Energy Efficiency Opportunity in Electroplating Rectifiers Through IGBT Technology

Energy Saving in Electroplating Plants

- How to reduce the electricity consumption and why to save energy?

- In this competitive market, how to reduce the raw material cost/manufacturing cost without compromising with quality?

Power supply Up gradation

- Why not we should think to upgrade power supply to reduce Electricity Bills which is always a big part of any plant?

- Can Electroplating Process be completed without DC Power Supply? It means Rectifiers are very important part of any Electroplating Plant , so we should have an efficient Rectifiers to save the Electricity and to improve the quality of product.

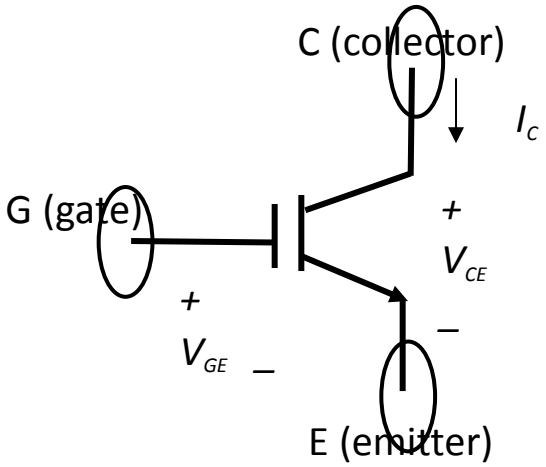
What is the rectifier and efficient rectifier?

- A rectifier is a device which converts the Alternating Current (AC) to Direct Current (DC). From energy use and technology audit studies, it was observed that presently a majority of electro plating units are using conventional rectifier for electro plating purpose.
- Energy efficient rectifiers are the rectifiers which consumes approx. half the power when compared to conventional rectifiers. Hence it is recommended to replace conventional rectifier with energy efficient rectifier.

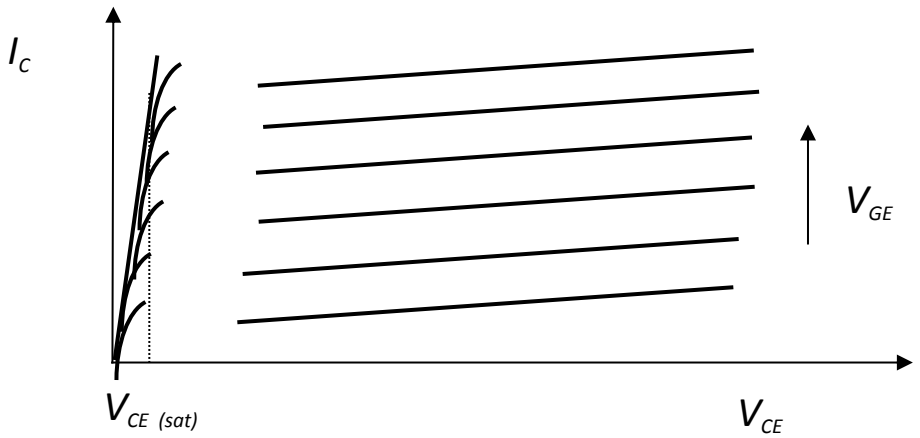
Rectifier with IGBT Technology

- What is IGBT? And how does this technology make the rectifier EFFICIENT/ENERGY SAVER?
- IGBT is switching device and works on very high frequency, it is the combination of BJT and MOSFET.
- Rectifier with IGBT Technology has low EMF
- Very Low Ripples.
- High Efficiency
- Small Foot Prints etc.

Insulated Gate Bipolar Transistor (IGBT)



IGBT: symbol



v-i characteristics

- Combination of BJT and MOSFET characteristics.
  - Gate behaviour similar to MOSFET - easy to turn on and off.
  - Low losses like BJT due to low on-state Collector-Emitter voltage (2-3V).

- **Ratings:** Voltage: V_{CE}<3.3kV, Current,: I_C<1.2kA currently available. Latest: HVIGBT 4.5kV/1.2kA.
- Switching frequency up to 100KHz. Typical applications: 20-50KHz.

How to select the correct IGBT based rectifier?

- By using only the IGBTs in the rectifier, it can not be called energy efficient, smart rectifier.
- Rectifier should have always a good control on DC voltage & currents, should have a smart controller.

IGBT Based Rectifier with Modular Technology

- Modularity: **Improved Uptime**

  The modular design makes sure to **minimize downtime**; if one Power Module should fail, the rectifier will still run at reduced output power. This will help you “save” the batch being processed and is a smart investment for anyone working with demanding and time-consuming processes of high value goods.

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- **Upgradeable Anytime**

  Thanks to the modular design, you only pay for the power you need. Should your future power requirements change, don’t worry! You do not have to invest in a new rectifier. The FlexKraft is easily upgradeable with more power – simply **add more power modules to increase your power**.

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- **Improved Output Quality**

  The FlexKraft guarantees **ripple below 2%** across the entire regulation range (0-100% output). Typical ripple is even lower – under most load conditions ripple is below 0.2%. This high quality of the output current combined with the **pinpoint accuracy** in the settings (set current: 0.1A and set voltage: 0.01V) promotes unparalleled results for sensitive processes like chrome plating.

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- **Energy Savings**

  The FlexKraft offers near **90% efficiency** across the output range. This could mean significant cost savings as compared to traditional thyristor controlled (SCR) rectifiers. A study made by one of our customers showed that the FlexKraft consumed 34% less energy than one of their SCR units when powering identical plating processes. In addition, the FlexKraft units offer **very little reactive power consumption**, which will help you **avoid unnecessary costs** by keeping energy consumption down.

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- **Multiple Outputs in One Stack**

  One of the things that makes the FlexKraft stand out from the competition is the ability to have multiple individually controlled outputs (powering multiple tanks) integrated in one stack. This is both **cost effective** – save up to 10-15% per output – as well as **space saving** for your business.

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