A REPORT ON

INDUSTRIAL VISIT TO

ABB VADODARA

ON 3RD AUGUST 2018

BY STUDENTS OF

BE-ELECTRICAL 4TH YEAR

ACCOMPANIED BY

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ORGANIZED BY

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INTRODUCTION TO ABB COMPANY:

ABB is a pioneering technology leader that works closely with utility, industry, transport and infrastructure customers in roughly 100 countries. With more than four decades at the forefront of digital technologies, ABB are a leader in digitally connected and enabled industrial equipment and systems with an installed base of more than 70,000 control systems connecting 70 million devices.

ABB is a Swedish-Swiss multinational corporation headquartered in Zurich, Switzerland, operating mainly in robotics, power, heavy electrical equipment and automation technology areas

What did students do…

Students have visited ‘ABB PowerTEC Technology Experience Centre’ and saw Switch yard, different types of switchgear & protection equipment used in transmission of power, etc.

Different Product that students saw:

In Switch Yard:

HORIZONTAL KNEE DISCONNECTOR DDK 800KV

Maximum reliability and minimal maintenance

The horizontal knee disconnector requires the smallest spaces in both horizontal and vertical directions, suitable for substation with small installation area. The DDK800 disconnector is available for rated parameters 800kV, 3150A and 50kA

Self-aligned contact system

Special spring-less contact design to prevent opening of contact during short circuit

Minimized contact resistance

Stable open/close movement of disconnectors;

Driving and driven pipe Studentsll supported by compression and extension spring

Large contacting area betStudentsen moving contacts and fixed contacts

Guiding device

Applications

The horizontal knee disconnector requires minimal space in both horizontal and vertical directions making them ideal for substations with small installation area.

Horizontal knee disconnector GW57

Maximum reliability and minimal maintenance

The GW57 disconnectors are available up to 550 kV, 4000 A and 63 kA. These disconnectors have a low friction design and offer minimized contact resistance. They are equipped with interlocking for reliability in extreme conditions. Some other important features of these disconnectors are:

Stable open/close movement of disconnectors

No overheating and constant contact resistance over life time

Self-cleaning design for contacts

Maintenance-free rotating contacts in the knees (no flex braids) and also on the housing

Ice breaking capacity

Applications

The horizontal knee disconnector requires minimal space in both horizontal and vertical directions making them ideal for substations with small installation area.

Medium voltage circuit breakers

The world’s most successful range of MV vacuum and SF6 gas circuit breakers for indoor and outdoor applications.

Across every market ABB's breakers occupy a leading position thanks to their proven reputation for reliability, performance and long life. CBs from ABB are available for original equipment manufacturers (OEM) to incorporate in their own installations or for use in repair, retrofit and upgrade projects.

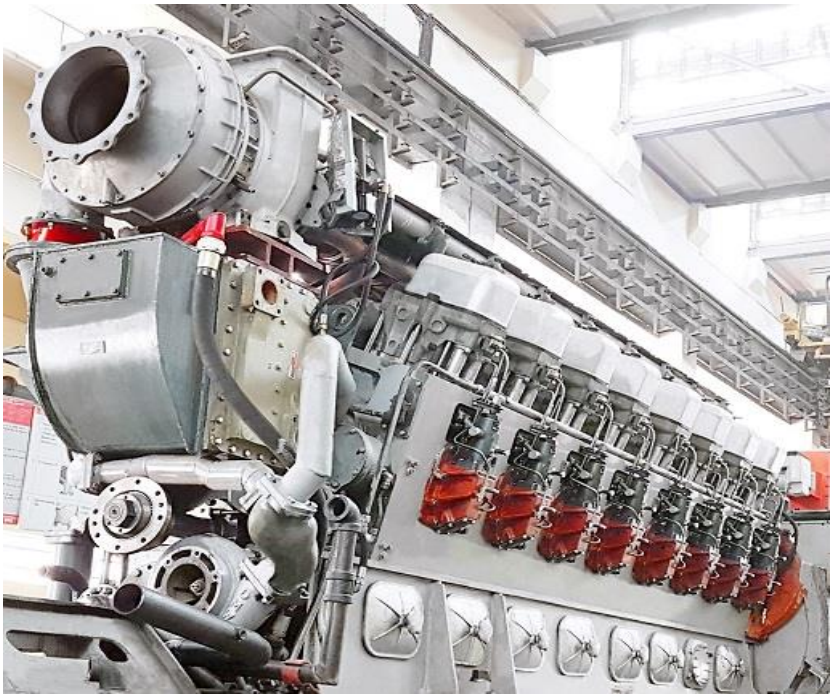
TPR turbocharger

The most power and efficiency for the long haul

The TPR turbocharger was developed for four-stroke diesel engines in an output range of 1,250 kW to 4,400 kW in single or twin turbocharger configurations. Available in the frame sizes TPR56 and TPR61, the TPR platform targets modern medium-speed engines used in heavy-duty rail traction applications. A global population of over 2000 TPR turbochargers is currently in use, notably in India, where they have to cope with the most demanding load profiles and ambient conditions in both heavy long-haul and shunting locomotive

Applications.

The TPR turbocharger platform offers high pressure ratios at high turbocharging efficiencies, combined with outstanding reliability and long times betStudentsen overhauls (TBOs) and is constructed as a compact package suitable for installation in the often restricted space available on many diesel locomotives.



MNS® CONVENTIONAL

Verification tested switchgear and motor control assemblies

MNS is ABB's low voltage switchgear and controlgear assembly for poStudentsr distribution and motor control. The MNS design is verified in accordance with the IEC 61439 series and IEC 61641 standards. MNS is of a modular design, enabling ABB to supply integrated solutions for today's challenging business environment.

Main benefits

Unmatched safety for protection of personnel and plant

Reduced operational expenditure

Increased availability

Reliable, flexible and scalable

Ease of maintenance with 100% accessibility from the front

Main features

Fully certified to IEC 61439 & IEC 61641

Modular construction

Ease of operation

Arc proof certified up to 690V, 100kA

Segregation up to form 4b

Thyristors

ABB Semiconductors' phase control thyristor has been the back-bone of the high poStudentsr electronics industry since its introduction 60 years ago. Its field of application ranges from kW DC-drives and MW rated load commutated frequency converters to GW converters for HVDC transmission.

Due to the growing demand for energy efficiency, the thyristor remains at the heart of much of the equipment needed for energy transmission and distribution, as it allows the best performance in terms of cost, reliability and efficiency.
ABB was the first company to introduce 6" thyristor products for HVDC applications and ABB offers the most complete range of high poStudentsr thyristors. New thyristor products continue to be developed with focus on minimizing overall losses and maximizing the poStudentsr rating of the device.

Bi-directionally controlled thyristors (BCT)

Phase control thyristors (PCT)

Press-pack IGBT and diode modules

StakPak is a family of high poStudentsr insulated gate bipolar transistor (IGBT) press-packs and diodes in an advanced modular housing that guarantees uniform chip pressure in multiple-device stacks.

Although the most common package for IGBTs is the isolated module, for applications requiring series connection, press-packs are preferred because of the ease with which they can be connected electrically and mechanically in series and because of their inherent ability to conduct in the shorted state – an essential feature where redundancy is required.Since IGBTs feature multiple parallel chips, there is a challenge - with conventional press-packs - in assuring uniform pressure on all chips. ABB has solved this problem with a patented spring technology.

The StakPak, optimized for series connection, features a modular concept based on sub-modules fitted in a fiberglass reinforced frame, which allows a flexible realisation of a range of products for different current ratings and IGBT/diode ratios.

Flexible connection kits for generator circuit-breakers

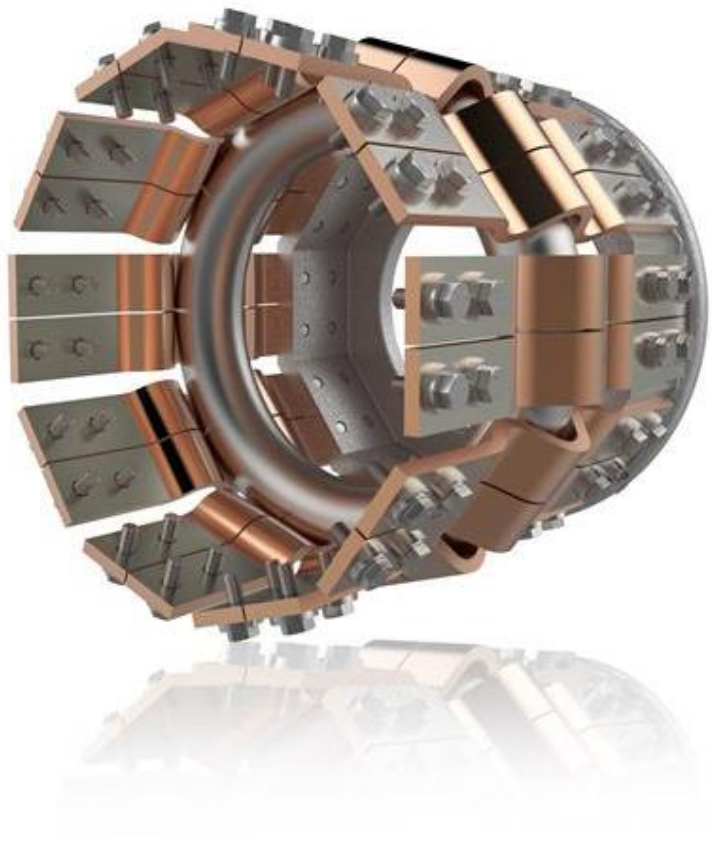
The most safe and reliable connection betStudentsen the generator circuit-breaker (GCB) and the isolated phase busduct (IPB)

Flexible connections provide a detachable (bolted) connection betStudentsen the GCB life part and the conductor of the adjacent IPB or busduct.

ABB’s flexible connections are extensively designed and type tested together with the GCB to ensure no harmful stresses are transferred to the GCB during operation while safeguarding dielectric distances.

Applications

For all type of breakers



LOCK OUT TAG OUT PRACTICE

ABB	Requirements for safe isolation of plant and equipment and application of lock out tag out		9AKK104941D0113
Lockout / Tagout WP-01	Code of Practice for Safe Working Hazard Control Sheet	Approved / date Approved 2014-08	Revision No. 2.0

GENERAL ISOLATION OF EQUIPMENT

Most items of equipment are driven electrically and hence lock out tag out it is a simple way of ensuring that whenever an engineer has to work on any piece of equipment that he will be safe during the period the work is being undertaken because the isolator has been placed in the off position and the lock and the tag has been applied. This simple action can be applied in any location. This precaution forms an important part of the ABB Seven Steps Electrical safety Programme. Figs 3 and 4 show 2 simple examples

Fig 3
Lock out applied but no tag

Fig 4
Locked out and tagged out

It is important that the lock is applied, to ensure that the poStudentsr supply has been turned off, and cannot be returned to service, and that the tag is fitted which will identify who was working on the equipment together with his contact number. If this is not done it may be assumed that the lock has been left in error and the tag will enable a check to be made as to who was working on the equipment. In the case of HV equipment earthing or grounding is also required as part of the 7 Steps.

In cases where a number of persons may be working on the plant or equipment then the use of a multi lock hasp is required as is shown in fig 4.

This in fact allows the supervisor or team leader to isolate the equipment to be worked upon after checking that it is the correct equipment, the key consideration being the confirmation that the isolator to be locked off in fact controls the equipment to be worked on. Once this has been done, the engineers who are carrying out the work can then apply their own locks. This will ensure that the equipment cannot then be returned to service until all persons have removed their locks and have been accounted for. This is important for all situations where persons are working remote from the point of isolation.

On-load tap changers type UCG

The UC family is a group of diverter switch on-load tap changers. They come in a wide range of models with a rating suitable for every application. They are mounted inside of the transformer tank, suspended from the transformer cover. The UC types operate with conventional arc quenching in oil diverter switches.

The UCG model is the smallest of the UC types and is suitable for transformers up to 500 MVA with a BIL rating of 1050 kV and current rating of 600 (1500) A.

Product scope

- Base technology: Conventional, resistance, in-tank
- Common applications: Network, special, industrial, HVDC

Tap-changers and switches

Tap-changers are used to change the turn ratio between windings in a transformer. This ratio determines the voltage ratio between the windings and is essential for the stabilization of network voltage under variable load conditions. This adjustment may be made by an on-load tap-changer, or by a de-energized tap-changer, or by the selection of bolted link positions.

ABB offers a comprehensive portfolio of on-load tap-changers both the conventional and vacuum type, for high voltage and low voltage regulation, in in-tank and on-tank solutions. Our offering includes a wide range of de-energized tap-changers.

Vacuum on-load tap-changers

Conventional on-load tap-changers

Motor-drive mechanisms

De-energized tap-changers and switches

ELK Hybrid Switchgear 550 kV

Space and cost optimization with proven technology

The simplified GIS, ELK for hybrid applications on 550 kV combines the advantages of encapsulated technology with the simplicity of air-insulated switchgear (AIS). Our hybrid technology delivers the essential switching and measuring components utilizing ABB's well proven ELK technology that has been in service for close to five decades. It is the most reliable and economical solution for new installations or extensions, and retrofit of existing substations.

Applications

- Optimal for new substation installations with constrained space requirements
- Substation extensions
- Replacement of aged conventional equipment to extend lifetime of substation
- Areas of high seismic activity benefit from low gravity point of equipment

Gas insulated switchgear - Medium voltage

Gas insulated switchgear solutions for primary and secondary distribution to suit every application up to 40 kV

Secondary gas insulated switchgear has been subject to a significant developments in the past 20 years, resulting in increased functionality and smaller dimensions. ABB's Ring Main Units (RMUs) and secondary switchgear are prepared for the use in future distribution grids and designed for use in various applications such as compact secondary substations, light industry, renewables or infrastructure.

Flexible combination, reliability, availability and economy are the attributes that make it easy for our clients in industry and utilities to decide in favour of **primary gas insulated switchgear** products from the ZX series. Together with complete conventional solutions, the use of digital protection and control technology, sensor systems and plug-in connections make ZX systems fit for the future.

Composite station post insulators (245 - 800kV)

ABB composite station post insulators can directly replace porcelain insulators. Composite insulators with silicone rubber insulation possess unique properties and are installed all over the world. ABB offers a wide range of insulators, and together with our flexible production method can deliver composite insulators that will meet your requirements.

Product scope:

- Main applications: reactors, disconnectors and busbar supports
- Range: from 45 to 550 kV AC, 800 kV DC
- One-piece design up to 15 meters in length
- HTV material
- Optimized shed profile
- Qualification and verification exceed standard requirements
- Low pressure gas filled
- No monitoring

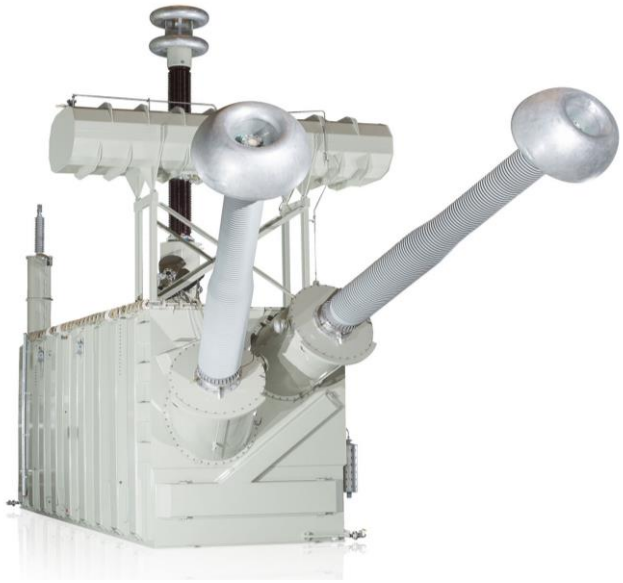
HVDC Classic converter transformers

The HVDC technology (High Voltage Direct Current) is used to transmit electricity over long distances by overhead transmission lines or submarine cables. It is also used to interconnect separate power systems, where traditional alternating current (AC) connections cannot be used. ABB pioneered the HVDC technology and is the undisputed world leader in the HVDC field. HVDC transmission offers, for instance, controllability and low total investment cost compared to AC solutions for long-range transmission.

In a high voltage direct current (HVDC) system, electric power is taken from one point in a three-phase

AC network, converted to DC in a converter station, transmitted to the receiving point by an overhead line or cable and then converted back to AC in another converter station and injected into the receiving AC network. Typically, an HVDC transmission has a rated power of more than 100 MW and many are in the 1,000 - 3,000 MW range. ABB has successfully developed the world's first 1,100 kV converter transformer with a power rating of 12,000 MW, breaking the record for the highest DC voltage levels ever.

HVDC transmissions are used for transmission of power over long or very long distances, because it then becomes economically attractive over conventional AC lines.



IEC outdoor gas insulated (SF6) circuit breaker OHB

Medium Voltage circuit breaker with mechanical operating mechanism designed for distribution systems up to 40.5 kV, 2500 A, 31.5 kA.

These circuit breakers are of live tank design. They are used in power distribution for control and protection of lines and for control and protection of transformers, rectifier units, capacitor banks, etc. Thanks to the autopuffer breaking technique, they do not generate operating overvoltages. This means they are also highly suitable for retrofitting, where the plant insulating materials may be sensitive to dielectric stresses.

Experience from the Industrial Visit

Exposure to better industrial and business practices in progressive economies.

Interaction with Guides and other person from the industry is motivating.

Know business skills in a global context encouraging cultural interaction to learn better coordination betStudentsen various Departments.

See & know is better motto than ‘read & learn’.

After completing the industrial visit, Students have upgraded our knowledge at a very great level.

It was a good learning experience. In each & every department, students got new ideas and new thinking which was very necessary for our Personal development.

Students have visited the entire process department. They are using new technologies that help us to understand about the role of advanced technology in productivity of Manufacturing.

They are strictly following quality & safety aspects. It is desirable to review various aspects & sum up the industrial visit.

During industrial visit, Students feed very much satisfied by acquiring information of various departments & knowing many new things.

The industrial visit helps how to translate theory into practical.

Conclusion

Students conclude that while going through the entire industrial visit, the cooperation is found to be very well organized developed & most ideal industry in every walk of its production, administration & management aspects.

Students extend our heartiest thanks to ABB for making 3rd August 2018 a day to cherish for some of the lucky students who are honoured with your humble gesture to get an opportunity to visit such an esteemed organization.

Students want to thank Mr. Harsh Ramaiya , for guiding and sharing information about organization profile at ABB VADODARA.

Students also want to thank our Prof.Sharad Patel Sir and faculty members, Prof. Krishna Vakhariya and Prof.Jignesh Desai for coordinating the Industrial visit.

Thank You