Power Saving and System Efficiencies

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Principal Sponsor

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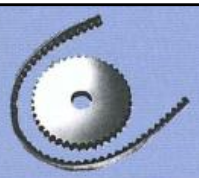
Rotorua, NZ

Content

Common Mechanical Losses

Belt Drives, Chain Drives

Characteristic value				
Type of gear	Flat belt	V-belt	Toothed belt	Chain
Max. reduction	5	8	8	6
Efficiency	96 ... 98 %	92 ... 94 %	96 ... 98 %	96 ... 98 %

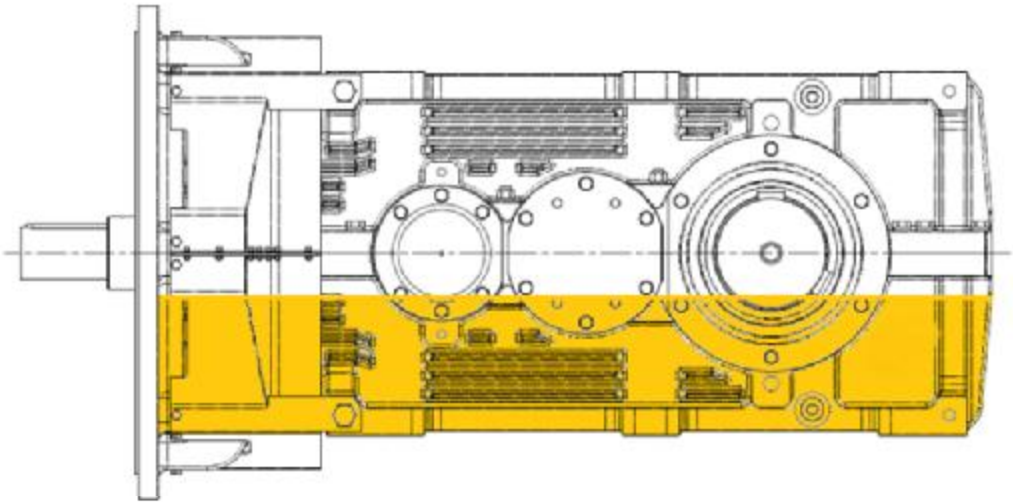
Common Mechanical Losses

Gearing

Characteristic value per stage			
Type of gear	Spur gear	Bevel gear	Worm gear
Max. reduction	approx. 7	approx. 5	approx. 50
Efficiency	approx. 98 %	approx. 98 %	approx. 50 ... approx. 96 %

Common Mechanical Losses

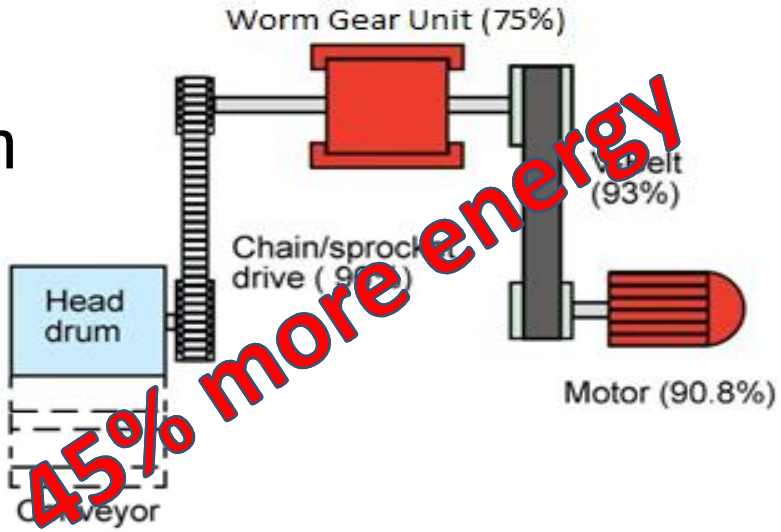
Lubrication



- Incorrect oil selection, high viscosity and / or extremely low ambient temperatures can consume up to 15% of the motor power.
- Running a gearbox in a mounting position that requires maximum oil fill increases the churning losses.

Common Mechanical Losses

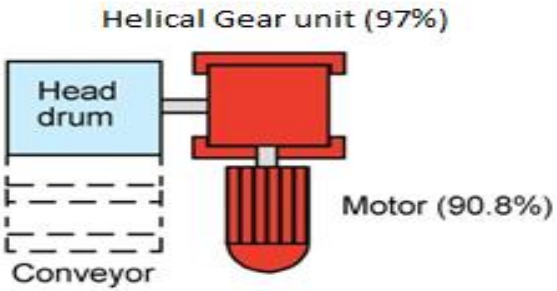
System



System Efficiency = 61%

Power required at conveyor = 9.1kW

Power drawn from mains = 14.9kW



System efficiency = 88%

Power required at conveyor = 9.1kW

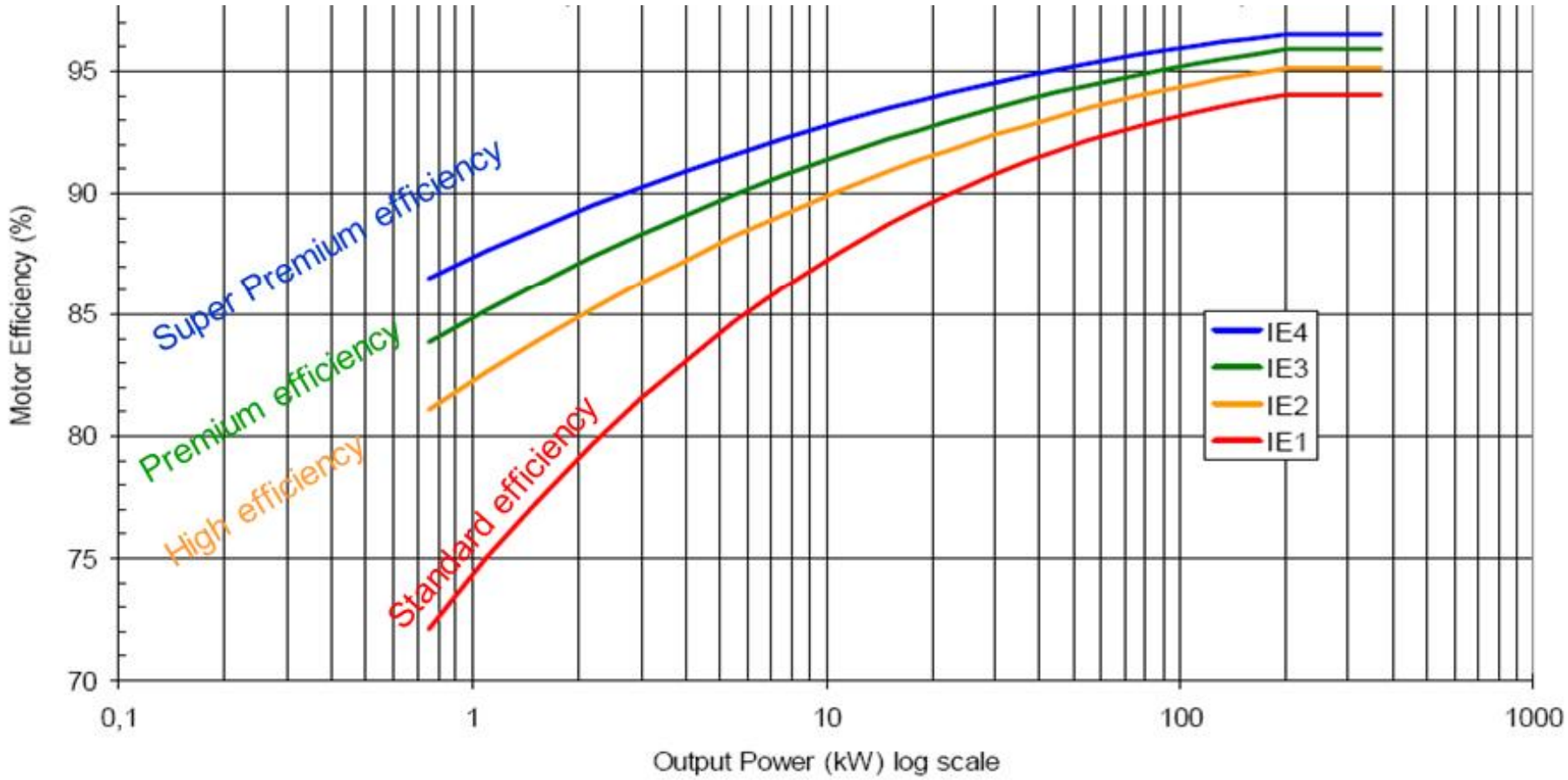
Power drawn from mains = 10.3kW

1	Common Mechanical Losses
2	Electrical Losses
3	System Efficiencies
4	Regenerative power supplies
5	Capacitive Storage systems
6	Q & A

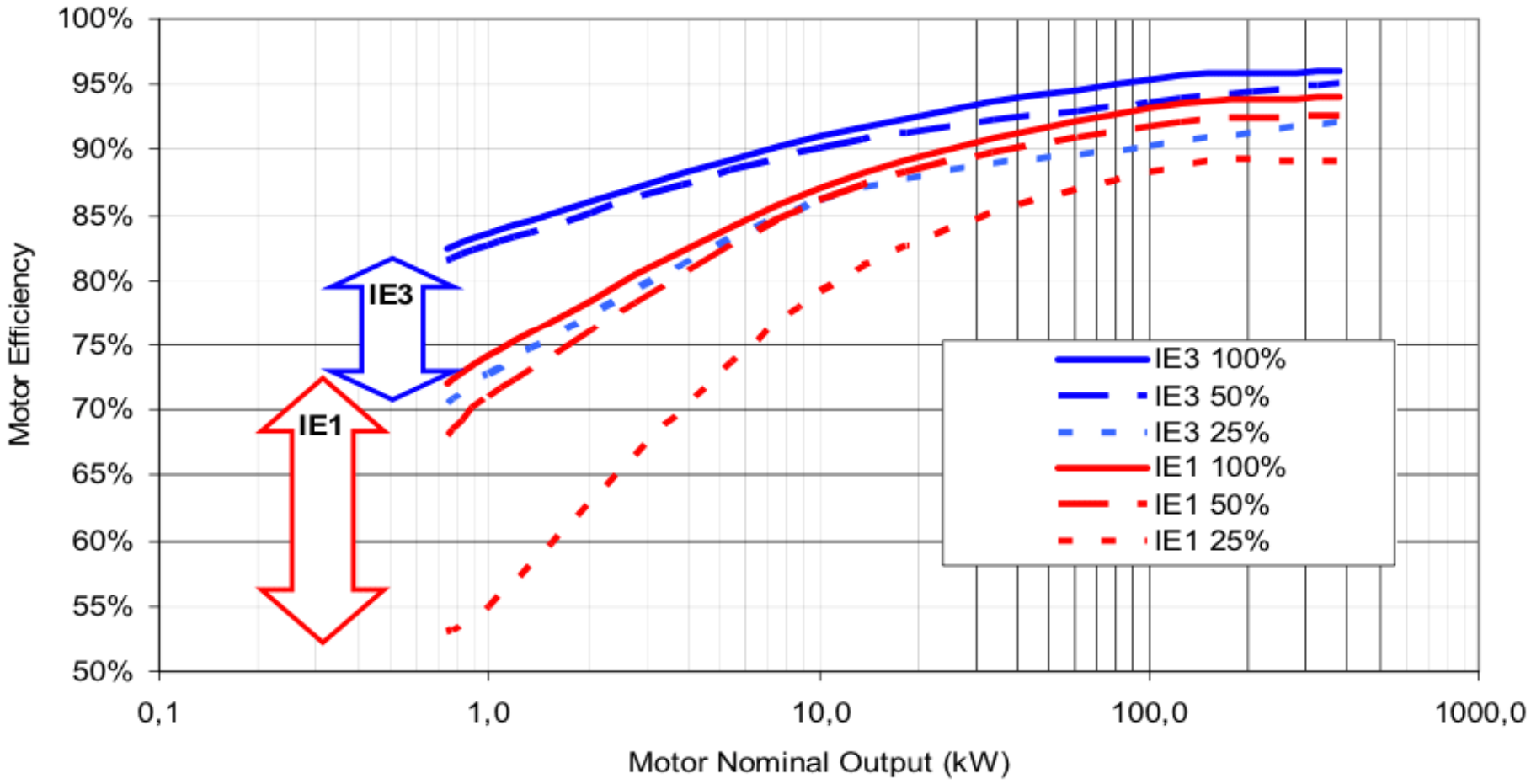
Electrical Losses

- Motor efficiency
- Motor Loading
- Supply system & Control via VSD's

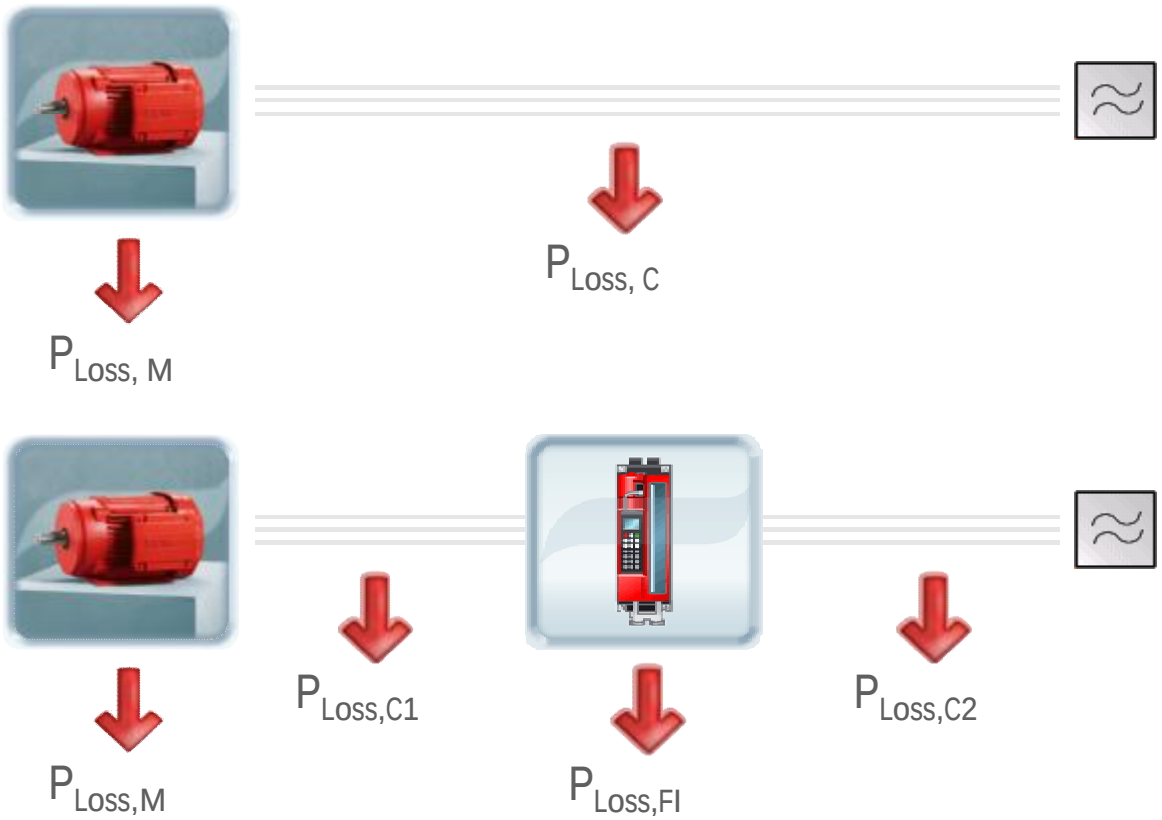
Electrical Losses - Motor efficiency



Electrical Losses - Motor Loading



Electrical Losses - Supply & Control via VSD's



2% – 6% losses

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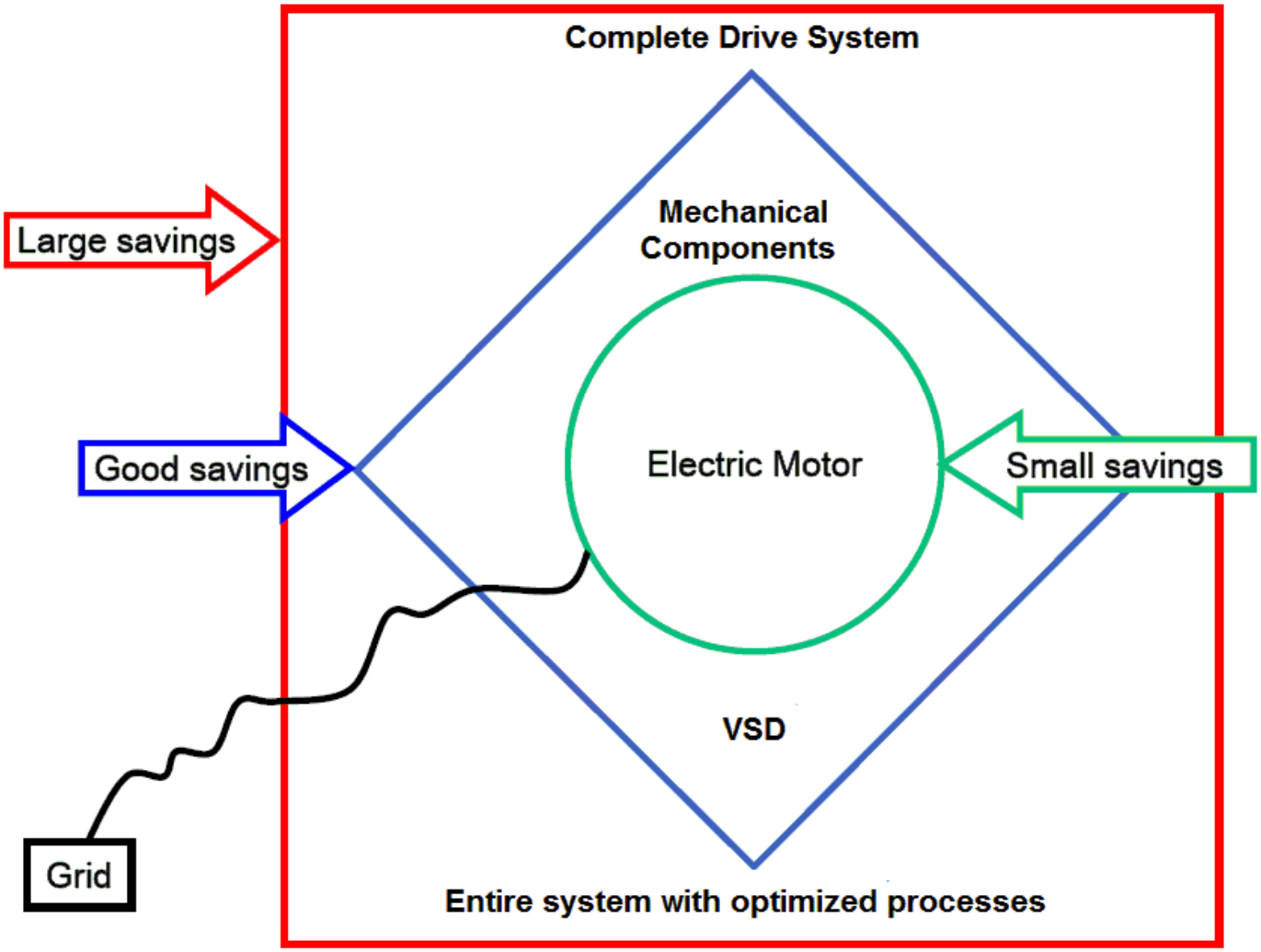
System Efficiencies

- Use the correct size motor for the application
- Replace or eliminate the inefficient drive components
- Use efficient starting methods
- Use VSD's to improve partial loading and incorporate smart system controls to adapt process speeds

System Efficiencies



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Regenerative power supplies

- Applications with high regenerative S1 power
  - Winders and un-winders
  - Lifts and hoists
  - Vertical stackers
- Applications with high dynamic braking
  - Shuttles drives
  - Transfer bogies
  - Flying saw
- Replacement of braking resistors

Case Study

Hoist Application:

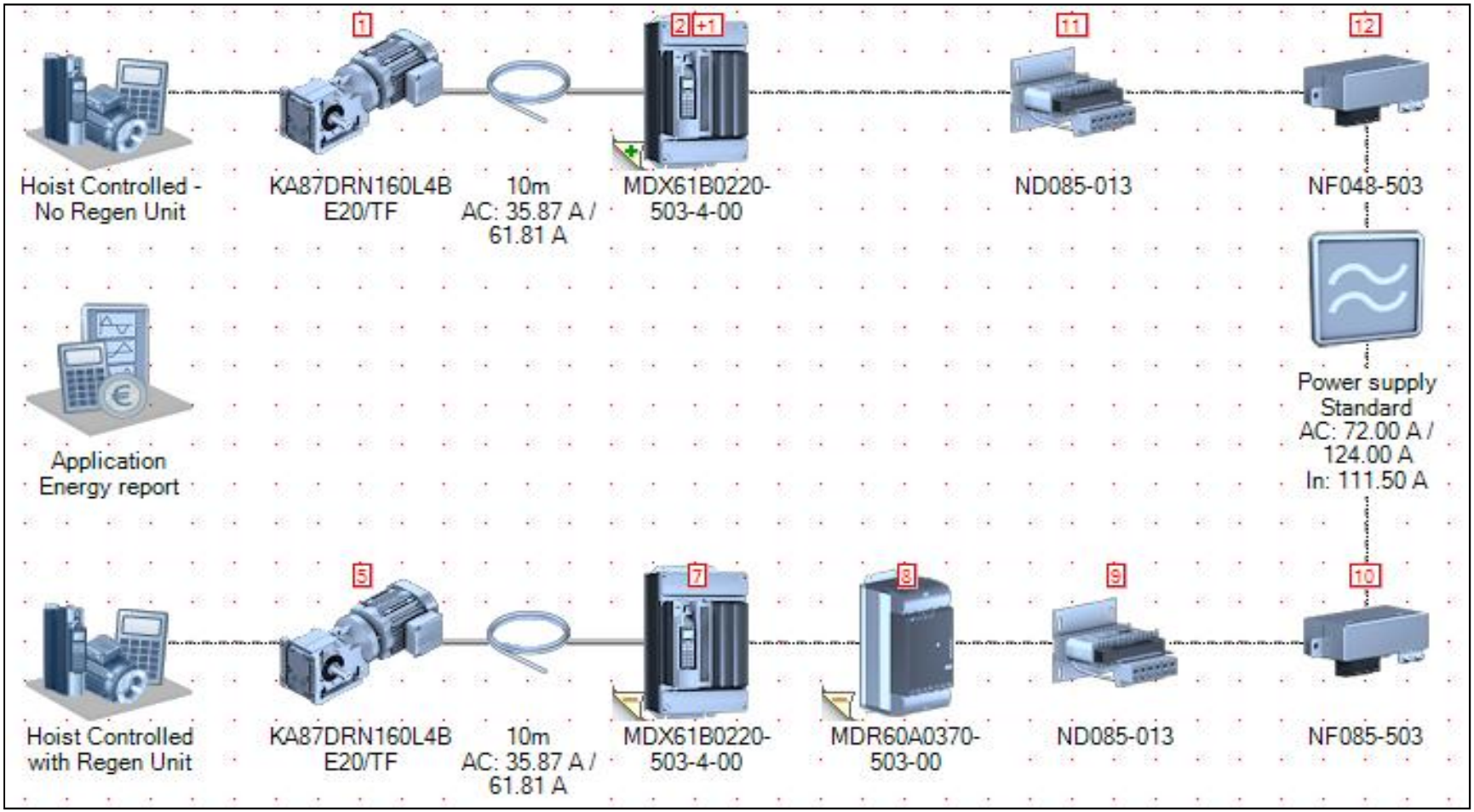
MDR60A0370 (37kW) used as supply module on a hoist with MDX61B0220 (22 kW)

- 1 x SEW motor, 15 kW 1450 rpm
- Drive connected via MDX61B0220 (no encoder)
- Simulation of hoist motion.

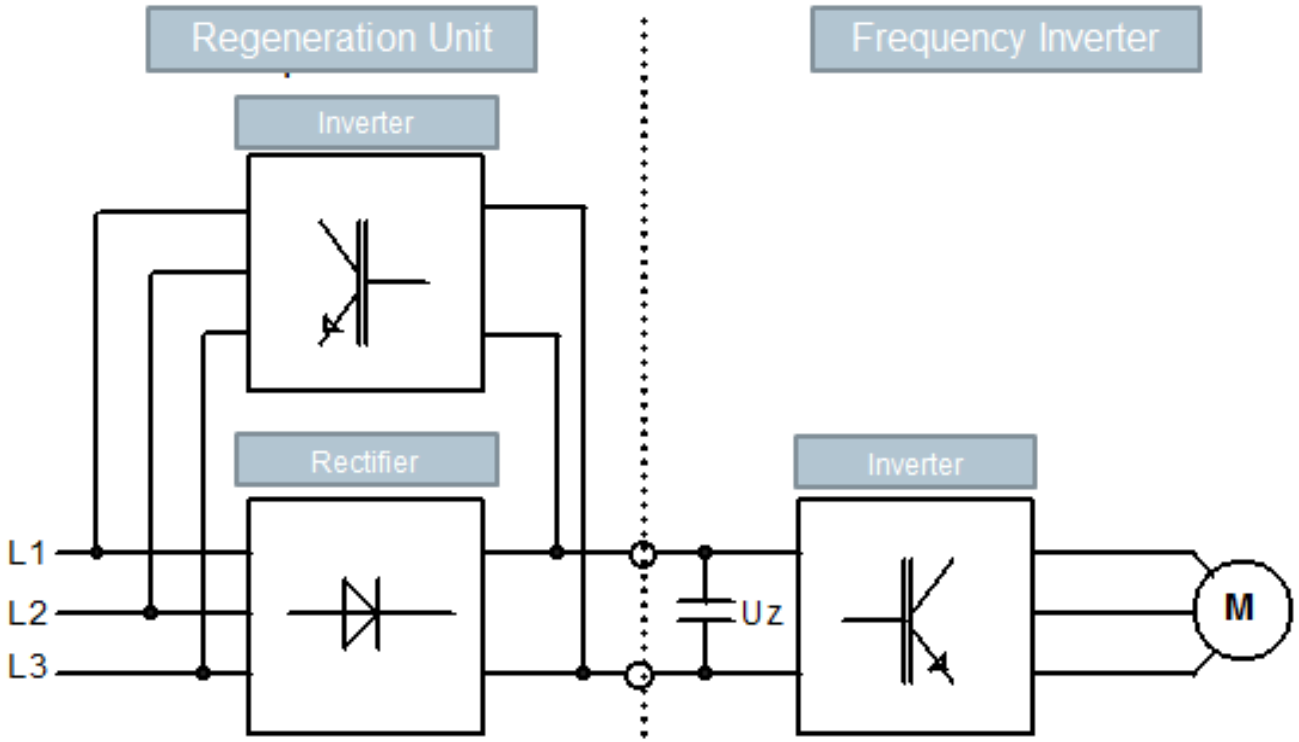
Measurements:

- Power/energy measured with standard braking resistor
- Power/energy measured with MDR60A0370 supply module

Graphical Workbench representation



Regenerative power supply connection



Energy report

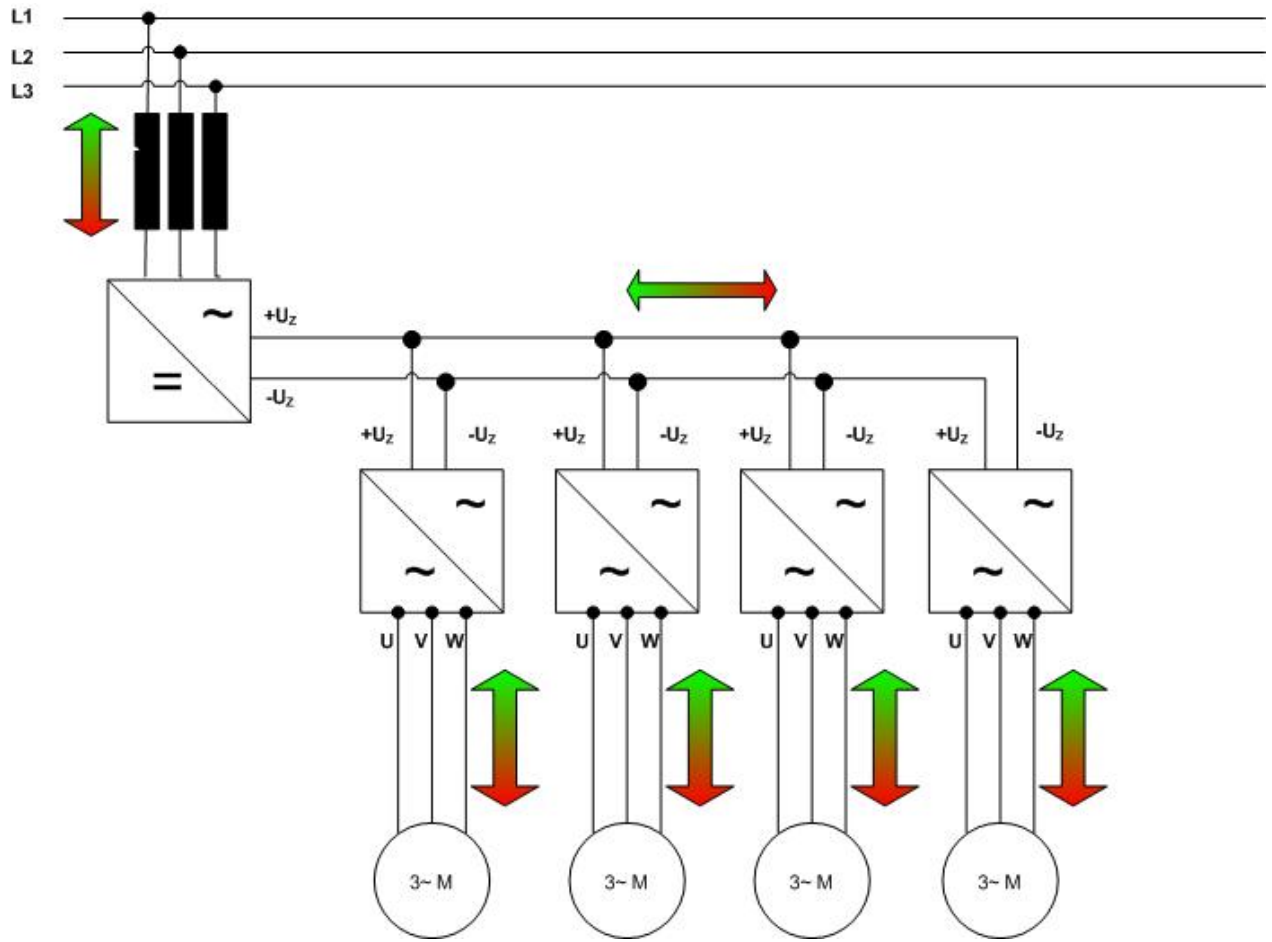
Test results:

Consumption with braking resistor	- 36 273 kWh/a
Consumption with energy recovery brake module	-21 877 kWh/a
Total Energy savings per annum	- 14 396 kWh/a
Cost savings at 19 cents/kWh	~ $ 2,736.00
Additional Capex	~ $ 3,500.00

40% energy saving

Cost savings from reduced energy consumption

Regenerative power supply connection

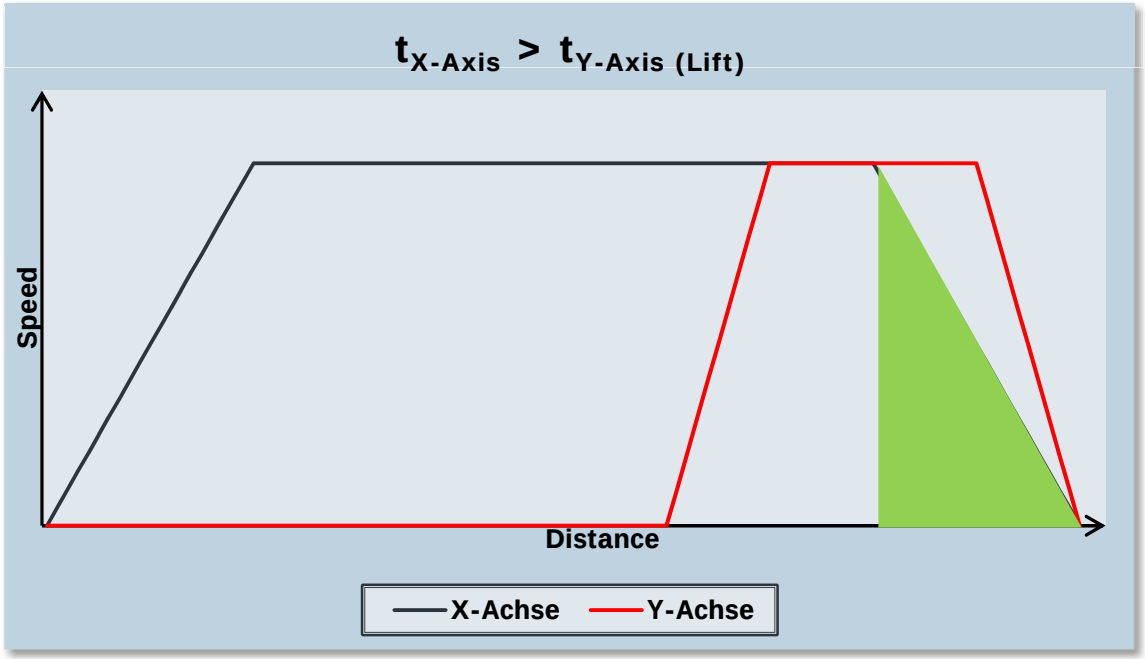


Energy Management

effidrive

effiSRS – intelligent coordination of synchronized axis.

- No additional hardware needed, only a software block
- Verification of time for travel and hoist axis,
- The axis with longer travel time (travel axis) starts at first,
- The second axis (hoist) starts movement as late as possible (without losing cycle time), in order to use the energy of the travel drive break



Regenerative power supplies - Advantages

- Enables the use of regenerative power within a closed system
- Eliminates the need for large or multiple brake resistors
- Reduces cabinet space
- Reduces electrical panel cooling requirements
- Significant cost saving over the product life span

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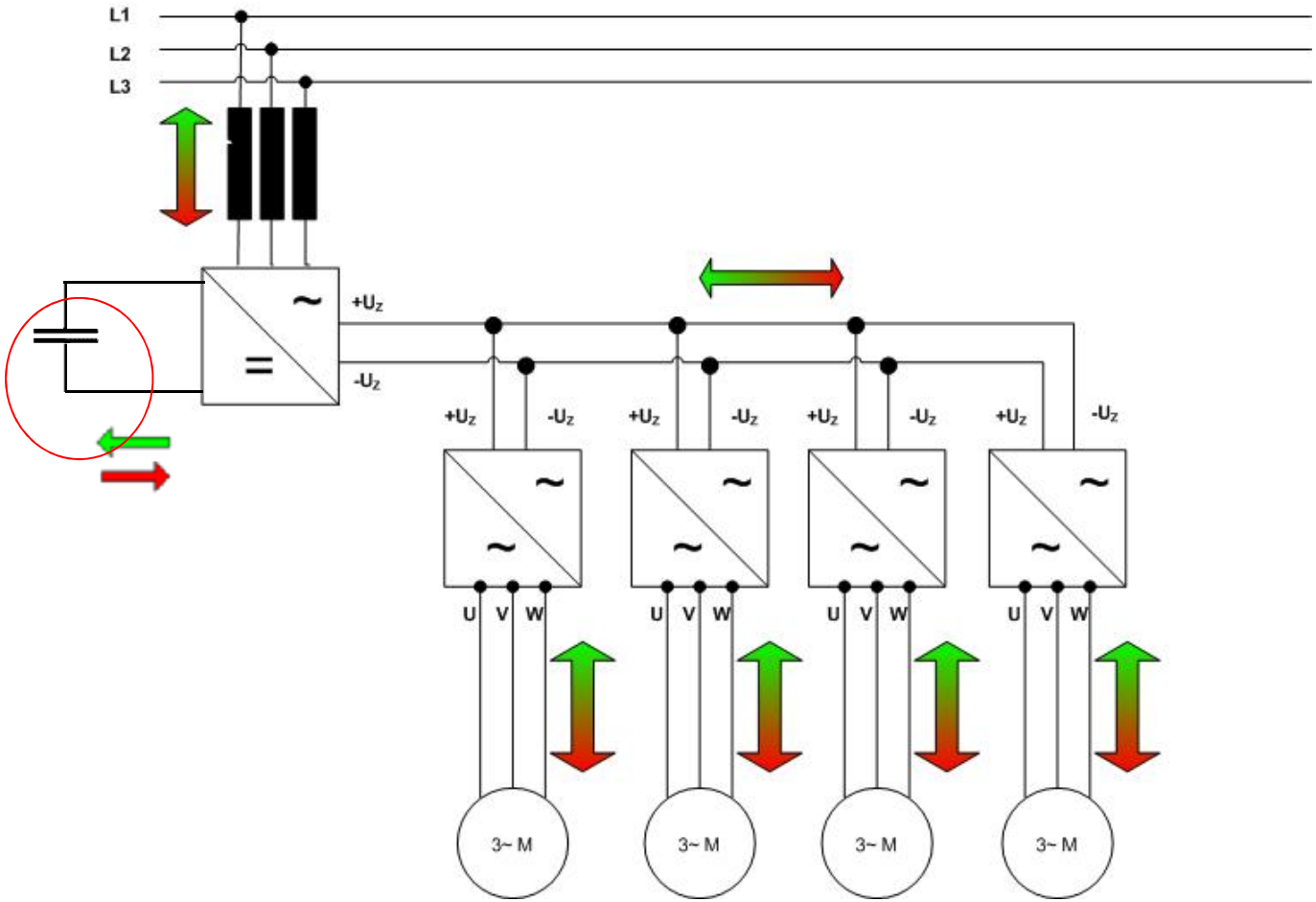
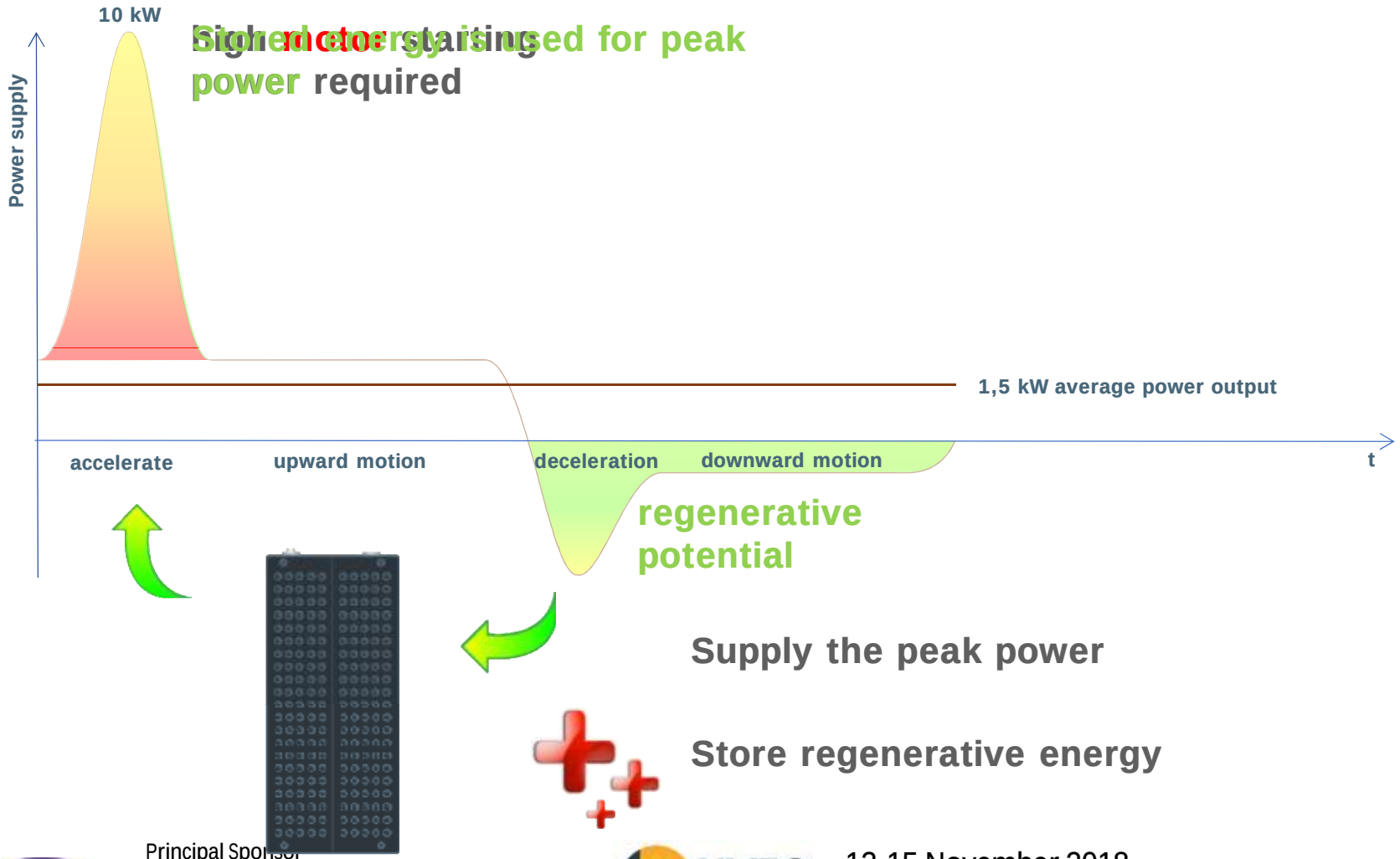
Regenerative power supply with Capacitive storage.



MAXOLUTION - Warehouse logistics

Energy buffer — operating principle



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Capacitive storage - Advantages

- All the advantages associated with the regenerative power supply

and

- Reduces the peak demand current on the supply by the application
- Smaller supply cables, switch gear etc. to the system
- Lower overall factory power demand on the grid

MOVIDRIVE® MDR regenerative power supply units - Documentation

Documents are available for download from our website at:
www.sew-eurodrive.co.nz / www.sew-eurodrive.de

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