

Final report

1.1 Project details

Project title	IEA 4E EMSA – IEC Standardization of motor systems
Project identification (program abbrev. and file)	EUDP 2016, J.no.: 64016-0040
Name of the programme which has funded the project	EUDP
Project managing company/institution (name and address)	Teknologisk Institut Energieffektivisering & Ventilation Kongsvang Allé 29, 8000 Aarhus C Project leader: Sandie B. Nielsen
Project partners	None
CVR (central business register)	5697 6116
Date for submission	June XX, 2020

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 participation in the IEC working groups which handles and develops testing standards for electric motors and frequency converters. Denmark have been one of two leading countries which have initiated, firstly a prototype round robin of frequency converter testing (RR'C1) and subsequently initiated the main round (RR'C2) of converter testing, which is still ongoing and are continued in the successive EUDP 4E EMSA project.

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 (2017-2019) Denmark was task leader and responsible for the MST-Tool part of the work plan as well the participating in IEC work, developing testing standards for electric motors and frequency converters. Denmark have also contributing to all the other parts of the EMSA work through the 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 deltagelse i de IEC-arbejdsgrupper som udvikler og vedligeholder teststandarder til elektriske motorer og frekvensomformere. Danmark har været én af to "lead countries" der har stået for, i første omgang en betaversion af en verdensomspændende "Round-Robin" for test af frekvensomformere (RR'C1) og sidenhen hovedrunden af frekvensomformer test (RR'C2) som stadig pågår og er blevet fortsat i et følgende EUDP 4E EMSA projekt.

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 lange 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 en fortsat stor indflydelse på udviklingen, især i Europa men også internationalt.

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 EUDP project with task leadership of: "IEC International standards", "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 (2017, Rome – 2019, Tokyo), and one time at the equally esteemed Swiss motor conference: Motor Summit (2018, 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 Danish companies would be: Grundfos, Danfoss etc.

At the Motor Summit 2018 in Zürich, Sandie B. Nielsen was awarded:

"The Motor Summit Award – 2018"

For his ingenious design of The Motor Systems Tool and his contribution to the global Round Robin testing program for converter losses

Basically, an acknowledgement of all the work Denmark (Sandie B. Nielsen) have delivered within the EMSA framework since the beginning of EMSA in 2009.

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, this specific project and many others.

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 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.

The main goal of this project has been to develop & improve the testing standard for frequency converters mainly through actual testing rather than calculating etc. For this reason, a global round-robin have been initiated in two parts, a beta round with only 4 none commercial labs participating, duly reported and discussed with all parties involved and since initiating a world-wide round robin (part 2) which is still on-going following this project.

This has indeed been a successful process during the entire 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 having written and presented papers on 3 international electric motor systems related conferences. On motor summit 18 in Zürich, Denmark hosted a workshop for all involved parties (frequency converters).

Through the EMSA work in this project Denmark have proven the importance of improving the testing methods for especially frequency converters. The fact that the coming regulation of electric motors and frequency converters in Europe now actually includes minimum efficiency performance standards for frequency converters, is directly linked to the work performed by Denmark and presented internationally through the EMSA channels. It is an ongoing debate and it has continued into the following EUDP project, but everything stands on the shoulders of this current project!

In parallel to the above it is also safe to say that Denmark have an influence on the motor testing standards – again mainly through actual testing results. Through the project period it is mainly the testing methods for motors supplied from frequency converters (as opposed to GRID supplied motors)

A side effect of the above is an ongoing adaption of the Motor Systems Tool (and the models inside) which are updated accordingly.

1.6 Utilization of project results

The EMSA work brings new motor knowledge and new knowledge regarding frequency converter testing 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 sideline looking at the motor train passing through.

The EMSA work ensures Danish companies being informed firsthand through internal stakeholder 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 to all of Danish industry which includes development etc. of electric motors and frequency converters.

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.ch/de/2018>

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