



The Danish industry portal for solving  
materials related problems



## Networking with a Focus on Research and Development

### Networking

The Danish Materials Network, DMN, has launched a concept to encourage private companies, knowledge institutions, public and private organizations to collaborate in problem solving for the benefit of both Danish and international partners.

The collaboration takes place through projects and specific problems, giving the companies concrete benefits from the networking activities. In addition, the companies contribute to bridge-building between the parties involved with a view to sharing and exploitation of knowledge and generation of ideas.

Our vision is to build an outstanding materials network, which will function as a technical and academic hub for both Danish and foreign companies as well as knowledge providers in the materials science area.

### Projects

It is DMN's philosophy that the best way to develop a network is to have something specific to network about. Accordingly, DMN collaborates with a number of companies on projects

of an innovative nature. In this brochure you will find descriptions of three completed projects as examples of this networking activity.

### Project participation

Should this form of collaboration be of interest to your company, and do you have a good idea for a project, please contact DMN for information regarding possibilities and conditions for participation, as this varies from project to project.

### Funding

DMN's projects are partially funded by: the Danish Regions, the Danish State or the EU. The remainder comes from the participating private companies that are directly involved in the projects. The companies' use of time help fund the projects, and it is therefore of vital importance, that the companies actually use the time agreed upon for the projects.

### Further information

If you require further information, please contact the Danish Materials Network, where nine experts in the materials area are ready to answer your questions.



Project description

# Composite Materials in Corrosive Environments

**With this project, DMN PlastNet has contributed to increased security, better aesthetics and a reduction in maintenance costs in Danish swimming baths. New knowledge generated in this project has shown that composite materials can be used in severely corrosive environments, which is of great interest, especially with respect to marine and chemical environments.**

In a test bath, Svømmestadion Danmark, the corrosion problems and the chemical environment were assessed. It was shown that corrosion was a problem on practically all metal equipment, whereas composite materials were untouched. The analysis of the chemical environment showed that the chloride concentration on metal surfaces increased with height above water level, giving a particularly aggressive environment under the ceiling. This may be the cause of accidents, where pool ceilings suddenly collapse without prior warning.

Material testing was performed in the project, and a steel construction - a spiral staircase - was chosen for substitution with a prototype of composite materials.

Many material tests were performed, and based on these and on theoretical considerations materials were selected for the prototype. Tests were also performed to identify material properties to be used in the calculations in connection

with the construction. Destructive testing on a step section showed, moreover, that the structure can withstand a heavier load than required.

The many tests have led to the acquisition of new information about materials in general and about their performance in the specific environment. This information has not previously been accessible and it is consequently of great interest to the plastics industry as well as to other industries.

The spiral staircase was designed, built, installed and approved in compliance with the current building code. A subsequent service check was performed on the staircase as well as a satisfaction survey among users and technicians. This led to optimization of the construction, making cheaper, faster and easier production possible. Calculations also revealed that it is possible to make a modular construction, thus facilitating installation in existing buildings.

An analysis of marketing possibilities at home and abroad was made and experience and information gathering about relevant problems was performed. The possibilities of automating selected production processes were also assessed.





Project description

## Experience with Construction Materials in Process Equipment

Process equipment for the food industry is predominantly made of stainless steel, which is strong, durable and resistant to both foods and cleaning agents. In this project, DMN SteelNet in collaboration with DMN AluNet and DMN PlastNet have contributed in identifying which materials can be used as alternatives to stainless steel as well as for the construction of process equipment. Considerations about weight and price indicate that it may be advantageous to use aluminium or plastic wherever possible.

In the project, the general problems connected with corrosion of production equipment in the food industry were identified. Due to the necessary cleaning and disinfection procedures, the production equipment is exposed to an aggressive and corrosive environment, which wears down the equipment if it is made of unsuitable materials.

The project was carried out in collaboration with the chicken slaughterhouse Danpo in Års, where there are problems with corrosion and bacterial growth on a cast, uncoated aluminium turning wheel in the transport systems. Functional and environmental analyses were performed on the turning wheel, and a requirements specification for the materials properties was drafted. On the basis of this, a systematic materials selection procedure was developed, resulting in the recommendation of specific plastic types as well as surface coated aluminium.



*Prototype made of a polymer material as an alternative to corroded aluminium turning wheels.*



*Finished product packaged and ready for use.*

The recommended materials were tested in situ against stainless steel at the slaughterhouse. Accelerated testing to estimate the long-term durability in the strongly corrosive environment was also carried out in the lab. After exposure, the materials were tested for ease of cleaning.

On the basis of the tests, it was concluded that certain surface coated aluminium grades and the chosen plastic types can be used without problems as alternatives to stainless steel in slaughterhouse environments.

The project forms the basis for further development of guidelines for construction materials and design in the food industry.



## Project description

# Aluminium Used in Sterile Trolleys in the Healthcare Sector

In this project, AluNet has contributed in identifying and demonstrating the design and materials requirements in connection with a desire to improve the workflow in reprocessing of surgical instruments in hospital sterilization units.

Through the use of aluminium, the handling of traditional heavy equipment could be facilitated just as workflow in and around the environment in the operating theatre could be simplified and streamlined. The focus of the project was to generate a new solution to simultaneously take into account existing procedures as well as requirements for instrument handling. The challenge was especially to counteract the corrosive influence that the autoclaving environment inflicts on aluminium and the other materials involved.

The project, being in the area of design and innovation in the healthcare sector, was funded on the basis of user-driven innovation with the values: Welfare effect (benefit to the community regarding quality and efficiency), growth and employment, market potential and commercial viability.

In collaboration with Glostrup Hospital and participants in the construction and production segment, the requirement specifications with respect to functionality, environment, handling and safety were identified. This led to the successful development of a prototype sterile trolley, which was then ready for final product maturation.



*The sterile trolley is a new concept for handling of instruments and materials in hospitals.*



*The sterile trolley is tested in situ in the participating hospitals.*

The Danish Marketing Fund has subsequently subsidized the manufacturer, Alu Technologies A/S, in the development phase towards the final production concept for the sterile trolley. Both Aarhus University Hospital and Regional Hospital Central Jutland have participated in this phase.

Time studies have shown that aside from manpower savings and avoidance of heavy lifting, the trolley also gives a ca. 10 minute time saving in the handling of 7 instrument containers. As a point of reference, a typical operation requires between 4 and 30 instrument containers, which all need to be packed, loaded and sterilized before being sent to the operating theatre.

Today the sterile trolley is a commercial success and is sold both at home and abroad.

The Danish Materials Network, DMN, is an innovation network consisting of a series of companies with a special interest in materials.

The network was established in 2014 as a partnership between three existing innovation networks - AluCluster, PlastNet/Plast Center Danmark and Staalcentrum - all having considerable experience in the fields of knowledge sharing, matchmaking and project collaboration.

AluCluster's activities continue in the DMN group under the name AluNet, PlastNet's activities under the name PlastNet and Staalcentrum's activities under the name StaalNet.

The Network is nation-wide and has Plast Center Danmark, PCD, as its focal point. PCD is recognized as a network facilitator by the Ministry of Higher Education and Science as well as The Region of Southern Denmark and Central Denmark Region.

The mission of the network is to strengthen the competition of Danish industry on global markets through innovative use of materials and related technologies.

*Seize the future and enjoy the many advantages  
Become a member of the Danish Materials Network*



Ministry of Higher Education  
and Science  
—  
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and Higher Education



Secretariat  
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