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Untapped Trends in Pulp & Paper Solution

Introduction
Paper Industry demands..

- Pulp & Paper Industry demands continuous need of processes and system which improves :
  - productivity ,
  - minimizes cost
  - extends equipment life.

- A lot has been done to improve the energy efficiency of the plant like :
  - Replacing obsolete and inefficient equipments
  - Upgrade from DC to AC Drives
  - Process optimization
  - Etc..

Introduction
To realize larger gains..

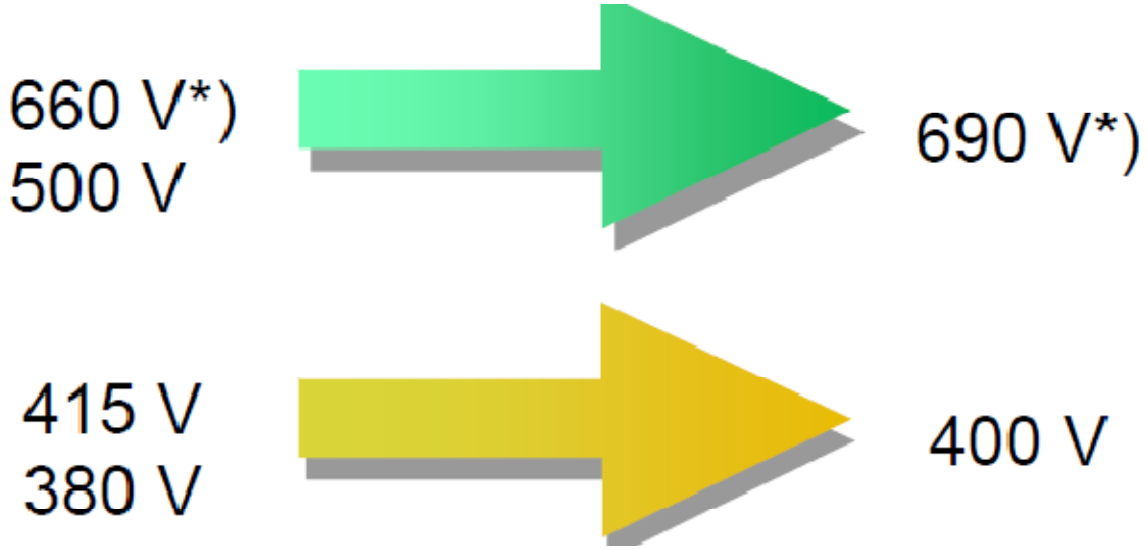
- To realize larger gains, initial focus during the design and engineering phase of the plant electrical and automation systems opens up new possibilities :
  - 690 V System
  - Direct Drive Solution
  - Intelligent MCCs

Short description of 690 V concept

- Normal international standard AC-motors 400/690 V
- Distribution transformers normally 3.5 MVA
- D.O.L. start of L.V. motors upto motor capacity 630 - 800 kW
- All L.V. panelboard components type tested
- ABB can offer fused and non-fused solutions

690V System
Standards

- IEC,VDE,BS,JIL: Standard voltage development



- *) ABB has utilized 660 / 690 V in all major pulp and paper projects since 1975

Investment costs difference 690 V vs 400 V solution

400 V | **690 V**

2 MVA

Less transformer units
Less MV feeders

3.5 MVA

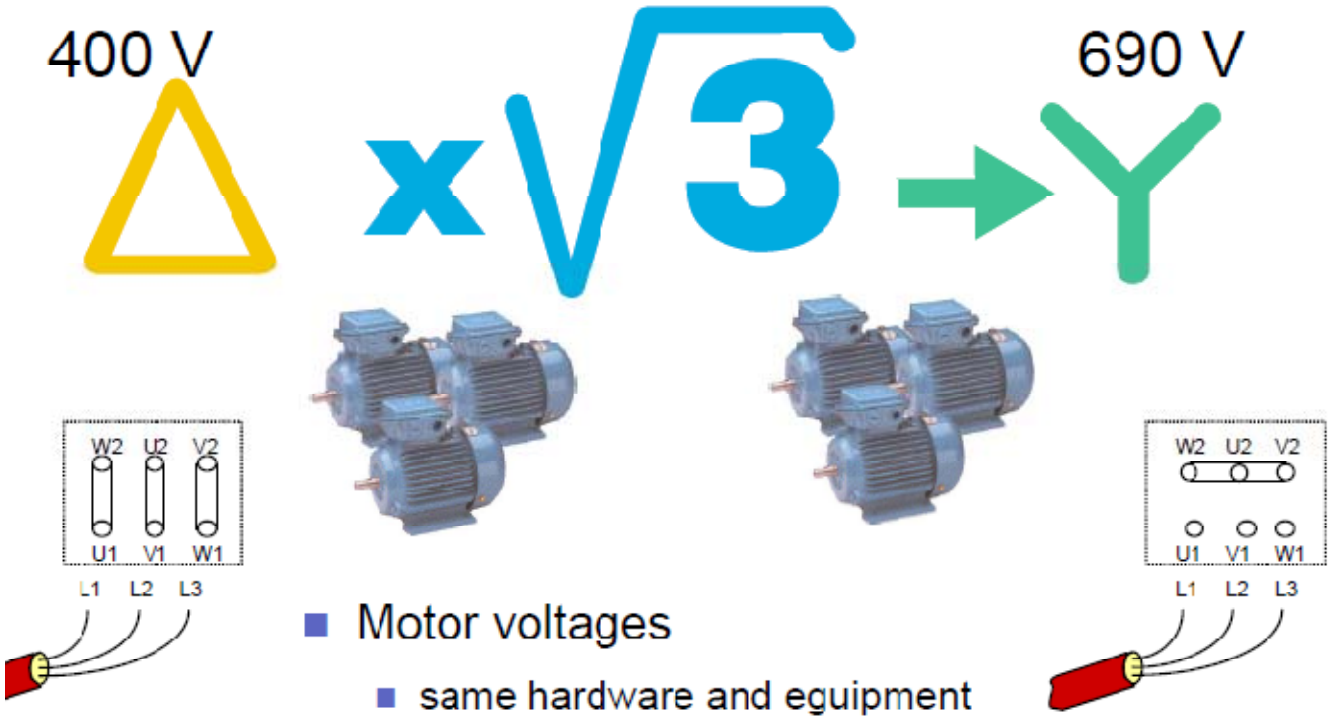
HT
MCC
HT motor

Lower cost
in MCC´s and
motors

LT
MCC
LT motor

Lower cabling
costs

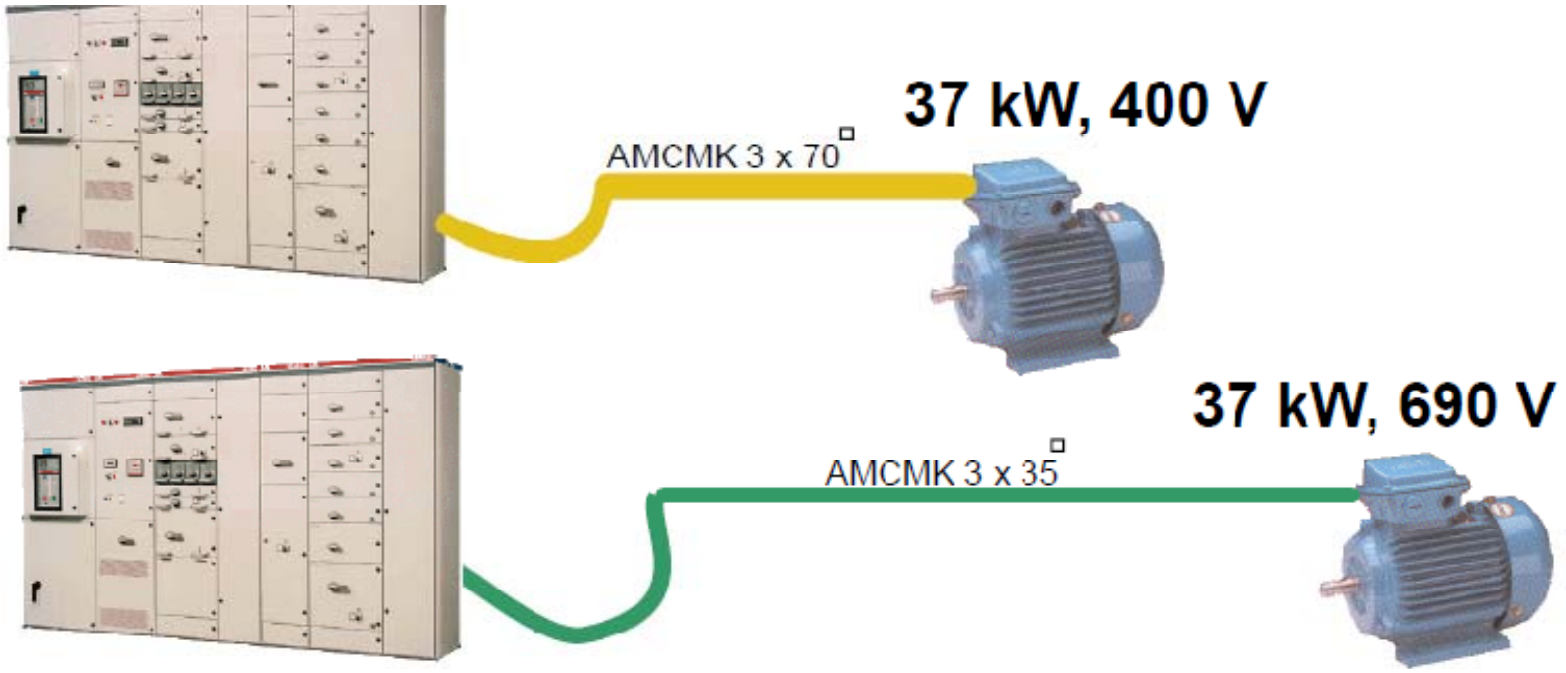
Same motors for 690V & 400V



- Motor voltages
  - same hardware and equipment
  - only change is the connection in the terminal box

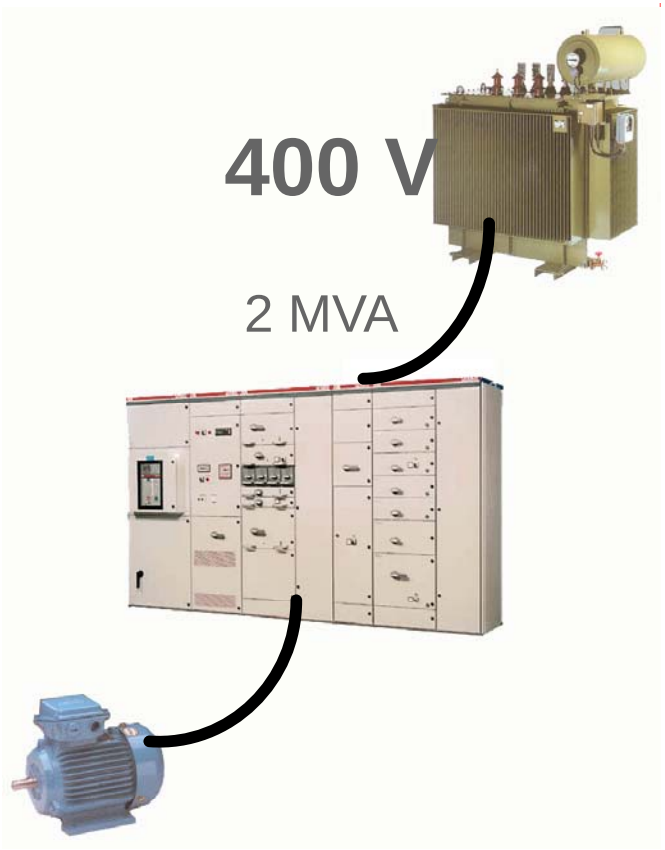
Smaller Low Voltage Cabling at 690 V

- Small cable sizes and less power losses.



690 V vs 400V

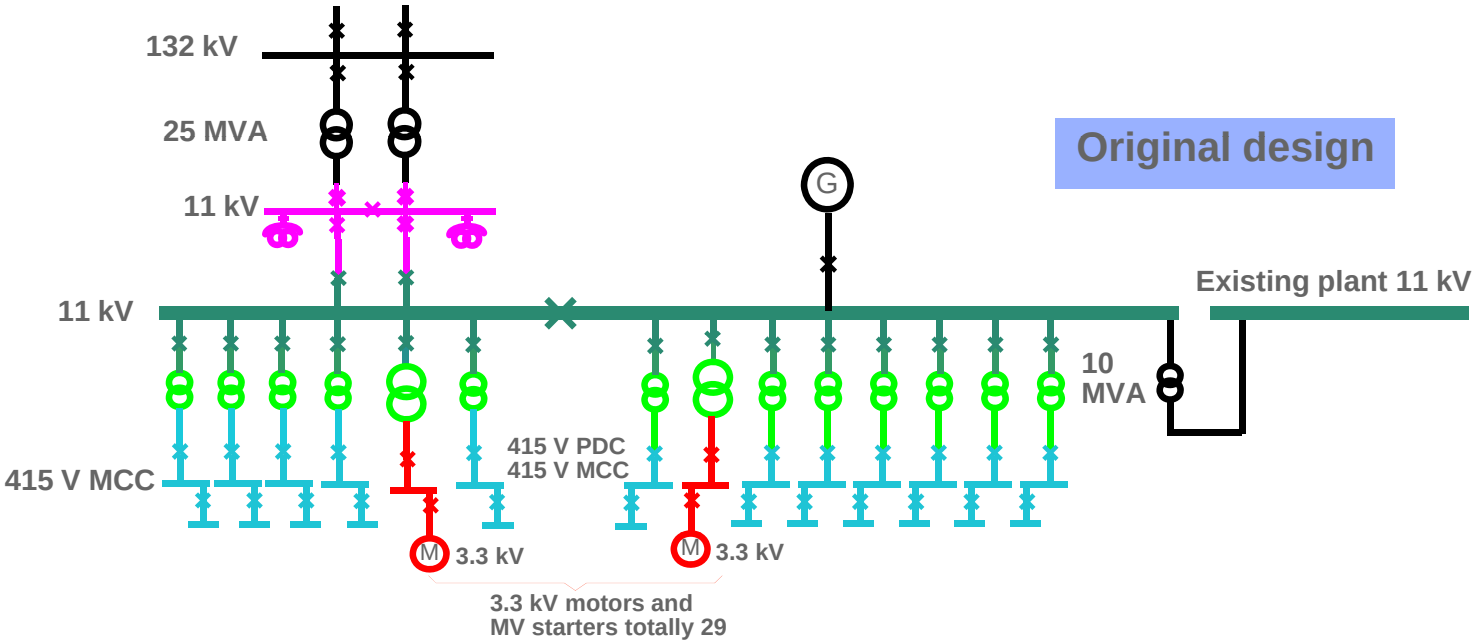
- Direct - on - line (D.O.L) start capability 630 kW

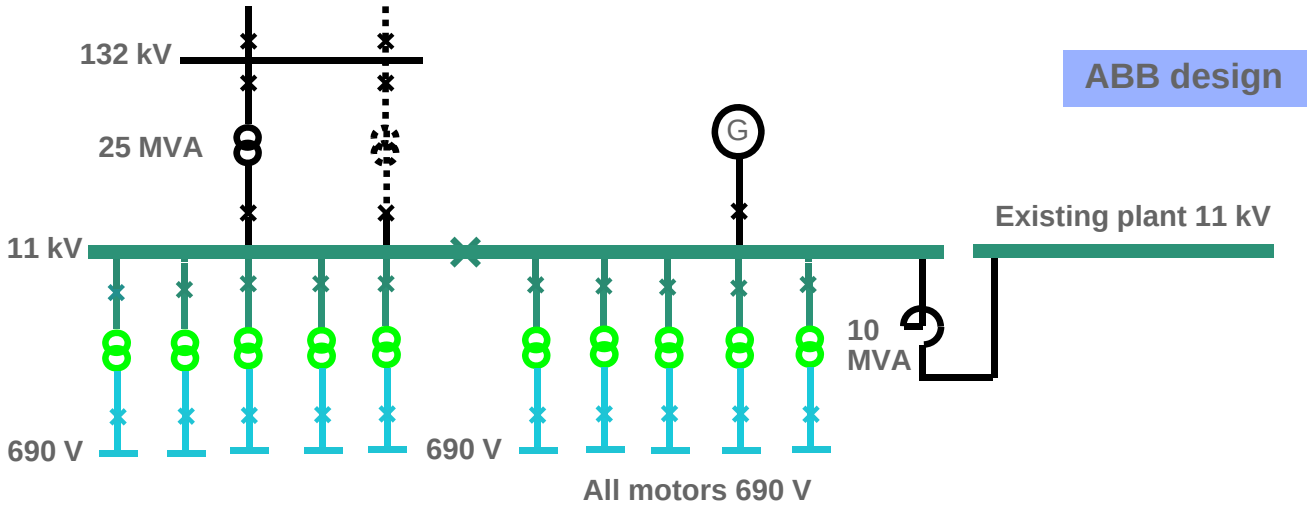


Old practice 250 kW

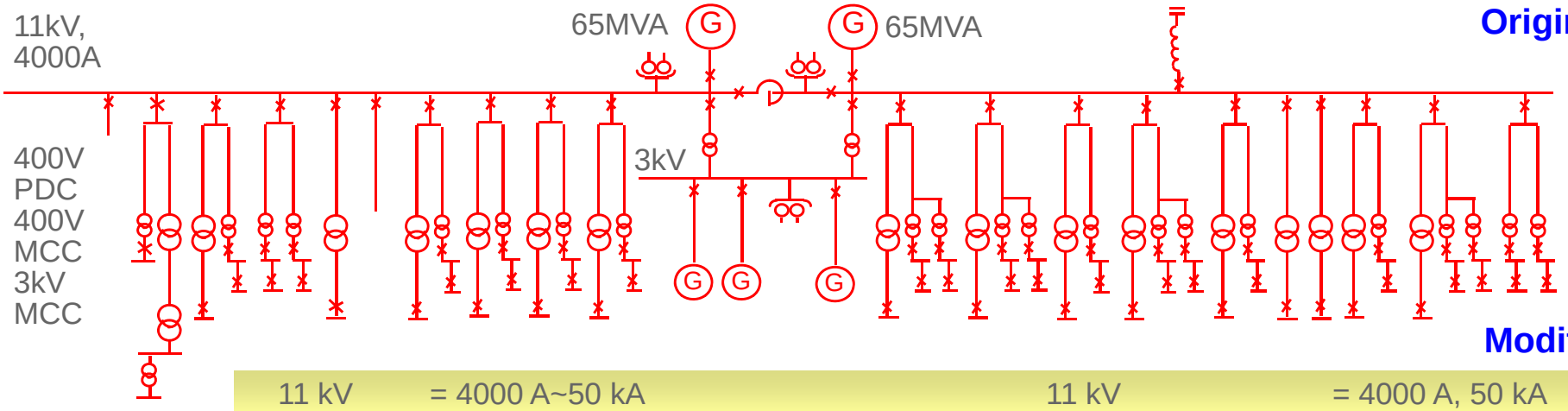
New concept at same starting conditions 630 kW

New Design: Saving Money





Case Study



Original design

Modifications

11 kV	= 4000 A~50 kA	11 kV	= 4000 A, 50 kA
3 kV	= 2000 A, 54 kA (Diesel gen. bus)	6 kV	= 1250 A, 25 kA
400 V /P DC	= 3600 A, 91 kA	690 V / PDC/MCC	= 2800 A, 50 kA

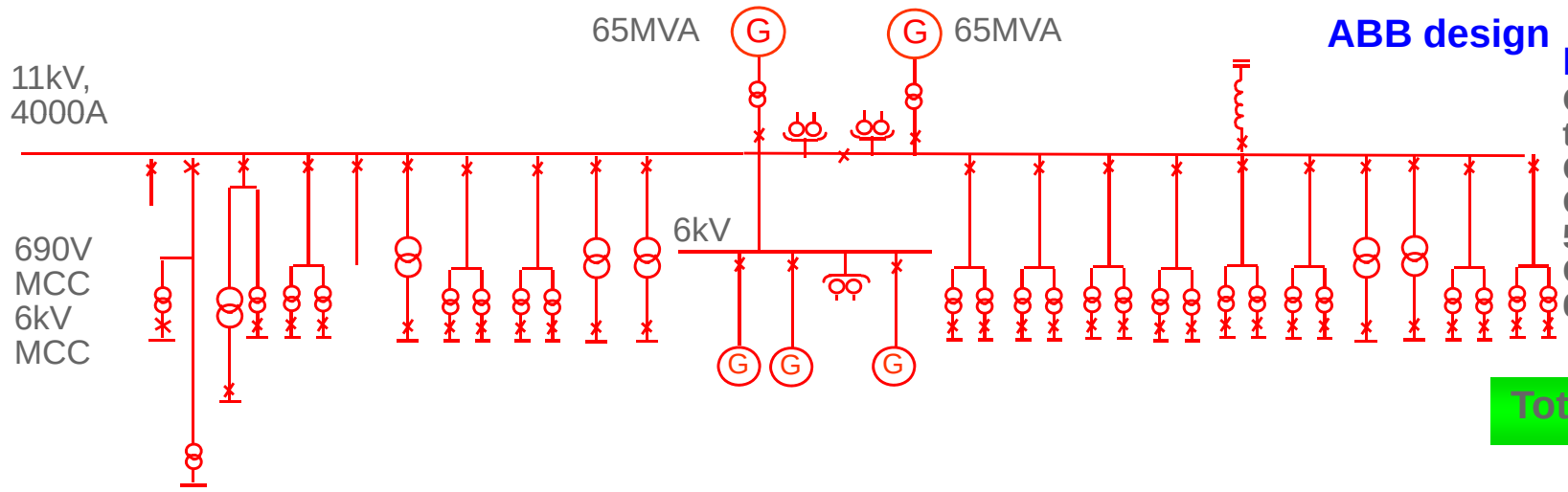


ABB design

Functionally better

- Qty of distribution transformers 40 → 35
- Qty of MV motors 97 → 12
- Currents in MV distribution 50% of original
- Current in LV distribution 60% of original

Total saving > 2 MUSD

Investment cost difference in 690V System

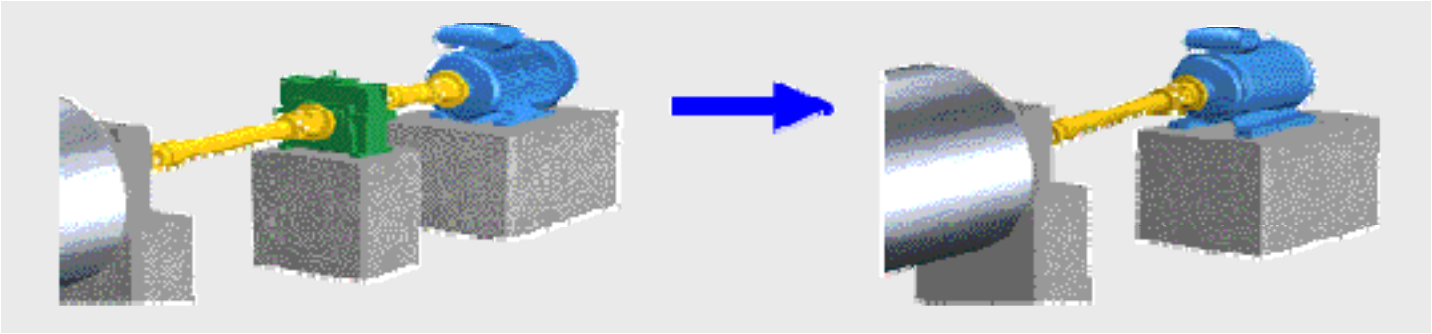
1. At 400 V Distribution transformers 2 MVA
   At 690 V 3.5 MVA
   → 20 - 30 % less units / 10 - 15 % less price

2. More economical LV MCC instead of HV MCC
   and cheaper LV MCC
   → 5 - 10 % less price

3. LV motors cheaper than HV motors
   → 5 - 20 % less price

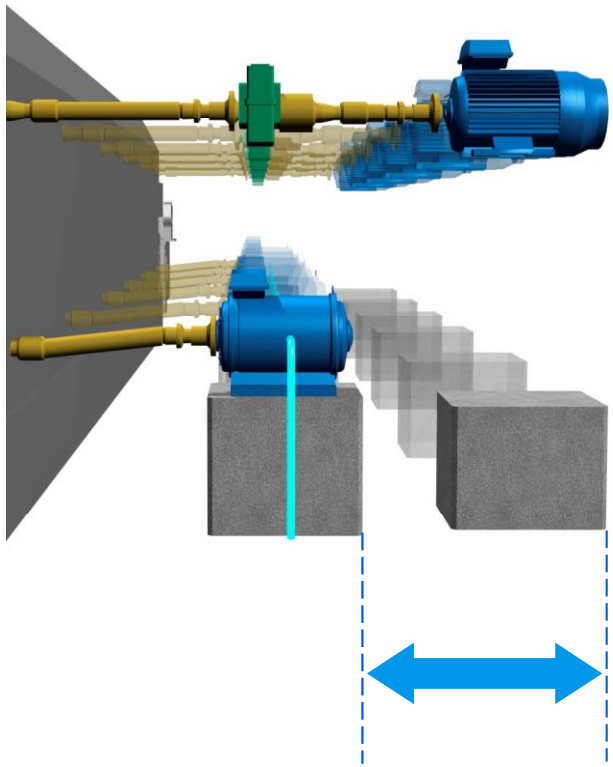
4. Cheaper cabling
   → 5 - 10 % less price

Direct Drive Solution
Mechanical drive system improved



- Less components, Less engineering, Less assembly
- Investment costs eliminated
  - Gears
  - Encoders
  - Primary couplings and covers
  - Gear condition monitoring system
  - Gear lubrication system
  - Engineering and Installation for mechanical gear

Direct Drive
Machine operation benefits



Saving in space

- Valuable 2-3 meter space savings on the machine side-bay
  - Narrower machine hall for new production lines
  - Limited space availability in rebuild projects
- Reduced maintenance costs with higher reliability
  - Downtime caused by gear or encoder failures totally avoided
  - No need for drive re-tuning because of mechanical wearing
- Better efficiency of PM motors, no gear losses
- Lower noise level

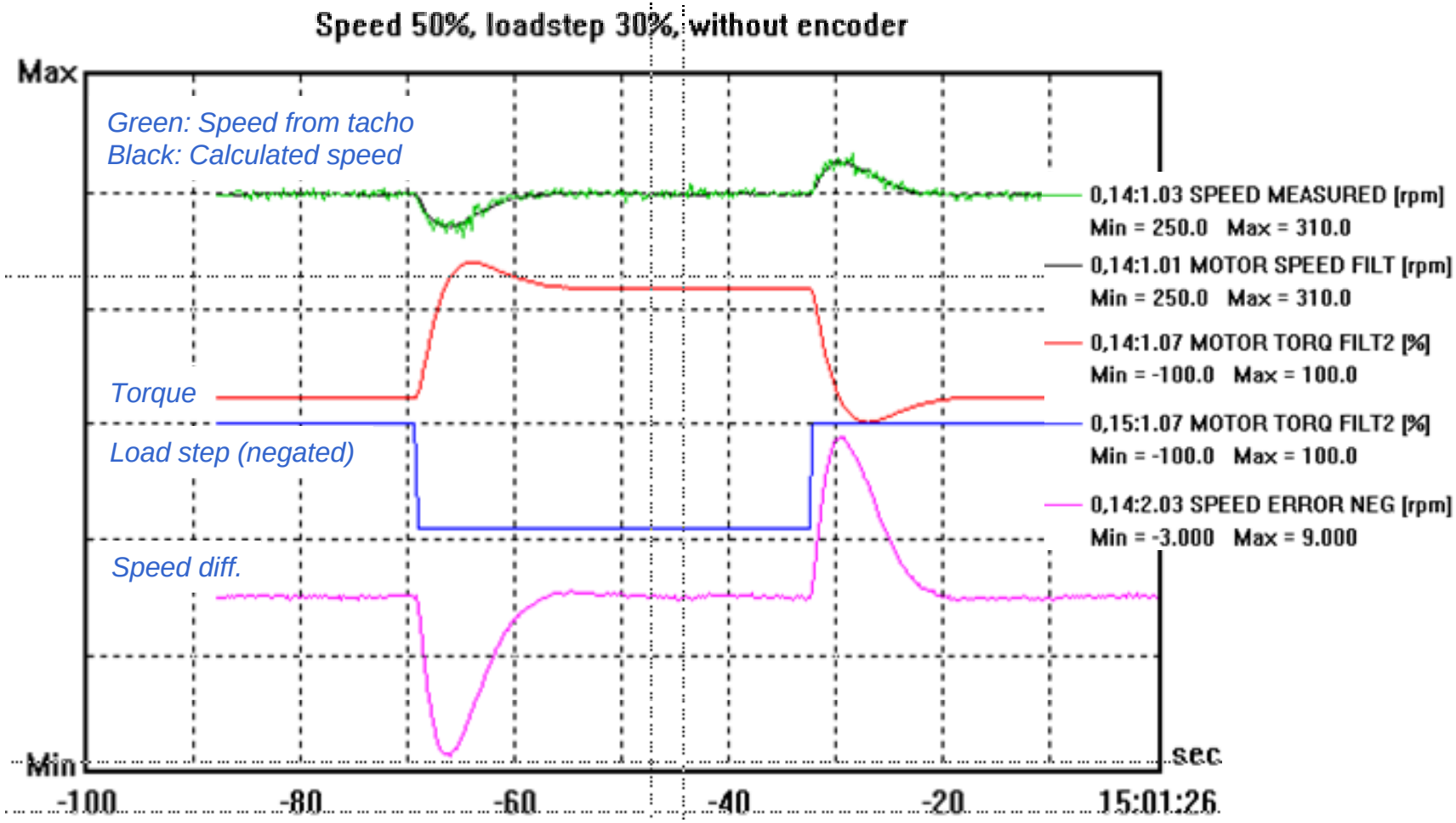
Direct Drive
PM motor with high torque and small size

- New motor alternative developed for Paper Machine Drives
  - Reliable operation in our application
  - Look similar to normal AC-motors
- Easy maintenance
  - Change of bearings without removing rotor
  - Repair of stator winding similar to AC motors
- Industrial Motors suited for paper industry environmental conditions
- Proven technology

Direct Drive
DTC control without tacho

PROOF STATEMENT

Load step & control without encoder



Direct Drive
Benefits of the Direct Drive

- Higher availability of the paper machine due to fewer mechanical components and without pulse encoders.
- Lower maintenance costs as a result of a simpler system with fewer components.
- Better paper machine runability thanks to the synchronous drive with accurate control and no gear play.
- Reduced total acquisition costs.
- Lower plant engineering and installation costs.
- More side bay area available (limited space often the case in rebuild projects)
- More simple building structure / narrower machine hall possible
- Less installed hardware and more simple installation
- Lower energy costs without gear losses and higher motor efficiency. Less environmental loading.

Intelligent MCCs – MNS series

One standard-features for MNS Switchgear family:

- Safety ‘Plus’ concept
- Modular design
- World wide production, support and service
- Common spare parts
- High operational performance

- Flexible applications
- Long life performance
- Safety
- Integrated into MNS Platform

- Low installation cost
- Low foot print
- High technical performance
- Low meantime to repair
- Low maintenance cost

Intelligent MCCs

- Latest evolution of the Low Voltage Power and Motor Control Center.
- Saving in Control Cables.
  - Eg. for each feeder 3 DI and 2 DO are considered
    - Approx distance from MCC to control System : 75 mtr
    - Total length of cable – 5*75 = 225 mtr
    - If total no. of feeders are 200 , length of cables – 45,000 meters

  With intelligent MCCs , a single communication cable from the MCC to the Control System. Saving in investment of cables.
- Easy maintenance.
- Easy troubleshooting.

Conclusion

- By adopting world class new avenue system which is proven there is a saving in project cost in planning stage.
- Better runability
- Standard solutions
- Saving of around 10 to 15% in overall project cost
- Low maintenance

Power and productivity
for a better world™