Energy efficiency in textile industry
Introduction
ABB in the Textile Industry

ABB offers solutions for complete electrification systems including the integration of the automation and optimization systems. ABB combines local and global competence to satisfy your needs.

ABB delivers from small systems up to multi-million $ turn-key contracts

- Identified and implemented numerous energy efficient motor solutions
- Many of these solutions have ABB drives
- Implemented control solutions in many textile plants
- Many ABB Analyzers (Flow, Pressure, Temperature) are currently being used in textile plants
Textile industry is the third largest energy consuming industry after chemical and engineering sector. The estimated energy saving potential is 23% for textile industry.

* Source TERI report
ABB Services
Structured standard elements of service scope

Audit Offerings:
- Motor / Drive System Assessments & solutions
- Power system Analysis
- Power factor & Harmonic study
- Energy Audit covering
  - Electrical
  - Thermal
  - Compressors
  - Pumps & Fans
- Captive Power Plant Fingerprint
- Control system Fingerprint
- Health check of electrical equipment
- Residual Life assessments of major electrical equipment
Offerings for textile industry
ABB Energy Efficiency Services

Power System & Power Quality
- Motor/Drive system assessments & solutions
- Power system analysis
- Power factor & harmonic study
- Energy audit
  - Electrical
  - Thermal
  - Compressors
  - Pumps & Fans
- Boiler FingerPrint
- Captive power plant FingerPrint
- Health check of electrical equipment
- Control system FingerPrint
- Residual Life Assessments (RLA) of major electrical equipment
Offerings for textile industry
ABB’s Energy Efficiency Products and Solutions

- High efficiency motors (IE1, IE2, IE3, IE3+)
- Variable speed drives (VSDs)
- Power quality solutions (APFC panels, active filters)
- Control systems and optimization software (Compact HMI, 800xA, Freelance 800F, open control system)
- Instrumentation and Measurement (COMMANDER 1900R for temperature control of slasher dryer cans, pressure transmitter 600T)
- Energy management software (CPM-plus)
- Renewable energy offerings (solar Photovoltaic)

One stop shop for all your PAT commitments and RPO obligations
# Industrial Energy Efficiency for Textile Program Overview

## Industrial Energy Efficiency

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<th>Opportunity Identification</th>
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<th>Implementation</th>
<th>Sustaining Benefits</th>
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</tr>
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<td>System Implementation</td>
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</tr>
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<td>Detailed investment Proposals for selected projects</td>
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<td>Analyser systems</td>
<td>Benefits verification and measurement methodology</td>
<td>Benefit Tracking</td>
<td>Benefit Tracking</td>
</tr>
<tr>
<td>Compressed air utilization</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance Improvement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boiler &amp; Steam System</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Efficiency Increase

- **Quick wins**
- **New Systems and practices**
- **Continuous improvement**
ABB’s full product & service portfolio

**Power**
- Switchyard
- HV, MV, LV systems & equipment
- Protection systems
- PF improvement & harmonic filters

**Energy Efficiency**
- Machines & Motors
- VVVF Drives
- Soft-starters
- Energy savings and audits

**Intelligent Operation**
- SCADA systems
- DCS / PLC solutions
- Optimization tools
- Asset management
- Remote monitoring & diagnostic

**Measurements**
- Flow meters
- Quality analyzers
- Pressure, level & temperature meters
- Indicators, recorders & controllers
ABB’s full product & service portfolio

- Health checks & condition monitoring
  - RLA & LEAP for electrical Static equipment
  - Machines & Motors
  - Control systems for boiler

- Retrofit, Upgrades and expansions
  - HT breakers, transformers, CT/CVT, PT & LA
  - Protection systems
  - MV / LV Switchgear
  - Machines & Motors

- Measurement, monitoring & optimization
  - Flow, pH, water quality
  - SCADA and DCS
  - Asset monitoring & management (leak detection, filters, pumps)
  - Smart distribution & metering
ABB’s full product & service portfolio

Energy management & Efficiency solutions
- Power & process consultancy
- PF improvement
- Harmonic analysis & filters
- Maximum demand control
- Power availability & tariff driven operations
- Demand forecasting, planning & scheduling
- VVVF drives
- High efficiency machines & motors
References:
Energy efficient Baldor motors in textile industry
ABB saves energy for textile industries
Optimizing energy consumption at Century Enka, Pune

Customer need:

- Old DC motor drive installed at the Century Enka unit in Pune with old PLC had frequent breakdowns. The customer wanted highly reliable and energy efficient motors for draw twisting applications.

ABB solution:

- ABB supplied super efficiency Baldor motors 22kw 4pole and 18.5kw 4 pole for total 6 machines

Customer value:

- Energy savings: 18 % as compared with old motors
- Payback time: 1.5 years
- Breakdowns reduced from 5% to nil

Project year: 2011
ABB saves energy for textile industries
Optimizing energy consumption at SRF, Malanpur

Project year: 2010  

**Customer need**
- High efficiency and reliable motors for old twisting machines

**ABB solution**
- Supplied 40 nos. of Baldor Super Efficiency 45kw motors with 95.4% efficiency and flat curve

**Customer value**
- Energy savings: 4.5% energy savings
- Payback time: 18 months
- Bearing life increased from 40,000 hours to 1,00,000 hours
- Greasing interval increased from 4 months to 6 months
ABB saves energy for textile industries
Optimizing energy consumption at Abhishek Yarn, Barnala

Project year: 2009

Customer need:
- High efficiency and reliable motors for ring frames

ABB solution:
- Supplied 21 nos. of 40kw 4 pole Baldor super efficiency motors with 95% efficiency and flat curve

Customer value:
- Energy savings: 7% energy savings
- Payback time: 24 months
- Bearing life increased from 40,000 hours to 1,00,000 hours
Customer need:

- High efficiency and reliable motors for chilled water pump application

ABB solution:

- Supplied 11 kw 4 pole Baldor standard efficiency motors with 91%

Customer value:

- Energy savings: 12.3% energy savings
- Payback time: 18 months
- Bearing life increased from 40,000 hours to 1,00,000 hours

Project year: 2009
Customer need:

- Existing 60kw motors supplied with LMW (Lakshmi Machine Works) ring frame machine was getting overheated resulting in reduced production when machine RPM was taken to rated 24000. The customer was suffering a production loss of almost 15%.

ABB solution:

- ABB supplied super efficiency Baldor Motors 75kw in same frame of 60kw with 95.4% efficiency and flat curve. ABB also changed the variable frequency drives.

Customer value:

- Machine attained 24000 spindle RPM and production increased by @ 15%
- Energy savings: Units per kilogram was maintained
- Payback time: 30 days
Customer need:

- High efficiency and reliable motors for E-Spin Drive in Sussein Asia ring frame machine. The existing 11kw was under loaded.

ABB solution:

- Supplied 7.5kw 4 pole Baldor super efficiency motors with 92.5% efficiency and flat curve

Customer value:

- Energy savings: 5% energy savings
- Payback time: 30 months
- Bearing life increased from 40,000 hours to 1,00,000 hours
Customer need:

- High reliability energy savings replacement motors 1HP 4 pole B3 for autoconing application.

ABB solution:

- ABB supplied Baldor super efficiency motors for autoconing application. 348 motors were replaced with 87.6% IEEE112B (Institute of Electrical and Electronics Engineers 112B standard) efficiency as compared with 77% (as per Indian Standards 8789) of working motors.

Customer value:

- Energy savings: 14.5% as compared with old motors
- Payback time: 2 years
Customer need:

- High efficiency and reliable motors for ring frames with 75kw in same size as 55kw to increase machine productivity

ABB solution:

- Supplied 3 nos. 75kw 4 pole Baldor super efficiency motors with 95% and flat curve in frame size 225M

Customer value:

- Productivity improved by 10%
- Energy savings: 3% energy savings
- Payback time: 4 months
- Bearing life increased from 40,000 hours to 1,00,000 hours
References:
Power system analysis in textile industry
ABB saves energy for textile industries
Industrial power system study at Alok Industries, Vapi

Project year: 2012  (Ongoing)

**Customer need:**
- 66/11kV sub-station design and engineering.
- Power system studies of the updated network.

**ABB solution:**
- Vendor neutral design engineering for 66/11kV sub station.
- Load Flow, Short circuit study.
- Relay Co-ordination study.
- Transient stability studies.
- Grid islanding study.
- Load shedding scheme.
Customer need:
- Power system studies for the updated network and to be commissioned loads.
- Re-verification of the unit protection settings.

ABB solution:
- Load Flow, Short circuit study.
- Relay Co-ordination study.
- Transient stability studies.
Customer need:
- Power system studies for the proposed network.
- Voltage level selection for grid interconnection.
- Re-verification of 11kV distribution network.

ABB solution:
- Load Flow, Short circuit study.
- Reactive power compensation study.
- Transient stability studies.
- Load shedding scheme & islanding study.

Customer value:
- Recommendations for installation of capacitors to improve power quality.
- Adequacy of switchgear checked and recommendations provided to withstand the fault condition to improve the reliability.
- Recommendations to improve the system stability and adequacy.
Customer need:
- Power system studies for existing network.
- Protection co-ordination study.

ABB solution:
- Load Flow, Short circuit Study
- Transient and largest motor starting analysis
- Relay Coordination
- Islanding and load shedding

Customer value:
- Adequacy of switchgear checked and recommendations provided to withstand the fault condition to improve the reliability.
- Relay settings modified to ensure proper co-ordination and grid islanding to improve availability.
- Motor starting analysis conducted under various scenarios to ensure proper starting.
Customer need:
- Power system studies for existing network.
- Protection co-ordination study.

ABB solution:
- Load Flow, Short circuit Study
- Transient analysis
- Relay Coordination
- Harmonic analysis.
- Network re configuration.

Customer value:
- Recommendations for retrofit of breakers and relays to strengthen the network to avoid nuisance tripping's to improve the availability and reliability of power system.
- Recommendations for re-configuring the network with merits and demerits in each scheme and sequence of operation to improve system stability and adequacy.
Customer need

- Power system studies for existing and planned network
- System adequacy checks for planned network.

ABB solution

- Load Flow, Short circuit Study
- Transient and motor starting analysis
- Relay Coordination
- Load shedding logic

Customer value

- Strengthened electrical network and changed relay pickup settings to improve the availability and reliability of power system.
- Recommendations to implement load shedding logic to improve the system stability and system operation.
Some customer testimonials – Energy Efficient Motors
Performance certificate by Century Enka Limited

**CENTURY ENKA LIMITED**

(Factory: Bhosari, Pune 411 028)

**Date:** 10/08/2007

To Whomsoever It May Concern

**SUBJECT:** Performance Comparison of Electric Motors

We have replaced over 10 - 12 years old rewound motors of reputed make with Baldor Motors and got the savings as under,

<table>
<thead>
<tr>
<th>SR NO</th>
<th>TYPE OF EQUIPMENT</th>
<th>MOTOR DETAILS</th>
<th>POWER CONSUMPTION BEFORE IN KW</th>
<th>POWER CONSUMPTION AFTER IN KW</th>
<th>SAVINGS KW</th>
<th>% SAVINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PUMP</td>
<td>110 kw 4 POLE</td>
<td>104</td>
<td>99</td>
<td>5</td>
<td>4.76</td>
</tr>
<tr>
<td>2</td>
<td>PUMP</td>
<td>55 kw 4 POLE</td>
<td>48</td>
<td>44</td>
<td>4</td>
<td>8.33</td>
</tr>
<tr>
<td>3</td>
<td>PUMP</td>
<td>45 kw 4 POLE</td>
<td>36</td>
<td>33</td>
<td>3</td>
<td>8.33</td>
</tr>
<tr>
<td>4</td>
<td>PUMP</td>
<td>45 kw 4 POLE</td>
<td>44</td>
<td>42</td>
<td>2</td>
<td>4.54</td>
</tr>
<tr>
<td>5</td>
<td>AGITATOR</td>
<td>18.5 kw 4 POLE</td>
<td>14</td>
<td>12</td>
<td>2</td>
<td>14.28</td>
</tr>
<tr>
<td>6</td>
<td>SCRUBBER</td>
<td>7.5 kw 2 POLE</td>
<td>6.5</td>
<td>6</td>
<td>0.5</td>
<td>7.69</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>252.5</strong></td>
<td><strong>236</strong></td>
<td><strong>16.5</strong></td>
<td><strong>6.53</strong></td>
</tr>
</tbody>
</table>

Thanking you

Yours sincerely

for Century Enka Ltd

N.L. Singh
General Manager Power & Automation
Performance certificate by KPR Mills Limited

RINGFRAME POWER STUDY REPORT
R.K.P MILLS LTD

Date of study: 19.10.07 to 23.10.07
Description of study: Specific power consumption (UKG) with LEDL / BALDOR motors
Machine Model & Mill No: LRS/6 & 30

Production Parameters

<table>
<thead>
<tr>
<th>Count</th>
<th>34 's HY</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPI</td>
<td>21.59</td>
</tr>
<tr>
<td>Machine speed:</td>
<td></td>
</tr>
<tr>
<td>Min.</td>
<td>10,000 rpm</td>
</tr>
<tr>
<td>Max.</td>
<td>18,800 rpm</td>
</tr>
<tr>
<td>Avg.</td>
<td>17756 rpm</td>
</tr>
</tbody>
</table>

Machinery Details

| Ring Oia | 38mm |
| Lift     | 180mm |
| Spl. Wharve | 18.5mm |
| No. of spindles | 1006 |

Electrical Details

<table>
<thead>
<tr>
<th>Meter Used</th>
<th>FLUKE 1735</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor details</td>
<td>BALDOR LEDL</td>
</tr>
<tr>
<td>KW</td>
<td>45</td>
</tr>
<tr>
<td>V/A</td>
<td>415/72</td>
</tr>
<tr>
<td>RPM</td>
<td>1480</td>
</tr>
<tr>
<td>Efficiency</td>
<td>95.4%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPEED PATTERN</th>
</tr>
</thead>
<tbody>
<tr>
<td>length</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>100</td>
</tr>
<tr>
<td>200</td>
</tr>
<tr>
<td>300</td>
</tr>
<tr>
<td>600</td>
</tr>
<tr>
<td>900</td>
</tr>
<tr>
<td>2950</td>
</tr>
<tr>
<td>3000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>BALDOR MOTOR</th>
<th></th>
<th>LEDL MOTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.No.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Run time in minutes</td>
<td>145</td>
<td>145</td>
</tr>
<tr>
<td>2</td>
<td>Doff Length</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Avg. Spd.</td>
<td>17556</td>
<td>17556</td>
</tr>
<tr>
<td>4</td>
<td>Power consumption (Kwh)</td>
<td>60.875</td>
<td>61.094</td>
</tr>
<tr>
<td>5</td>
<td>Production in Kgs.</td>
<td>53.08</td>
<td>44.54</td>
</tr>
<tr>
<td>6</td>
<td>Waste weight (Kgs)</td>
<td>0.84</td>
<td>0.84</td>
</tr>
<tr>
<td>7</td>
<td>Units per hour</td>
<td>25.19</td>
<td>25.28</td>
</tr>
<tr>
<td>8</td>
<td>Kgs per hour</td>
<td>21.96</td>
<td>21.96</td>
</tr>
<tr>
<td>9</td>
<td>UKG YP</td>
<td>1.147</td>
<td>1.147</td>
</tr>
<tr>
<td></td>
<td>TP</td>
<td>1.129</td>
<td>1.129</td>
</tr>
</tbody>
</table>

Notes:
YP: yarn production
TP: total production (yarn + waste)
Study conducted without capacitor and without Inverter.

Comments and Conclusions:
1. Production is varying between Baldor and LEDL
2. As such there is a saving of 12.3% in BALDOR over LEDL
3. When the production in LEDL goesupp to equal to BALDOR power may also goesup.

K.N Consultants

ABB
Performance certificate by Ramalinga Mills Limited

RINGFRAME POWER STUDY REPORT

Date of study: 26.10.07 to 31.10.07
Description of study: Specific power consumption (UKG) with LEDL and BALDOR motors
Machine Model & Mill No: LR G5 /1 & 44

Production Parameters
- Count: 80 S.W
- TPI: 30.3
- Machine speed:
  - Min: 18,400 rpm
  - Avg: 21,125 rpm
  - Max: 22,000 rpm

Machinery Details
- Ring Dia: 38mm
- Lift: 155mm
- Spl. Wharve: 19.0mm
- No of spindles: 1008

Electrical Details
- Meter Used: FLUKE 1735
- Motor details: BALDOR LEDL
- KW: 55 55 80 20800
- VA: 415/3 400/91 83 21280
- RPM: 1475 1430 85 21600
- EFFI: 95.4% 93.50% 80 22000
- 84 21440
- 78 20480

<table>
<thead>
<tr>
<th>SI No</th>
<th>Description</th>
<th>BALDOR MOTOR</th>
<th>LEDL MOTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Run time in minutes</td>
<td>377 372 377 376</td>
<td>375.5</td>
</tr>
<tr>
<td>2</td>
<td>Dof Length</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>3</td>
<td>Avg Spl Speed</td>
<td>21,125 21,125 21,125 21,125</td>
<td>21,125</td>
</tr>
<tr>
<td>4</td>
<td>Power consumption(KWh)</td>
<td>167.27 161.95 167.53 166.09</td>
<td>166.710</td>
</tr>
<tr>
<td>5</td>
<td>Production in Kgs</td>
<td>47.12 46.10 47.36 46.06</td>
<td>46.56</td>
</tr>
<tr>
<td>6</td>
<td>Waste weight(Kgs)</td>
<td>0.56 0.56 0.52 0.498</td>
<td>0.540</td>
</tr>
<tr>
<td>7</td>
<td>Units per hour</td>
<td>26.52 26.12 26.66 26.50</td>
<td>26.48</td>
</tr>
<tr>
<td>8</td>
<td>Kgs per hour</td>
<td>7.50 7.44 7.54 7.35</td>
<td>7.46</td>
</tr>
</tbody>
</table>

YP: yarn production
TP: total production (yarn + waste)
Note: Study conducted with Inverter.

Comments and Conclusions:
1. There is a clear saving both on UKG and Units/hour in BALDOR
2. There is a saving of 5.3% on UKG in BALDOR motor
3. The saving will be 35.63 units/day/frame
4. Max loading on the motor for the count and speed is 34.8 KW on BALDOR and 36.7 KW on LEDL.
Monday, May 11, 2009

To Whomsoever It May Concern

SUBJECT: Performance Comparison of existing Electric Motors of Ring Frame with Baldor make motor

We have carried out tests on the following motors to compare the energy savings on Textool Ring Frame with Inverter Drive and the results are given below:

Machine- Textool, RPM- 9000, Count- 1/60,

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Baldor Motor Details, A</th>
<th>Average Energy Consumed per Hour KW</th>
<th>CGL Motor details,</th>
<th>Average Energy Consumed per Hour KW</th>
<th>Savings over B %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11 kw 4 Pole, 1460 rpm Super E</td>
<td>6.40</td>
<td>11 Kw 4 Pole, 1440 rpm Eff2 4 years old motor</td>
<td>5.768</td>
<td>4.41</td>
</tr>
</tbody>
</table>

The trial was carried out for 55 hrs for each of the motors.

Thanking you

Yours sincerely
For RAYMOND LTD

Vishnu B Singh
Manager- Engineering & Energy Conservation

*05: +919833242110
Some customer testimonials – PS Analysis
Date: 10.05.2006

TO WHOMSOEVER IT MAY CONCERN

This is to certify that M/s ABB Ltd, Vadodara India has undertaken and executed Power System Studies for GRAISI, Nagda plant right from the 22 kV network up to 3.415 kV level within the contractual period. M/s ABB has successfully completed the job within the stipulated time frame and the services rendered are to our entire satisfaction.

Work Order: EPSC/SC/RC/34/RD

Dated: 27/06/2007

The following analysis was carried out successfully in their study within contract period:

Phase-1: Engineering

1. Verification & approval of CT, PT, LA and surge capacitor
2. Earthing system design for new 30 MW CPP

Phase-2: System Studies

1. Data Collection & Network Modeling
2. Load flow studies for intact and contingency condition
3. Short circuit studies
4. Motor Starting Analysis
5. Transient stability Analysis
6. Load Shedding Logic
7. Relay Coordination Studies

The study was conducted in 2007-2008. The study report submitted by M/s ABB is as per our requirement and satisfactory.

[Signature]

Manager (Technical Cell - Projects)
Performance certificate by Indian Rayon

Date: 26th August, 2009

TO WHOMSOEVER IT MAY CONCERN

This is to certify that M/s ABB Ltd., Vadodara has undertaken and executed Electrical Power System Studies for Indian Rayon (A Unit of Aditya Birla Nuvo Ltd.) Veraval from 11 kV generation to PCC inomer level, within the contractual period.

P.O.No.: 4550016461

Dated: Jan 24, 2009.

The following analysis was carried out successfully in their study within contract period:

1. Data Compilation & Network Modelling.
2. Load flow studies for intact and contingency condition.
4. Protection Relay Coordination Studies.
5. Transient stability Analysis.
   • Rectifier Starting Analysis.
   • Largest Motor Starting Analysis.
7. Harmonic measurement & analysis.
8. Network Reconfiguration.
9. Review of Unit Protection Settings.

The study was conducted in 2009. M/s ABB has successfully completed the job within the stipulated time frame and the services rendered are to our entire satisfaction.

For Indian Rayon Limited
Veraval

Mr. Anupam Gupta
Sr. GN-(YFY-Engineering & WCA)
Some customer testimonials – VFDs
Date: 07.09.2005

To Whom It May Concern

This is to certify that M/s S21B Power System & Controls, 188-D, Salvy Buildings, Chinnasamy Naidu Road, Coimbatore - 044 has supplied ABB make AC drive ACS 800 series to us for implementing our Energy conservation measures to one of our Textile customer located in Karur for their Air Compressor.

### Equipment Details

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Compressor</td>
<td>Make: ELGI</td>
</tr>
<tr>
<td></td>
<td>Model: TANDEM (Screw)</td>
</tr>
<tr>
<td></td>
<td>Capacity: 490 CFM</td>
</tr>
<tr>
<td></td>
<td>Rated Pressure: 9.0 Kgf/cm²²</td>
</tr>
<tr>
<td></td>
<td>Motor KW: 90 KW</td>
</tr>
<tr>
<td>Motor</td>
<td>Make: Siemens</td>
</tr>
<tr>
<td></td>
<td>Model: ILAO 283-4YA 76</td>
</tr>
<tr>
<td></td>
<td>Frame size: 280 M KW: 90</td>
</tr>
<tr>
<td></td>
<td>Voltage: 415 V Delta</td>
</tr>
<tr>
<td></td>
<td>Frequency: 50 HZ RPM: 1480</td>
</tr>
</tbody>
</table>

### Observation

<table>
<thead>
<tr>
<th>With or Without Drive</th>
<th>Power consumption</th>
<th>Power Factor</th>
<th>Voltage</th>
<th>Current Drawn</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without Drive</td>
<td>78 Units per Hour</td>
<td>0.81</td>
<td>407 V</td>
<td>135 A</td>
<td>49.5 HZ</td>
</tr>
<tr>
<td>With Drive</td>
<td>67 Units per Hour</td>
<td>0.91</td>
<td>407 V</td>
<td>103 A</td>
<td>39 HZ</td>
</tr>
</tbody>
</table>

### Conclusion

For the last 60 days we observed 260 units saved per day consistency and drive working satisfactory.
Date: 30/01/2009

To Whom So ever It May Concern:

This is to certify that **ABB Make ACS800 VFD** is working smoothly without any problem on our Ring frame machine, since last 2 years. We are satisfied with the performance of ACS800 Variable Frequency Drive.

For Vikram Woollens:

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