




Enabling Productivity, Precision and Energy Efficiency


70+
years
experience


4 million
motors


10,000
servo solutions


20,000
gearless
machines
for elevators

Editor's Note

I write this on behalf of all my colleagues in our Industrial Systems segment.

After a protracted slowdown through to 2019, Indian industry was optimistic of demand revival from 2020 following initiatives announced by Government, and encouraging signals from some sectors. However, the outbreak of COVID in China and its subsequent global spread in early 2020 created an unprecedented situation in which all social and economic activity came to an abrupt standstill. At BB we suspended manufacturing operations from 23rd March to comply with Government Lockdown Orders. Our sales teams, working from home with the benefits of digitalisation, were able support you with offers, technical documentation, virtual technical seminars and trainings to help you to operate through the lockdown.

We resumed limited manufacturing operations from mid-

May, and have been ramping up activity within the continuing lockdown constraints. Our first priority has been to safeguard the health and wellbeing of our workforce, while doing our best to fulfil the urgent delivery needs of our domestic and overseas customers and attend to service calls. Our teams are gearing up to deliver on our commitments, while being fully aware of the many challenges we will undoubtedly face as our nation and economy make the slow climb back to normalcy. Please do contact our sales teams if you have any urgent delivery needs; we will do our best to support you.

Recent events portend that the world is moving towards a fundamental and permanent change in how we interact, collaborate and conduct business with our stakeholders. At BB we are absorbing the learnings from this unprecedented disruption, reorienting ourselves to effectively conduct our business under the new normal, and focusing on addressing opportunities and countering threats that will emerge in the unfamiliar world we will live in.

Sunil Mistry
VP - Motors



Get Velocity in your inbox!

By subscribing to our newsletter on this link: <https://www.bit.ly/2EcBoHF> you will receive it by e-mail as soon as it's published.

Bharat Bijlee is synonymous with electrical engineering in India. Our key business lines are Power Systems (Power Transformers, EPC Projects) and Industrial Systems (Motors, Drives & Automation, Magnet Technology Machines). Headquartered in Mumbai, we have sales and service network across India. The company's manufacturing facilities are located in Airoli, Navi Mumbai on a 1,70,000 sqm. campus.

Case Study

Typical Problems in Installation and Commissioning of Motors with VFDs (Part 2)

Customers sometimes report problems with motors operating with variable frequency drives (VFDs), notably: the motor not accelerating, stalling, or experiencing insulation failure. In our previous issue of Velocity (No. 5) we had discussed some real-life application related problems and their solutions. We now cover insulation failures and their prevention.

Types of additional voltage stresses

● Stress on Phase insulation:

- Higher peak voltages between phases due to reflection of the voltage at the motor terminals. Depending on the cable length and rise time, these can be up to twice the DC link voltage.

$$\text{Peak Phase to Phase voltage} = 1.35 \times 1.1 \times V_n \times K_c$$

where, 'Vn' = Rated voltage and 'Kc' = a factor between 1 and 2 for voltage increase due to long cables. (1.35 for DC conversion and 1.1 for voltage variation)

● Stress on slot insulation:

- Higher peak voltages increase the stress between the winding and the stator laminated core.

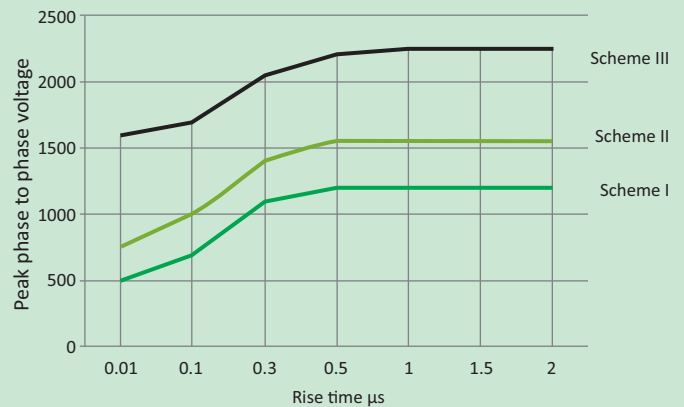
● Stress on the turn insulation :

- Higher electrical stress between the turns (V turns) at the entry coils (which are connected to the motor terminals) is caused by very short rise times.

Bharat Bijlee motors use the following three insulation schemes

- **Scheme I:** For motors upto 280 Frame with Rated voltage (Vn) up to 690V (This is the standard scheme upto 280 Frame)
- **Scheme II:** For VFD-driven motors from 63 to 280 Frame with Vn up to 500V. This is also the standard scheme for 315 frame and above.
- **Scheme III:** For VFD-driven motors with Vn greater than 500V and up to 690V

The graph below shows the permissible voltage versus rise time for our motors with the different insulation schemes.



We have witnessed several cases where insulation failure has been caused by the voltage at motor terminals exceeding the above limits. Investigations at site by our Motors and Drives & Automation teams, with oscillograph recordings of the voltage and rise time, invariably showed that voltages were higher than the limits.

It is essential that the system integrator clarify at the specification stage the voltages coming at the motor terminals as determined by the drive and the cable lengths.

If the expected voltage at motor terminals is higher than permissible, one of the following solutions should be applied:

1. Select a higher insulation scheme.
2. Add suppressors between the VFD and the motor. This could be in the form of: 1) Output reactors 2) Output dv/dt filters (sometimes known as dU/dt filters) 3) Sinusoidal filters 4) Motor termination units.

Generally sinusoidal filters are the most effective solution but, as always, the choice of device must balance its cost with the criticality of the application. Any one of the solutions chosen must be correctly matched to the application after establishing the effects of device's voltage drop on the final terminal voltage.

3. Select strip winding (with 3.3 kV insulation system).

Addressing these factors at the early stage of selection and specification can go a long way in ensuring a trouble-free life cycle for VFD-driven motors.

Partner Spotlight



Sandip Tandon
M/s Arkay Engineers
New Delhi

When did you start Arkay Engineers? What was the impetus to start it?

Arkay Engineers was incorporated in 1997. The motivation for starting Arkay Engineers has been very clear from the beginning:

- The hunger for growth in existing trading business
- To earn profits
- To increase customer base thus expanding market reach

What are the focus areas of your business?

- Profitability
- Customer satisfaction
- Efforts to innovate
- Deliver what we commit

Can you tell us a bit about the market/industries you cater to?

We cater to industries such as HVAC, Food, OEMs (small and medium range), Infrastructure and Paper amongst others.

Since when have you been associated with Bharat Bijlee? What have been some of the key highlights of this association?

We have been associated with Bharat Bijlee since 22 years. The key highlight of our association has been achieving goals with complete customer satisfaction through timely supplies, competitive price support and quick response. Bharat Bijlee has never forced us to keep huge stocks but at the same time supported us with timely delivery and kept adequate stocks at their respective godown as well as works. Bharat Bijlee also considered our request for opening up additional service centers across North to provide good service back-up network.

What do you look forward to going ahead in your journey with Bharat Bijlee?

We look forward to: timely supplies, adequate stock back-up for IE2 as well as IE3 motors, maintenance of quality standards, enhanced production so that we are more price competitive, flexibility in price support in case of competition, new market development and most importantly a healthy dealer margin of profit.



Sandeep Patel
M/s Shri Rang Enterprises
Ahmedabad

When did you start Shri Rang Enterprise? What was the impetus to start it?

I was working in the steel industry from 1994 to 2006. I got a lot of experience in the electric domain during my service tenure, which motivated me to start Shri Rang Enterprises.

The organization was formed in 2006 for supply and trade of large range of standard motors, that use excellent material and components, consume less energy and are durable.

What are the focus areas of your business?

Our office and warehouse is located in the middle of an industrial zone in Gujarat. Our main focus is OEM manufacturers and newly developed industrial plants and projects, in and surrounding Ahmedabad. We have a well equipped and trained sales team and after-sales team.

Can you tell us a bit about the market/industries you cater to?

We supply all types of 3-phase electric motors to several end users and manufacturers in Pharmaceutical, Oil & Chemical, Steel & Metal, Hydro-blasting and Pumps. We also provide support and after-sales service.

Since when have you been associated with Bharat Bijlee? What have been some of the key highlights of this association?

We have been associated with Bharat Bijlee since 2017. Even though it's been a more recent association, we feel that we have become a part of the Bharat Bijlee family. After seeing the infrastructure and the amenities provided by Bharat Bijlee, we are sure that we have taken the right step and can only see both Shri Rang and Bharat Bijlee progressing in the years to come.

The key highlight of our association is that Bharat Bijlee has truly made-in-India products; after their first purchase itself customers are convinced of the quality of a Bharat Bijlee motor due to its efficiency and performance.

What do you look forward to going ahead in your journey with Bharat Bijlee?

We look forward to becoming Bharat Bijlee's best dealer in Western region.

Highlights of our participation in International Elevator and Escalator (IEE) Expo 2020

We participated in the IEE Expo, organised by Messe Frankfurt India from 27th - 29th February 2020 at the Bombay Exhibition Center, Mumbai. The IEE Expo is a premier exhibition for elevator companies and component manufacturers to showcase their products and innovations, and tap potential business opportunities in the Indian market.

Nakul Mehta, our Vice Chairman & Managing Director and R Rajaraman, VP - Magnet Technology Machines were part of the inaugural ceremony of the Expo and interacted with the media present at the event.

At our booth, we showcased our GreenStar range of gearless machines, highlighting their salient features and explaining how they can address business needs of our customers. This year, we introduced the GreenStar BELT machine in the Expo, which garnered a lot of interest.

The second day of the Expo saw Vinay Patwardhan, DGM - Application Engineering, Magnet Technology Machines deliver an informative session, titled **Energy consumption in elevators and development of an efficient permanent magnet gearless machine** in the technical seminar organised concurrent to the Expo.

Watch a brief video that has highlights of our presence at the IEE Expo: <https://www.bit.ly/2VeVVuz>



Our booth at the IEE Expo



Nakul Mehta lighting the inaugural lamp



R Rajaraman inaugurating the Bharat Bijlee booth



Vinay Patwardhan delivering an informative session

Welcoming our new Drives & Automation Channel Partners



Amaresh Hiremath
DP Power Tech, Bangalore
BL52 VFDs in Process industries
(Sugar & Rice mills)



Anand Raj
AB Automation, Coimbatore
KEB Drives & BL52 VFDs in Cranes,
Agro and Textile industries



Udit Lakra
Aditya Automation, Rourkela
KEB Drives & BL52 VFDs in Metal
(steel plants)



Sanjay Kumar Sharma
SS Hydraulics &
Pneumatic Tools, Jaipur
BL52 VFDs in Crane and
Plastic industries

BB in the News

Before the pandemic struck India, our Managing Director Nakul Mehta was interviewed by Economic Times Realty at the IEE Expo show in February 2020. The text version of the interview here <https://www.bit.ly/3dGfsLG> speaks of our focus on gearless machines for elevators, growth and challenges for the industry, and the need to enforce compliance with established Standards, Rules, and Codes by relevant authorities and the industry itself.



Our presence at IEE Expo was covered in the Quarter 2 issue of Elevator World India. Please turn to page 40 of the e-magazine here <https://www.bit.ly/2VvC3UK> for the coverage and page 45 for a quote by R Rajaraman, our VP - Magnet Technology Machines, on the challenges faced by the industry in light of the pandemic.

R. Rajaraman, Vice President, Magnet Technology Machines, Bharat Bijlee Ltd.



We are focusing on the domestic market and exports. For the VT industry, there is steady growth of 8-10%. All types of machines are being sold in India. Belt machines are one of the new things, because people expect smaller machines, more energy-efficient machines. Since 2008, we have been participating in this expo. It is growing, but there is too much competition for machines. We were the first to start with machines, but it is good to keep this focus and be innovative. I would suggest that there should be a star



During the country-wide lockdown, our Motors and Drives & Automation divisions conducted online training sessions for our customers and dealers.

Our Motors team conducted technical webinars for several customer organizations to increase their awareness of our products and capabilities. Sessions were also organised for dealers to address their concerns during the pandemic.

A series of webinars by our Drives & Automation team covered a range of topics, including application solutions and product maintenance. All sessions were full to capacity.

BB in the News



Manufacturing Today magazine quoted Nitin Bansode, our Chief Quality Officer for Industrial Systems, in their 9th anniversary issue released in February 2020, which featured 100 leading manufacturing companies in India. Here's the full-text version of his quote.

"Evolving technologies in products and digitisation enable companies to deliver quality more consistently - this enables marketplace differentiation. Differentiation will take place via providing unique, or "innovative" solutions. These will address unmet, even unrecognised, customer needs, and offer solutions that minimise or eliminate limitations that the customer had taken for granted.

Innovation is a progression from the established discipline of quality management and quality thinking, even though innovation involves behaviours - creativity, risk-taking, willingness to fail - seemingly contrary to those demanded for quality. Innovation calls for more non-linear thinking, and both creativity and execution. If the role of the quality function is perceived to be strategic and value-adding rather than only to "reduce

variation", then innovation and quality cultures can reinforce each other so that there is simultaneously flexibility for innovation, and order for quality.

As customers grow globalised and demanding, the traditional definition of quality - "fit for purpose" - has become a fast moving target. Companies must develop a culture for continuous improvement across systems and processes.

Enhancing value to the customer can take place through: consistently uniform products and services by benchmarking; reducing variation, COPQ, and waste; reducing the number of defects; improving service response and delivery performance, etc., with each one being measurable. There is a well-developed body of knowledge in the quality profession on these "technical" aspects, and the quality function can drive these initiatives in a structured manner. However, equally important are the "social" or "cultural" aspects: fostering a culture of ongoing improvement through participation, knowledge-sharing, and fact-based analysis."