

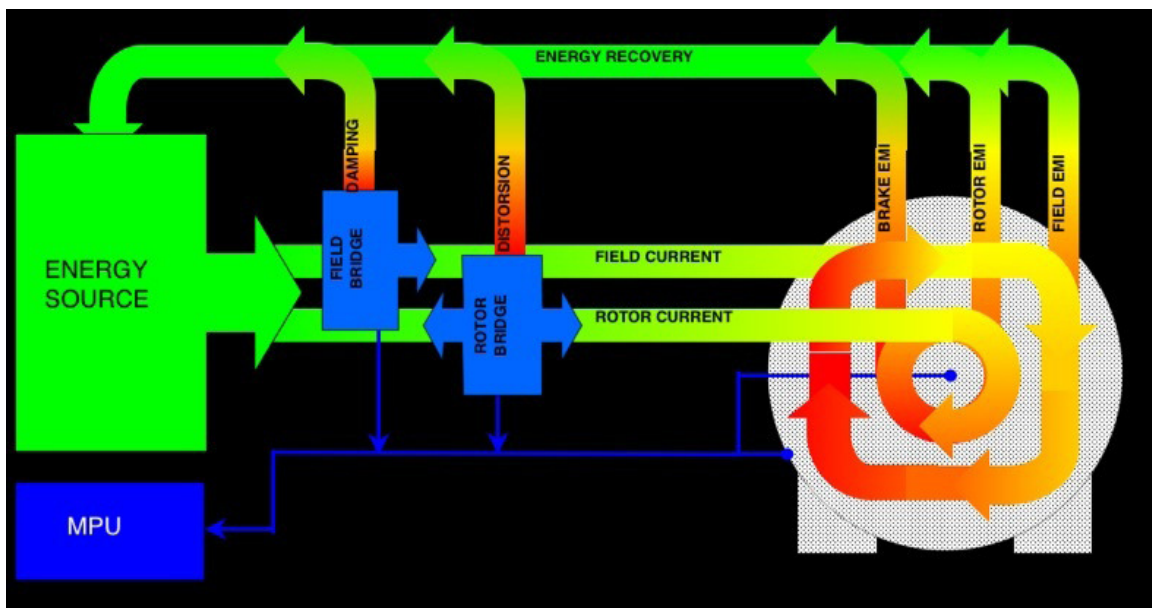


SPECTRA ELECTRONICS

Spectra Electronics supports the ESP ideology and current “Clean Wake” project. We support this initiative by participating with the evaluation of our new motor controller/ generator concept.

Spectra Electronics is working to evaluate a completely new engine drive concept. This new product (called Ecologic) is a method to drive vessels aimed to ultimately be complete environmentally neutral. The new concept combines a multitude of technical principles that is made possible by a new (patented) combination of electronics and microprocessors modules.

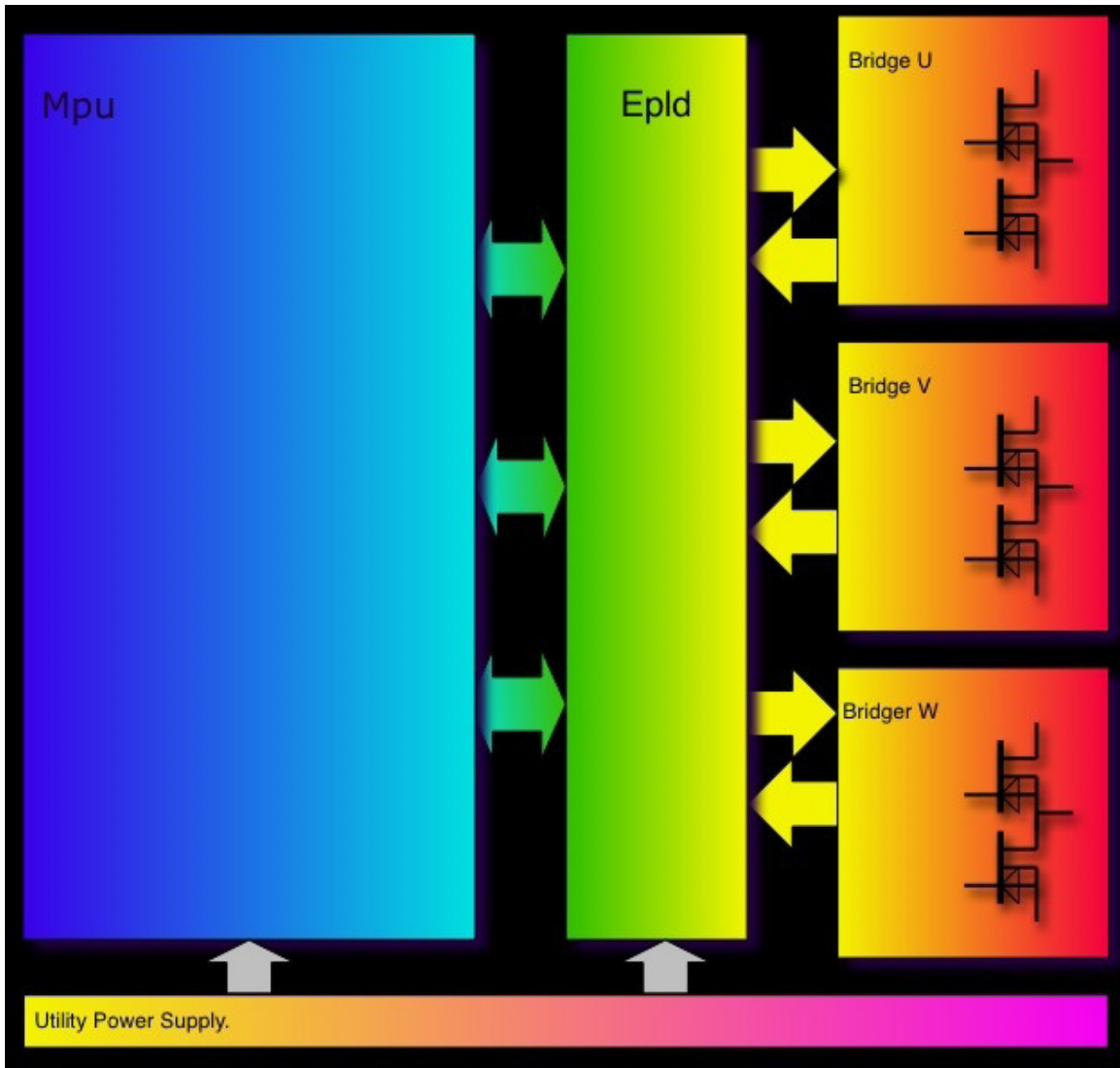
Inside electric engines magnetism is used to create a rotating field which is responsible for rotating and driving the motor. At that moment at several places inside the motor so called whirl currents appear which are opposite to the streams that feed the engine. Through channeling these unwanted inductive currents by means of phase angle control and cosines phi power factor improvements these flows are caught and recycled back into the battery.



D.E.R.S. (Dynamic Energy Recovery System)

On this picture you can see that the induction of field and rotor coils and the induction that occurs during braking is reused again. This technique is called

D.E.R.S . For this technique much arithmetic power with quick response times are necessary which are provided by the microprocessors. The D.E.R.S technique ensures that the motor hardly produces any heat. As a result the motor runs 26% more efficient and will also last longer. Another important feature of the new concept is the ability to produce multiple drive technologies within the same concept. For instance there could be five different types of motors controlled with or without full drive and [re]generator applications. This is achieved by applying the (re) programmable logic technology called epld and fpla. This allows the processor to configure the electronic modules for the most efficient way to drive the motor, the delivery of regenerated energy for charging the batteries.



Ecological concept with the three main function blocks.

In the Ecologic diagram you will see next to the processor block, the block of the programmable logic which in turn controls the output stages. However it would be beyond the scope of this mail to go into further details.

With the Ecologic concept we plan to achieve a total energy reduction of 60% overall and through specially developed regeneration techniques the battery will be fully recharged during sailing times.

During our initial evaluation and demonstration we learned that our concept is most efficient with DC motors with a field winding and rotor winding with brushes. For the ESP project we have calculated that a 1200 -1600watt 24V DC pod motor is the best starting point for our evaluation.

We will evaluate and log the data within three main concepts:

- 1 Electric Outboard motor**
- 2 Hydro Generator (underwater generator)**
- 3 Windmill Hydro Generator**

Sincerely Yours

Harm Lok

Spectra Electronics

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