# The Extended Product Approach for energy saving in Motor Driven Systems – Outcomes of the Workshop at EEMODS, 30 October 2013, Rio de Janeiro

The focus of the workshop was on the Policy and Practical aspects of implementing the Extended Product Approach.

Short presentations were given by:
Markus Teepe, Europump (Wilo) – Description of the Extended Product Approach
Kurt Stockman, University of Gent – Applying the Extended product Approach to Fan systems
Peter Zwanziger, IEC (Siemens) – Overview of relevant standards
Hugh Falkner EMSA (Australian Dept of Industry ) – Outcomes of internal EMSA EPA Policy meeting

## What is the Extended Product Approach?

*For a fuller explanation, please refer to the following paper on the EEMODs web-site.*

Motors and Pumps in the EU and elsewhere are currently regulated on the basis of the Minimum-Efficiency-Index (MEI), which just considers the performance at a single duty point. To evaluate the energy efficiency of pump units in the context of the Extended Product Approach (EPA), the Energy-Efficiency-Index (EEI) is introduced as a normalized weighted average of electrical power input of a pump unit operated at different duty points of a standardized load-time profile. This gives a much better idea of the actual energy consumption, taking account of the actual load point(s) of the different components, how they interact together, and the chosen control method.

## The need for Standardised Load Profiles

The difference between simply looking at a group of components and considering how they will perform in real life is through the use of an assumed (standardised) load profile. Devising load profiles that are adequately representative of a wide range of systems seems challenging, but huge advances have been taken by Europump over the last year. The limited experience so far is that modest adjustments to the duty profile appear to make little difference to ranking of products, and so the assumed duty profile does not have to be an accurate match to reality.

The same assembly of parts may have more than one EEI value, depending on application. *An example is an air compressor that may be on base load or load following duty.*

A product might have an acceptable EEI in one application but not another. Will it be OK to have products on the market that can be used in some applications but not others?

So far we have only seen standardised load profiles for pump systems. We are not aware of any being developed for other applications such as compressors or fans.

## Options for Compliance Checking

Currently compliance involves testing a component in a test lab. When checking an assembly of components, new methods will be needed, summarised in figure1 below.

| Option | Compliance check | Comments on implementation |
|---|---|---|
| Check parts individually compliant (MEI), and that EEI is OK when using the selected Load profile | No additional measurements needed, just calculation of EEI using existing component (MEI) data. | Just requires a database of component EEI values and software to calculate the MEI value. |
| For Integrated products, calculate EEI of assembly as a whole under assumed Load profile. | Measurement of whole assembly required. | Testing of physically large or products assembled in situ will be difficult. |

**Figure 1 Options for Compliance checking**

There are further questions relating to Compliance checking:

What will happen in the event that a "one off" product fails, where it is not possible to ask for a further three models to be supplied as the second test?

For Integrated products, would it be OK for only some components to be tested, the remainder to use declared EEI values?

## Availability of non-compliant products

A fundamental principle of the EPA is that the supplier is able to construct the product using any components that achieve the required performance. This encourages innovation and reduces costs, but might mean that components that do not individually comply with MEPS regulation might still be manufactured and sold to product integrators.

Are we content that non-compliant components should still be manufactured?

## Supporting tools

Calculating the MEI of a product will require efficiency data at several different load points of all the components used in the systems, and then some simple but time-consuming sums. For speed and accuracy a product database and calculation tool will be essential.

Who will create and maintain the MEI calculation tool? What checks will there be on entered data? Might the database contain details of products with individually non-compliant EEI values that might be used to construct combined products that do have compliant MEI values?

## Integrated vs Combined products

For combined (separable) products, the parts can be tested individually according to the specified test conditions. But if the product is integrated, and non-separable, then it will by necessity be tested according to actual working conditions. For example, a motor may be tested assuming a 2 or 4 kHz switching waveform, but actually be operating with a 6kHz waveform.

How can we ensure a level playing field if integrated products use actual operating conditions but separable products use specified test conditions?

## Other Considerations

The reduced slip of higher efficiency motors can greatly reduce the net energy saving in some high friction resistance applications.

How will motor slip be taken account?

There is variation in standby energy consumption of VSDs, which might influence choice of best VSD for an application. Unfortunately there is no published data on this that we are aware of.

Is any work being done on VSD standby energy consumption? How significant a factor is this?

When a component is replaced, will it be necessary for the assembly to still meet the MEI value? How will this work when there is insufficient data on the other components to be able to calculate the MEI? Or will it just be sufficient to ensure that the EEI value of the replaced component is acceptable?

What will happen when a component needs replacing?

## Who will be responsible?

One of the most important questions is understanding who will be the responsible party. Expecting anyone other than the manufacturer to take responsibility for ensuring compliance is a big change from the current approach.

| Product Type | Responsible Party (?) |
|---|---|
| Integrated (non separable) | Manufacturer |
| Combined (separable) | Product Integrator |
| Field assembled | Installer |

**Figure 2 Identification of the party responsible for Compliance**

What issues are there regarding training much larger numbers of personnel, some with only modest technical knowledge, in the use of the Extended Product Approach?

How will compliance regimes need changing in order to take account of the many smaller parties who now have some responsibility for ensuring compliance?

## Implementation first steps

The introduction of the EPA marks a step change in regulations. Two ideas were suggested that would enable a “soft” launch in order to learn from early experience prior to large scale implementation:

Voluntary Scheme. By making its use optional, it would effectively be an information only scheme. This would mean that the inevitable problems with loopholes and exclusions can be identified without causing major industry disruption or user confusion.

Limited Pilot Scheme. A pilot scheme for particular products / applications could be used in order to check the approach before launching a wider scheme.
(These suggestions came from US attendees, where ACEEE is leading a voluntary EPA-based labelling scheme.)

## Standardisation

Many standards are being developed at IEC and Cenelec level that will be required in order to support the implementation of the EPA. The pace of work is impressive and greatly appreciated.

Two key points were raised:

Detailed technical standards are required in order to document a wide range of knowledge on new technical areas. But in addition to these, much simpler Instructions which should include test procedures and clearly defined limits / values are required in order to provide the simple guidance needed by all parties responsible for ensuring compliance.

Just because we can measure and define a property of part of an EPA system, does not mean that it has to be regulated. So where the difference in energy consumption of a component and other possible options is only very modest, it may overall be worthwhile to regulate it.

**Hugh Falkner, Meeting Chair, EMSA (for Department of Industry, Australia)**