

- ***It is better to use two motors on both sides of the traction sheave.***

- ***Machine sizes***
  MX32, MX40, MX100
  for high rise buildings.



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KONE MonoSpace® The most celebrated elevator innovation of modern times

1996	Announced to world press
1996	Wins Grand Prix at Building Fair, Prague
1997	Wins the Grand Prix ´97 at CONECO Fair, Bratislava, Slovakia
1997	Wins Top Prize for Innovation at SAIE ´97 Fair, Bologna
1997	Wins Grand Prize for Innovation at Batimat Fair, Paris
1998	Wins Electrical Industry's (SET) Annual Award, Finland
1999	Chosen for "Eyecatcher", a Swissbau showcase green building, Switzerland

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KONE MonoSpace® The most celebrated elevator innovation of modern times

1999	Wins NOVA Award for Construction Innovation, Detroit, USA
1999	Wins the Construmat 1999 Prize for Innovative Technology, Barcelona, Spain
1999	Wins Top Prize for Innovation, Baucon Fair, Singapore
2000	Wins Nikkei Outstanding Quality Products and Services Award, Japan (Nihon Keizai Shimbun group of economic newspapers)
2000	Chosen for Thermo-Staete, Netherland´s most energy-efficient office building
2000	Recommended Product for Engineering Construction, China Engineering Construction Association, China
2002	Chosen for 'Product of the Year', British Lift Industry Awards, UK
2003	Wins 'Best Innovation' Award at Building Specialist Contractor Awards by Building Magazine, UK
2003	Awarded the 'Premio Quatrium for Innovative Solutions' by Via Inmobiliaria, Spain

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KONE INNOTRACK™

- Surface mounted, no pit required
- Architectural freedom
- Easier installation
- A flat and light construction
- Green drive technology
- Decorative pallets
- Flexibility of use
- Reusability
- Solves difficult transportation problems

More than 20 patents protect the innovations in KONE InnoTrack™.

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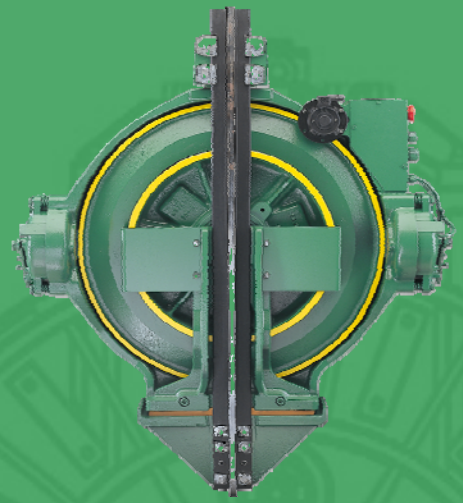
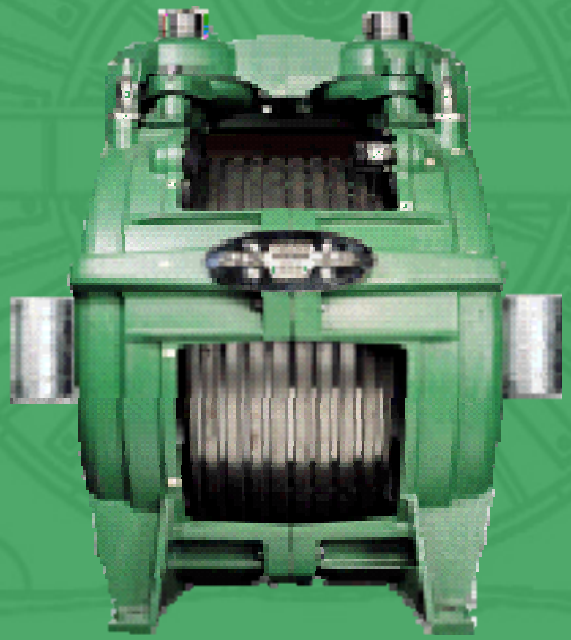
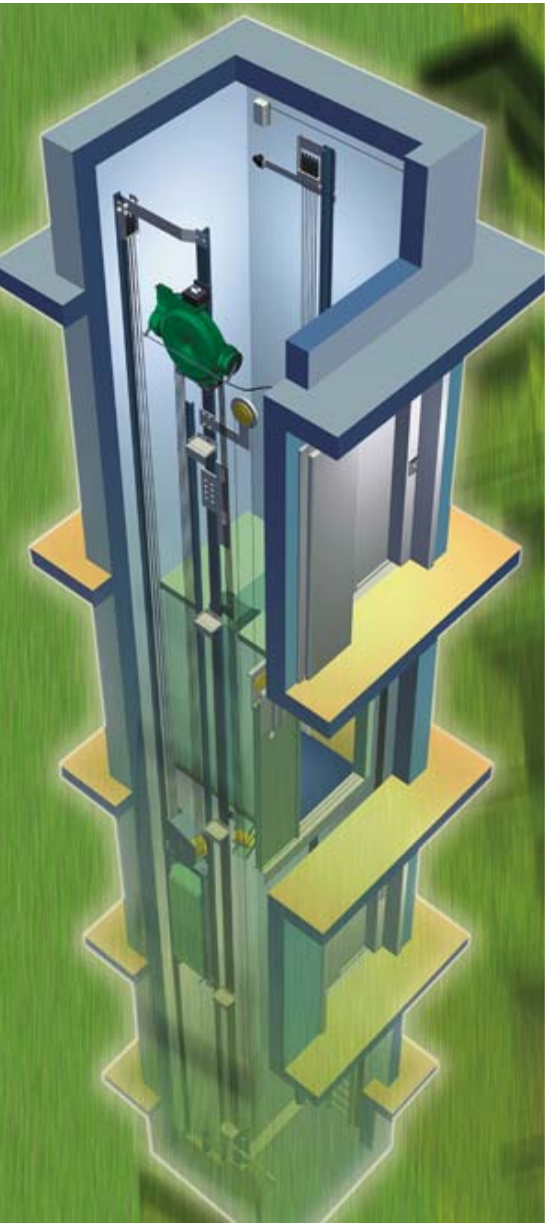
KONE EcoDisc®

- The elevator invention of the 20th century
- Ensures a smooth ride, accurate stopping and reliable operation of the elevator
- Replaces several different solutions: featured in both machine-room-less applications and elevators with machine rooms.
- KONE is the only elevator company that can offer consistent technology to all types of builidings (low, mid and high)





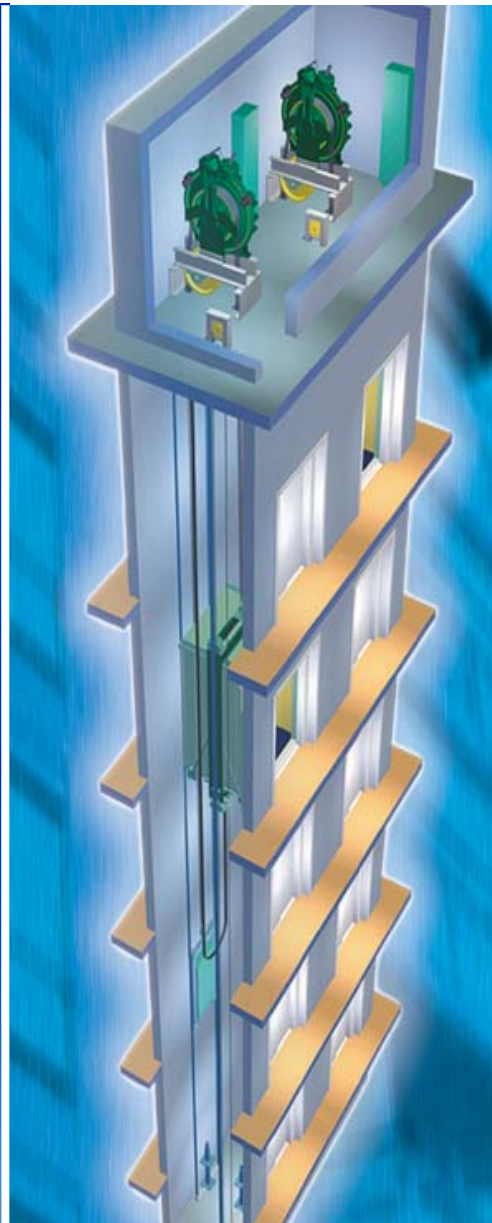
Technology Impact



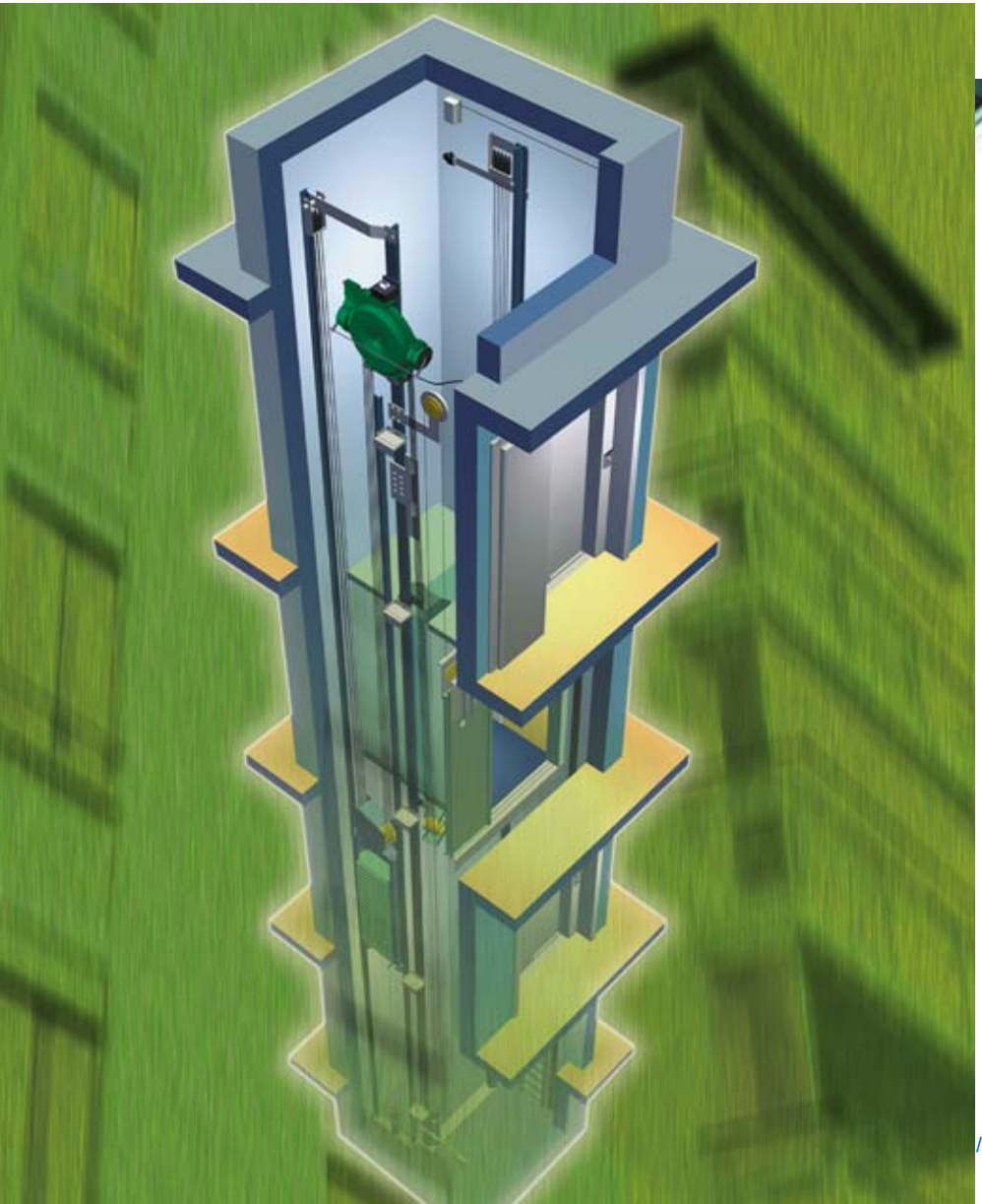
Consistent technology for all buildings

- A new industry standard replacing several different solutions

  Powered by KONE EcoDisc®
-
  - KONE MonoSpace® for low rise
  - KONE MiniSpace™ for mid range
  - KONE Alta™ for high rise
  - KONE TranSys™ for freight

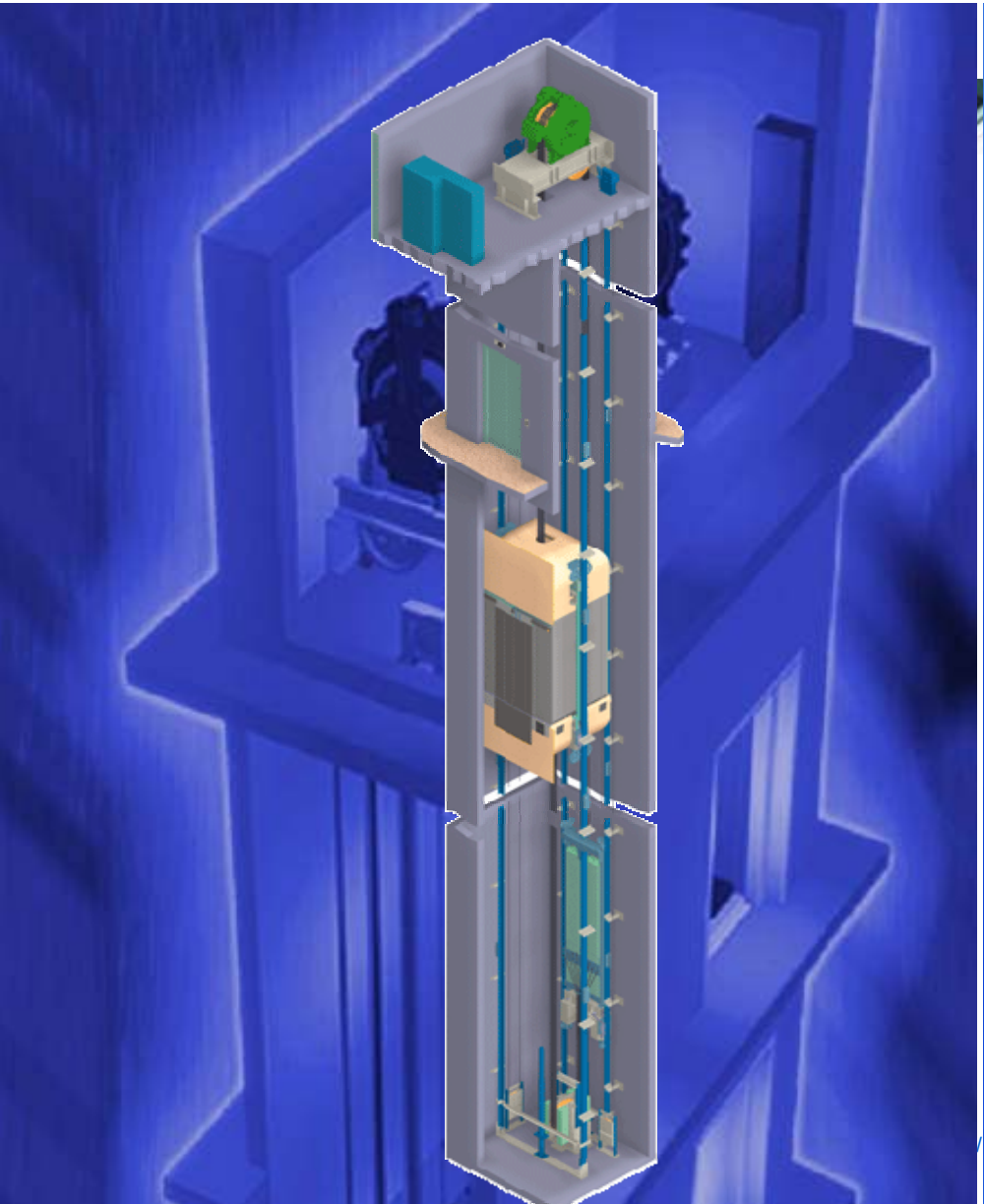


KONE MonoSpace®



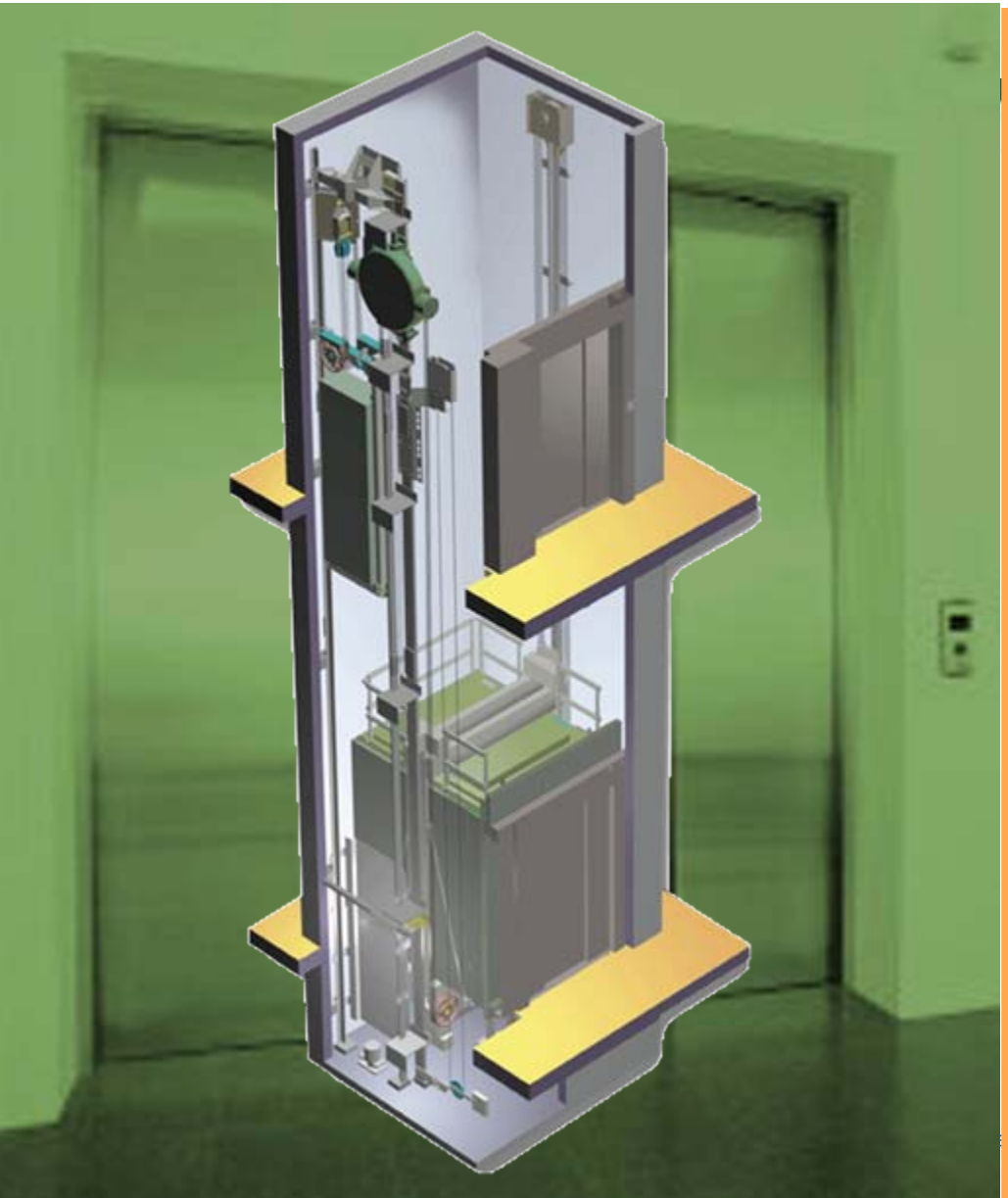
- The elevator invention of the 20th century
- Winner of many prestigious awards from around the world
- Add value for customers:
  - Easier building design and improved aesthetics
  - Lower construction costs
  - Space savings
  - Lower energy and life-time costs
  - Greater building quality and comfort

KONE MiniSpace®



- KONE MiniSpace™ elevators feature the space-saving KONE EcoDisc® hoisting machine above the shaft
- Particularly suitable for medium to high-rise buildings

KONE TransSys™



- KONE TransSys™ freight elevators use machine-room-less technology
- Especially suited for low-rise buildings
- Elevator stops accurately at landing, which facilitates the loading and unloading of heavy goods

MX 05 Hoisting Machinery

- Power 2.8 kW
- Nominal torq. 240 Nm
- Weight 180 Kg
- Width 730 mm
- Height 810 mm
- Axial length 230 mm
- Lift applications:

  - 2:1, 480 kg 1 m/s

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MX 06 Hoisting Machinery

- Power 3.6 kW
- Nominal torq. 370 Nm
- Weight 260 Kg
- Width 930 mm
- Height 890 mm
- Axial length 260 mm
- Lift applications:

  - 2:1, 630 kg 1 m/s 630 kg 1.75 m/s

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MX 10 Hoisting Machinery

- Power 13.3 kW
- Nominal torq. 800 Nm
- Acc torq. 1400 Nm
- Weight 370 Kg
- Width 1070 mm
- Height 990 mm
- Axial length 280 mm
- Lift applications:

- 2:1,	1000 kg	1.0 m/s	
	1000 kg	1.6 m/s	
	1150 kg	0.75 m/s	
	1150 kg		2.0 m/s
- 4:1,	2000 Kg		0.5 m/s

2007-06-11/PL

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MX 18 Hoisting Machinery

- Power 36.0 kW
- Nominal torq. 1850 Nm

Acc. torque 3800 Nm
Weight 800 Kg
Width 1060 mm
Height 1170 mm
Axial length 630 mm
Lift applications:

1:1,	1000 kg	3.5 m/s
2:1,	2050/1600 kg	3.5 / 4.0 m/s
4:1,	3700 kg	1.75 m/s

Shaft load 75kN

-11/PL

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MX 20 Hoisting Machinery

- Power 34 kW
- Nominal torq. 1800 Nm
- Acc. torque 3800 Nm
- Weight 780 Kg
- Width 1350 mm
- Height 1290 mm
- Axial length 330 mm
- Lift applications:

2:1/ED60	2050 kg	2.5 m/s
	1600 kg	3.0 m/s
2:1/ED40	2500 kg	1.0 m/s
	2275 kg	1.75 m/s
4:1/ED60	4000 kg	1.0 m/s
	3200 kg	1.6 m/s
4:1/ED40	4500 kg	1.0 m/s

- Shaft Load 50 kN

11/PL

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MX 32 Hoisting Machinery

- Power 71.0 kW (S1 96 kW)
- Nominal torq. 3800 Nm
- Max. torque 9000 Nm
- Weight 1750 Kg
- Width 1280 mm
- Height 1360 mm
- Axial length 1130 mm
- Lift applications:

- 1:1,	1600 kg	6.0 m/s	
- 2:1,	3200 kg	4.0 m/s	
- 4:1,	6400 kg		1.75 m/s

- Shaftload 148 kN

2007-06-11/PL

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MX 40 Hoisting Machinery

- Power 90 kW (S1 121 kW)
- Nominal torq. 6200 Nm
- Max. torque 19000 Nm

'eight 2700 Kg

'idth 1580 mm

eight 1530 mm

xial length 1240 mm

ft applications:

:1, 2250/2050 kg 6.0 / 8.0 m/s

:1, 4500/4000 kg 3.0 / 4.0 m/s

:1, 9000/8000 kg 1.6 / 2.0 m/s

haft Load 220 kN

PL

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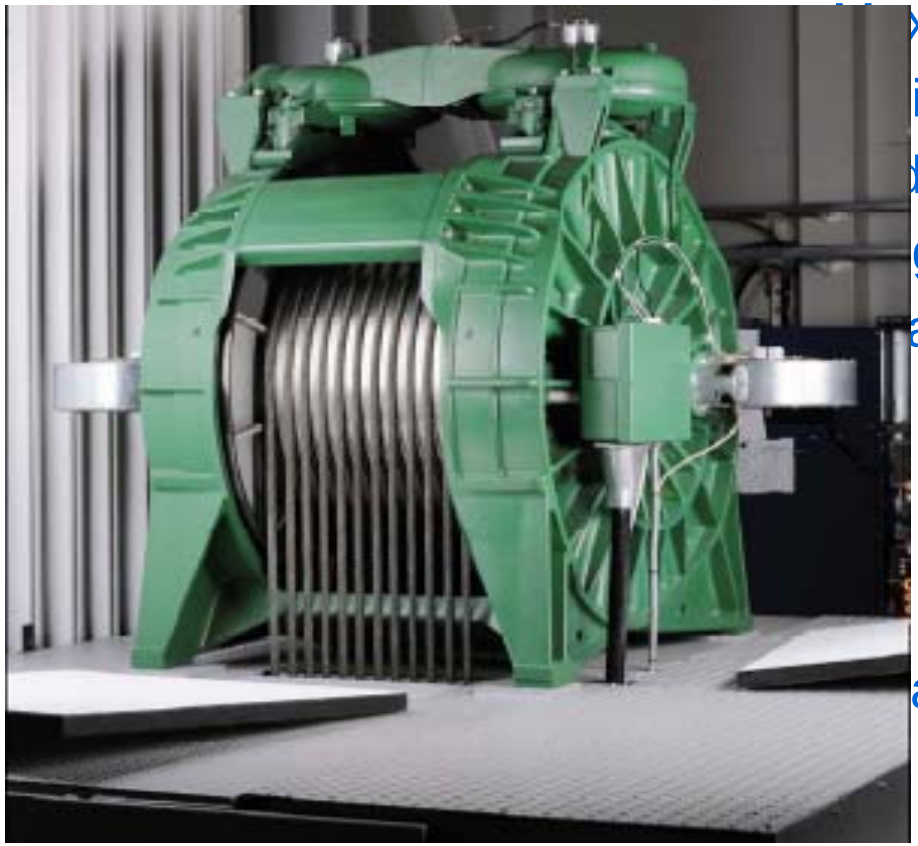
MX 100 Hoisting Machinery



- Power 250 kW (S1 330 kW)
- Nominal torq. 16000 Nm

x. torque 50000 Nm

ight 6150 Kg

dth 1860 mm

ght 2100 mm

al length 1800 mm

applications:

4500 kg	10 m/s
10000 kg	4.0 m/s
18000 kg	1.75 m/s

aft Load 500kN

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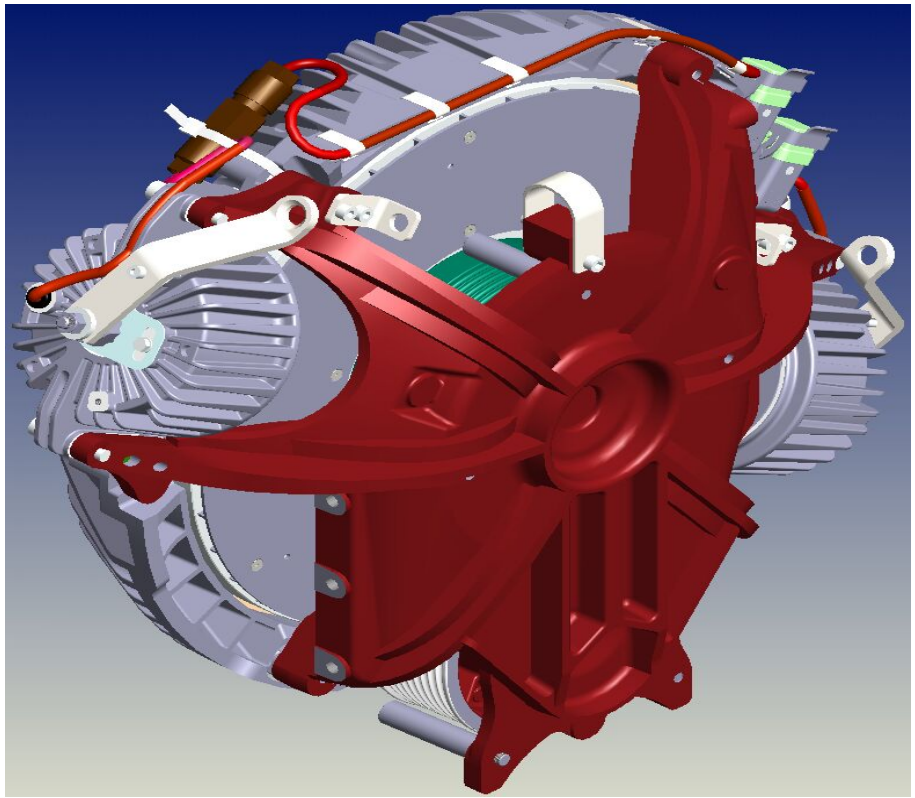
GMX1



- Power 6.5 kW
- Nominal torq. 81 Nm
- Weight 81 kg
- Width 564 mm
- Height 476 mm
- Axial length 186 mm
- Lift applications:
  -without counterweight
  - 10:1, 0.63 m/s 800 kg
  - 6:1, 1.0 m/s 480 kg
  - with counterweight
  - 4:1, 1.6 m/s 630 kg

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