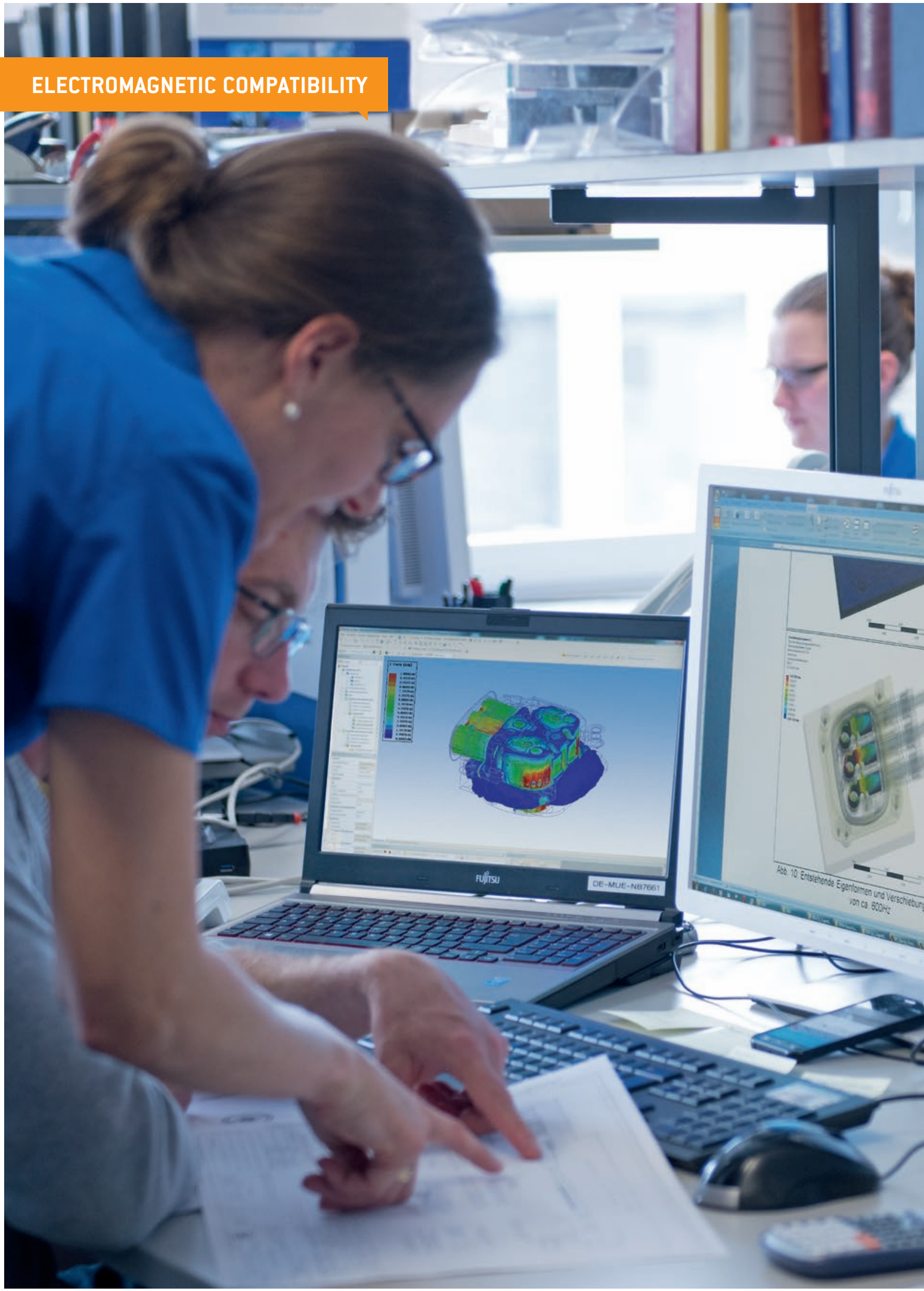
# ELECTROMAGNETIC COMPATIBILITY



Electromagnetic compatibility (EMC) is considered a matter of course in many of today's application areas. In standard solutions it can be achieved in fixed, e.g., bolted, connectors or application areas with a low number of mating cycles. Yet the real challenge is to design an EMC-shielded connector for products with many sophisticated mechanical specifications that also offers a high number of mating cycles.

# 07 THE MATRIX FOR AN OPTIMAL EMC SOLUTION

ODU systematically solves varied challenges such as these – and brings to the task the necessary know-how together with production expertise from one single source. ODU's fundamental knowledge – developed over the decades and now systemized – has been used to create a database from which our ODU EMC solution matrix has been developed. Our 3D CAD simulations also make use of this substantiated and exact data. EMV-shielded ODU connectors are especially valuable and successful where failure-free electronics are called for, such as in the automotive field, military and security applications, medical diagnostic devices and the entire field of data technology.

# ODU'S IN-HOUSE EMC SOLUTION MATRIX

For years now, ODU has attached a great deal of importance to basic research in the area of electromagnetic capability (EMC). In this context, we have developed an extensive solution matrix containing a wide range of connector property combinations and specifications – from water tightness to vibration resistance. All these features have been thoroughly examined regarding their impact on shielding effectiveness and transfer impedance.

In our age of networks and data communication, EMC is not just about electrical devices or active electronic circuits. The connective elements – cables and connectors – play an important role, too. Connected cables can function as an antenna and significantly impair interference both from and to the system. For this reason, cable shielding and connection to the electronic casing via a connector are paramount for the overall performance of the system.

ODU has the necessary expertise to meet various EMC classes and to compare and select component parts for each application area with respect to costs, flexibility and functionality in harsh environmental conditions.

## Optimal shielding effectiveness and transfer impedance across the entire life cycle

Shielding effectiveness and transfer impedance are clearly defined for electrical connectors. Inappropriate connector impedance in an application leads to a drop in voltage and undesirable compensation currents in the system. This can bring about unintended disruptions between systems that are interconnected with cables. When designing a connector – as with a cable shielding – the contact resistance and inductive part of the connector must be kept as low as possible.

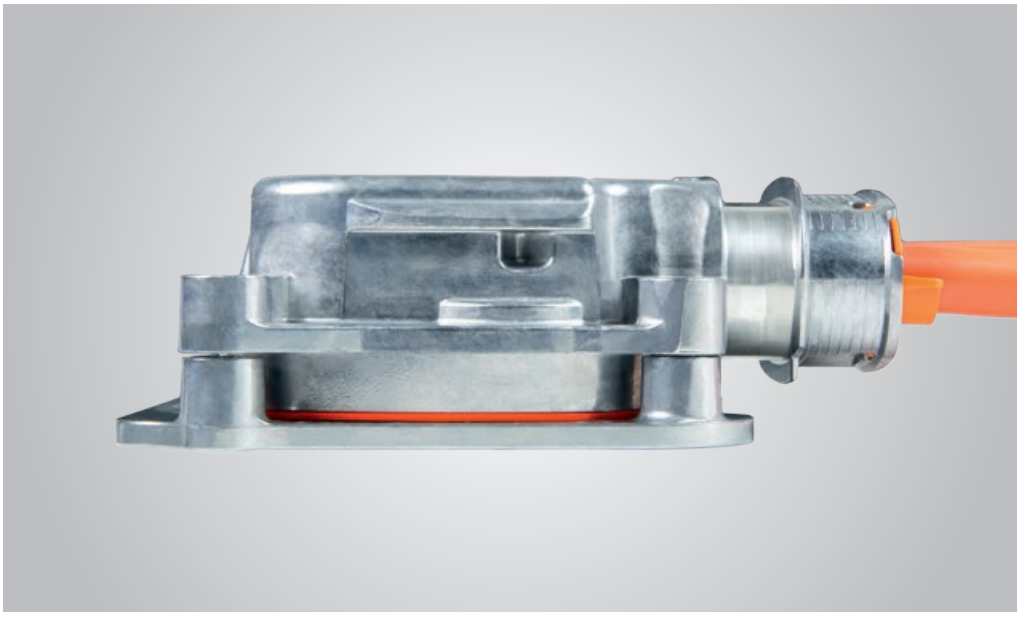
When an electromagnetic wave spreads within the connector-cable-system, the shielding effectiveness becomes an important quality feature of the overall system. A connector or a connector assembly with low shielding effectiveness can absorb radiation from its surroundings and thereby disrupt the electronics connected with it, and also emit into the environment high-frequency signal components occurring within the electronics. This can even interfere with systems located some distance away. ODU, therefore takes special care to design and produce unbroken shielding systems with maximum conductivity.

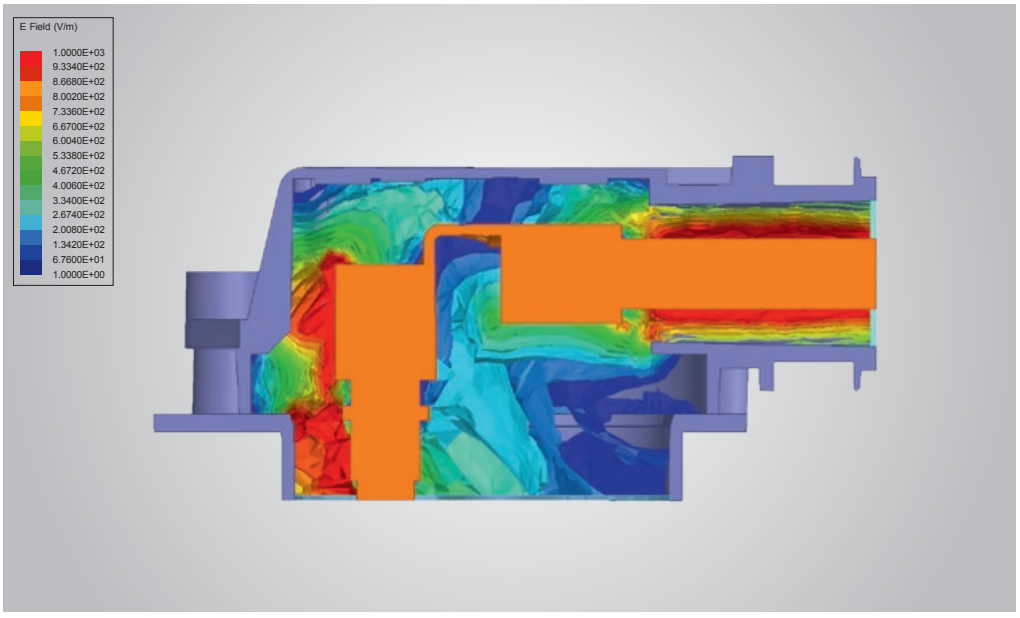
Based on its many years of experience and associated knowledge, ODU also develops special solutions for particularly rough, high-vibration environments. Continuously low contact resistance levels between connectors and receptacles can be achieved through the use of special conductive components.
ODU connectors thereby meet shielding effectiveness regulations and transfer impedance even after maximum product life stress.

ODU measures shielding effectiveness and transfer impedance according to relevant standards with a combined triaxial cell (or triaxial pipe) and network analyzer.
Regarding the resulting coupling transmission function for EMC resistance, a distinction is typically made between the measure of transfer impedance in the lower frequency range and the shielding effectiveness for higher frequencies.

## In-house measurements and 3D CAD simulation

In addition to the EMC solution matrix, the designed concepts are assessed via in-house simulation and measurement, and are optimized for the specific application. The ODU simulation imports the 3D CAD model of the design and replicates the measuring environment. Problem areas – such as the plug gap in the connector, as seen here – can be identified and the quality of various solution concepts can be compared in an assessment.






**EMC resistance simulation**
Depiction of the magnitude of electrical field strength for testing the housing for EMC leakages or problem areas. In this case, the housing is perfectly sealed. No radiation is being released.