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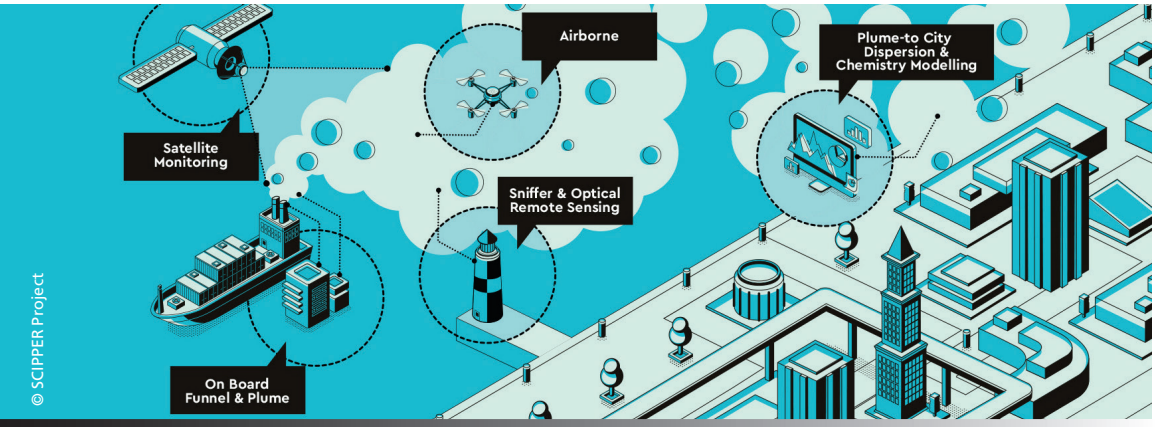

Different technologies are used for the determination of ship emissions

EMISSIONS IN SHIPPING
CML SUPPORTS DETERMINATION OF POLLUTANTS

Sea transport is the most energy-efficient means of transporting goods and merchandise: seagoing ships emit by far the least CO_2 per tonne-kilometre, compared with aircraft, inland waterway vessels, trains and trucks. Nevertheless, global shipping causes about 3% of global carbon dioxide emissions, 13% of nitrogen emissions and 15% of sulphur emissions. For this reason, international regulations are increasingly restricting these emissions, which are relevant in terms of quantity, and are setting decreasing limits. However, it is difficult to check compliance with the requirements, as reliable measuring equipment is only available to a very limited extent to date. For the reliable determination of nitrogen and sulphur emissions on board, ashore and from the air, the EU is therefore supporting five large-scale measurement campaigns with funds from the Horizon 2020 research program.

As part of the SCIPPER (Shipping Contributions to Inland Pollution Push for the Enforcement of Regulation) research project, various innovative emission measurement methods, such as satellite- and airborne sensors, modern SO_2 sniffers and shipborne measurement methods are being developed and used in a joint campaign to make the measurement results comparable and validable.

The CML has developed an on-board sensor box adapted to the challenges on seagoing vessels for various measurement tasks. Within the framework of the SCIPPER project, this box will be equipped with a measurement sensor system for the determination of nitrogen and sulphur emissions. Depending on its position on the ship, the sensor box allows the measurement of components of the ship's exhaust gases as well as background values, such as emissions from neighbouring ships. The SCIPPER project consortium consists of 17 partners from eight countries and is coordinated by the Aristotle University in Thessaloniki. In addition to the Fraunhofer CML, the Helmholtz Association and the Federal Maritime and Hydrographic Agency BSH are involved from Germany.

Read more about SCIPPER at www.scipper-project.eu.

JOINT OPTIMIZATION OF CREWING
AND MAINTENANCE MANAGEMENT

Besides fuel costs, personnel costs and costs for maintenance and repair make up the largest share of the operating costs of a merchant ship. They account for up to 30 or 25% of the total operating costs. Increases in efficiency in these areas can therefore lead to decisive competitive advantages for shipping companies.

Against this background, the Fraunhofer CML has now further developed the SCEDAS® software solution to smartly integrate maintenance tasks into personnel and resource planning. SCEDAS® was originally developed in order to plan the deployment of the crew for port calls and voyages, as well as for navigating and manoeuvring of a ship efficiently and in accordance with regulations. In addition to the special requirements of a specific voyage for the crew and their qualifications, SCEDAS® can take into account and document legal requirements and thus support the complex task of personnel management on land and on board.

The further development of SCEDAS® means that maintenance and servicing tasks are now also integrated into the crewing software SCEDAS® so that free personnel resources can be optimally used. An important prerequisite for this is the recording and description of the tasks and their duration, combined with the necessary qualification of the personnel. With the aid of these parameters, SCEDAS® can assign the ideal time for these tasks to the appropriate personnel and thus provide a decisive benefit for effective resource deployment and safe ship operation.

The CML has now published further information on the joint optimization of crewing and maintenance management in the white paper „Maintenance Management. Mathematically Optimized." which can be downloaded for free from the websites www.scedas.de and www.cml.fraunhofer.de/en.

FOREWORD

Dear Readers,

A successful year of the CML lies behind us: In June, we laid the foundation stone for our new building on the Harburg Lotsekanal with many high-ranking representatives of the maritime industry and Hamburg's politics and administration. Thanks to many new projects and the development of innovations, we were able to achieve a growth of around 30%. And with Carlos A. Quesada, President of Costa Rica, a foreign head of state visited us for the first time.

In the next year we are expecting more exciting projects. Some of them we present in this newsletter. Read about the SCIPPER project, in which different technologies are used to determine ship-related air pollutants. We also present the dashPort project, which focuses on optimizing the use of energy in ports.

I wish all of you a Merry Christmas and a succesful and happy New Year!

Your Prof. Carlos Jahn
Head of Fraunhofer CML

The Internet of Things enables self-controlling processes in ports

INTERNET OF THINGS
ON COURSE TO THE PORTS

The Internet of Things offers a fascinating vision for port logistics: self-controlling container stackers, intelligent light poles and autonomous gantry cranes are integrated into optimized processes at port terminals. The self-controlling container in agile logistics chains can also be found in this vision. Devices, machines and systems that network with one another in the digital world and take over and process tasks themselves, autonomously and efficiently - this is the world of the Internet of Things (IoT).
It will take some time before this vision becomes reality in the world's ports. A multitude of technological possibilities for implementing the IoT are available, but as diverse as the choice of IoT technology is, so different are the solutions. The result is a lack of interoperability of IoT applications in different application areas.
For international shipping, there is a danger that an IoT application will not be able to develop its potential due to a lack of interoperability in other ports.
The Fraunhofer CML is currently laying the foundations for European IoT interoperability in the research project I2PANEMA. Together with the HPA (Hamburg Port Authority) and other European project partners, the Fraunhofer CML develops IoT applications in the ports of Hamburg, Gijon (Spain) and Derince (Turkey) and derives an IoT reference architecture from them.
In the project, the research and development team cooperates with port authorities, shipowners, telecommunications companies and terminal operators. The CML supports the partners from a scientific and developmental point of view and coordinates their activities. In the Port of Hamburg, for example, the automated exchange of information between Ship and Port is examined and an IoT application for the exchange of relevant data such as vessel position, bunker filling level or machine operating hours is developed within the reference architecture. The resulting communication between machines enables those responsible in port authorities and ship management to carry out tasks such as berth allocation or ship maintenance planning more quickly and reliably.
The recommendations for standards, interfaces and applications derived from the I2PANEMA reference architecture shall support European ports in developing compatible IoT solutions and thus further strengthen their competitiveness.

REDUCE ENERGY CONSUMPTION ON TERMINALS
DASHPORT VISUALIZES POTENTIAL SAVINGS

The transport, transshipment and storage processes as well as the associated auxiliary processes in ports require large amounts of energy. This involves both considerable operating costs and - depending on the energy source - emissions. In the dashPort project, the CML is now working on a solution to investigate, optimize and then reduce the consumption of electrical energy in ports without restricting the core business. In the port of Brake, the study focuses on the operator NiedersachsenPort and the handling company J. Müller as the largest company. The aim is to find synergies in operational processes, to optimize processes and in this way to reduce energy consumption.
For this purpose, the Fraunhofer CML records the processes and consumers of the terminal and infrastructure operator and examines them for optimization potentials. The identified critical consumers, e.g. the compressed air suction systems for grain handling, are then equipped with intelligent measurement technology. The consumptions, which can be retrieved in (almost) real time, are brought together in a „digital control room" - the actual dashPORT - that spans all ports. The dashPort visualizes, for example, consumption patterns and peaks.
On the basis of the visualization and the resulting transparency, recommendations for action are formulated in real time. These should lead to a long-term reduction of the total energy consumption, the associated costs and the CO_2 balance of the port. In addition, peak loads can be reduced, also to the advantage of the power grid. Overall, a savings potential of around 10% of today's energy consumption is expected.
dashPORT is funded over three years by the IHATEC program for innovative port technologies of the German Federal Ministry of Transport and Digital Infrastructure. In addition to CML, partners are NiedersachsenPorts GmbH, J. Müller AG and OFFIS - Institut für Informatik. In addition to process recording and analysis from an energy point of view, the CML will demonstrate the optimisation potential, develop recommendations for action and quantify the success of the project in terms of saved electrical energy.

IN BRIEF

Start of a new project on the use of artificial intelligence in the Port of Hamburg: The Hamburger Container- und Chassis-Reparatur-Gesellschaft mbH (HCCR) and the CML use KI in the project ***COOKIE - Container Services Optimized by Artificial Intelligence*** *to improve the availability, cleaning and repair of containers in an empty container depot. COOKIE is funded by the German Federal Ministry of Transport and Digital Infrastructure within the framework of the IHATEC Program for Innovative Port Technologies.*

In another new research project called ***B ZERO, the concept of a watchfree bridge*** *is to be designed. Under the leadership of the CML, supported by the program „Maritime Technologies of the Next Generation" of the German Federal Ministry for Economic Affairs and Energy, sensor technologies and decision support systems are to be developed, which shall enable a temporarily watchfree bridge on merchant ships.*

+++DATES+++

- ***NAVIGATE 2020,*** *January 22.-23., 2020, Turku*
- ***Oceanology International,*** *March 17.-19., 2020, London*
- ***Maritime Innovation Insights 2020 - CML's Annual Lecture Event,*** *May 7, 2020, Hamburg*

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