

# Final report

## 1.1 Project details

<b>Project title</b>	IEA 4E EMSA – MST-Tool development and dissemination
<b>Project identification (program abbrev. and file)</b>	EUDP 14-II, J.no.: 64014-0539
<b>Name of the programme which has funded the project</b>	EUDP
<b>Project managing company/institution (name and address)</b>	Teknologisk Institut Energieeffektivisering & Ventilation Kongsvang Allé 29, 8000 Aarhus C Project leader: Sandie B. Nielsen
<b>Project partners</b>	None
<b>CVR</b> (central business register)	5697 6116
<b>Date for submission</b>	August 28, 2018

## 1.2 Short description of project objective and results

UK:

The main contribution from Denmark in this period of 4E EMSA has been the continued development and dissemination of the Motor Systems Tool. The direction and inspiration for this development came from both feedback from users and participants in MST-Tool workshops. Another important source of inspiration for this development comes from Danfoss Power Drive Systems, the largest manufacturer frequency converters and other drive units in Denmark.

The participation in 4E EMSA has ensured Denmark's position as a strong and reliable partner in global motor questions and emphasizes the importance of the 4E EMSA work up until now. In the work performed by 4E EMSA (2015-2017) Denmark was task leader and responsible for the MST-Tool part of the work plan as well as contributing to all the other parts of the EMSA work through two annual meetings within the EMSA group. In this way, Denmark continues to play a very important role in the overall 4E EMSA work and in the international motor community.

DK:

Danmarks bidrag i dette projekt har primært været den fortsatte udvikling og udbredelse af MST-Tool baseret på både feedback fra brugere og kursister ved flere afholdte workshops. Yderligere input til værktøjets udvikling blev skabt i tæt dialog med Danfoss Power Electronics – VLT-Drives, der er Danmarks ubetinget største producent af frekvensomformere og andet drev udstyr. Teknologisk Institut har via 4E EMSA arbejdet skabt gode relationer til netop Danfoss VLT-Drives.

Deltagelsen i 4E EMSA har givet Danmark mulighed for fortsat at "sidde med" hvor tingene sker i motorverden og fastholde det gode ry og rygte som Danmark har opbygget gennem en længere årrække. 4E EMSA har sikret energieffektivitet og samarbejde på tværs af lande, organisationer, erhvervsliv og institutioner. Dette er opnået gennem 2 årlige møder i EMSA

gruppen, fremlæggelse af papers på konferencer, afholdelse af workshops/webinars. Alle aktiviteter der har sikret Danmark stor indflydelse.

### **1.3 Executive summary**

Through this project, Denmark has been participating in the continued work of IEA 4E EMSA as one of six member states (AUS, AU, CH, US, NL, DK) – <http://motorsystems.org>

4E EMSA is an International collaboration within IEA which main object is to spread and globalize methods and technics of high efficiency electrical motors and motor systems. Denmark participates through this project with task leadership of: "MST-Tool development and dissemination" as well as a strong contribution to all the other tasks.

In the current project period Denmark has participated two times in the esteemed international electric motor conference EEMODS (2015, Helsinki – 2017, Rome), and one time at the equally esteemed swiss conference: Motor Summit (2016, Zürich). On all occasions a paper has been written and presented at the events, displaying progress and results of the Danish contribution to the EMSA work in the periods between the venues. Venues in which major Danish companies always are represented as these are important opportunities to "catch up" with international development on motor related issues. Examples of these companies would be: Grundfos, Danfoss etc.

In the summer of 2015 Denmark participated in the first ever: Motor Summit China, Zin-Jiang province, this time with a paper on European ecodesign (MEPS) and random check testing experiences on motors and motor systems. This – again – was only possible due to the Danish involvement in the 4E EMSA work.

Through all this EMSA work Denmark has been invoking energy efficiency on electric motor systems in the entire world and has been an important factor in pushing the European ecodesign decision makers to more strict energy efficient regulations as one of the few none commercial parties in the electric motor community. All of which would be not possible without the support of EUDP and this project.

### **1.4 Project objectives**

This is an IEA project under the Danish EUDP programme and therefore not to be considered as a "normal" project with milestones, results and conclusions as such.

The main objective in this project has been not only to participate, but positively influence, the collaborated work of the six member states of 4E EMSA and all the followers of the EMSA project, and in this process also bring relevant motor related information back to both member countries and the ExCO of EMSA.

This has indeed been a successful process during the project period.

### **1.5 Project results and dissemination of results**

Denmark has participated in all the scheduled meeting activity within EMSA in the given period as well as written and presented papers on 4 international electric motor systems related conferences.

Denmark has also hosted 4 webinars in the project period

- Motor Systems Tool
- Optimization of cooling systems
- Pumps & Circulators, ecodesign & optimization of pump systems
- Fans, ecodesign & optimization of fan systems

During the project period the Motor Systems Tool have been developed further and now includes calculation models directly linked to the current IEC standards on motor and motor systems testing. There has also been a major development within the application side of the tool and finally the tool have been translated into German & French and today stands as the only impartial calculation tool worldwide taking all parts of an entire motor system into account, including partial load.

Today more than 2.200 individual downloads of the tool have been registered.

### **1.6 Utilization of project results**

The EMSA work brings new motor knowledge back to Denmark, to Danish Energy Agency, to Technological Institute and to Danish companies as Grundfos, Danfoss etc.

Based on this EMSA work Denmark always have a strong voice in the European community in the ecodesign and regulation work in Bruxelles, and without the EMSA involvement Denmark would be placed on the side line looking at the motor train running through.

The EMSA work ensures Danish companies being informed first hand through internal stake holder meetings, meetings in the Danish National Committee as well as improvised meetings in the Danish motor community.

### **1.7 Project conclusion and perspective**

The importance of the Danish 4E EMSA involvement cannot be exaggerated. 4E EMSA is founded on very few member countries and EMSA without Denmark is not existing. Denmark has been co-founder and apart from Switzerland by far the biggest contributor over the years. From a Danish perspective it ensures having Denmark in the front row in the motor community and through EMSA Denmark gets "invited" to many activities not possible without, thereby securing vital information, first hand, to Danish government, to Technological Institute and Danish industry which includes electric motors.

The work is nowhere near the end and Danish Technological Institute hope to be able to continue this important work on behalf of Denmark in the years to come.

### **Annex**

<https://www.motorsystems.org/>

<https://www.motorsystems.org/webinars>

<https://www.motorsystems.org/motor-systems-tool>

<http://www.motorsummit.cn/>

<http://www.eemods15.info/>

<https://ec.europa.eu/jrc/en/publication/9th-international-conference-energy-efficiency-motor-driven-systems>

<http://www.motorsummit.ch/de/2016>

<http://eemods17.org/>

<https://ec.europa.eu/jrc/en/publication/proceedings-10th-international-conference-energy-efficiency-motor-driven-systems-eemods-2017>