

UNCOVER YOUR HIDDEN SAVINGS POTENTIAL

Webinar May 2023: key takeaways

In older rectifiers, energy efficiency was not the primary focus

We often see 70-80% efficiency at rated outputs. They also deliver direct current with a lot of residual ripple, which impacts on output quality, leading to scrap and reworks. We often see poor accuracy of output values on older rectifiers, often leading to plating results deviating from expected results, and requiring increased plating times.

Any rectifier will have lower efficiency when operated below the rated output

This effect is more substantial when rectifiers are oversized, leading to larger energy bills.

Power supply impacts finishing quality

If have two rectifiers using SCR and SMPS technology side by side, the voltage reading could be the same, but there would be a significant difference in plating quality.

- SCR-type rectifiers have a high-to-deep ripple in the current, to the point that the current output goes to 0 for fraction of a second. This causes thinner plating deposits and a milky or frosty appearance.
- SMPS rectifiers have a much smoother ripple, which always maintains power availability above the minimum required – there is always enough voltage to keep the chemical process going for getting a consistent deposit, while avoiding the burns which can happen if the current peaks too high. With a smoother ripple, and therefore no high peaks, you can even increase the current without damaging components, and therefore increase the process speed.

Current control optimizes quality and performance

The output from a SMPS-type rectifier can still be sub-optimal, depending on how you control the power. When using voltage control, current density varies with the resistance in the plating bath, resulting in variable quality plating, and increased plating time.

Using current control, you can control the process, securing a constant current density throughout – minimizing process time and optimizing quality.

[Watch the webinar recording >](#)



Q & A

How can we reduce plating time?

Ripple affects the plating and speed of plating. Replacing older rectifiers that have high ripple will improve plating speed and efficiency. FlexKraft runs at below, or around, 1%. And of course, if you have a voltage control process, switching to current control will also make the process faster.

What about other variables when selecting current or voltage control?

Too much ion transfer can cause secondary reactions and resistance in the circuit. This results in lost efficiency, and can also burn the parts you are plating. This is avoided by choosing current control.

What are the key differences between FlexKraft and other IGBT rectifiers, as well as SCR and diode-based?

[FlexKraft's](#) modularity enables scalability: you can have the same rectifier, no matter the size of outputs you need, throughout your factory. This makes installation, control and maintenance easy. It's built to be a simple solution that fits any kind of need for the customer.

How many modules can you have in one FlexKraft rectifier?

You can have 50 modules in a primary/secondary configuration, or run them as individual stacks using a centralised PLC or similar. We're used to seeing systems of 100 or more.

Why does current go down during a batch?

This happens only when you're running in voltage control mode, and it's because resistance in the circuit is increasing. When you run in current control, you'll see the voltage increasing instead.

What maintenance and spare parts does FlexKraft need?

For air-cooled rectifiers, you'll need to check the filters at the regular intervals and clean them if necessary. We usually recommend three months or so on, but this does depend on the environment the rectifiers are working in. If there's a lot of dust in the air, for example, the filters might need to be cleaned more often or even replaced.

You'll also want to check the ribbon cables, and that the busbar connections are all secure. Ideally, you'd check the whole circuit with a heat camera to make sure that you don't have any hotspots in your load circuit – this would just be costing you money. Hotspots are caused by resistance, leading to voltage dropping while heating the environment.

We do recommend calibrating rectifiers once a year – but many customers don't. Our rectifiers stay very consistent – when they come in for servicing, we can see that they are still extremely accurate in terms of the outputs they produce.

What could go wrong with the rectifier?

Very occasionally, the rectification circuit in the module fails - because it's the part that is always working with high load. But with FlexKraft, you don't have to go in and repair the module yourself (unless you really want to); you can replace it with the spare we provide you with, and then send the one you've switched out to us for repair. That's one of the great things about our modular system – you don't have to worry about interruptions to production. Even if you didn't replace one failed module, the rectifier will keep on working, but it would lose some of that output.

How come your rectifier can save more power than other SCR or IGBT rectifiers?

Every rectifier running at less than its rated output is losing efficiency. So ideally, you want one that suits your particular need. With FlexKraft, the modular design means you don't need to have an oversized rectifier, you can choose the number of modules you need to match the output you're looking for. Each power module has a maximum of 600A/ 12V.

You provide measurement reports after an energy audit – can these be used to apply for a grant to replace or upgrade to a more efficient solution?

Yes, you can – depending on where you are. Certainly, in some countries – such as Germany and Croatia – we have had customers use the report to apply for government grants.

Do you make thyristor technology rectifiers?

Yes, we do: PowerKraft, which is used mainly for large installations, such as hydrogen production.

Can you suggest a device for checking the ripple factor?

A multi-meter is a quick and easy way to check – although if you have an oscilloscope as well, you can get even more exact measurements.

What is the redundancy you talk about with FlexKraft?

If there is a failure in one power module, it shuts down, but you only lose that module – the rectifier will keep on working. This means you won't have a complete shutdown, and can keep on running.

It will give you a slightly reduced output until the module is repaired or replaced, but if you can change that in your PLC, you can override that and simply change the power module when you have time.

How much is the ripple factor percentage in FlexKraft rectifier?

Usually below or around 1%. We test every rectifier before it leaves the factory.

If the environment is really extremely tough, perhaps with extreme temperatures or a high risk of corrosion, then a water-cooled rectifier could be a good option for optimising conditions for the best rectifier performance, and keeping maintenance to a minimum. We also make a cooling circuit, [CoolKraft](#), which means that there's no need to have one specially designed and built for your rectifier.

Find out more about KraftPowercon solutions for [general metal finishing](#) or [get in touch](#) with our experts to ask your own questions.

Experience is our key competence.
And helping you is our passion.

We won't let you down