

# Unfold the secret of smart metering.



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**FROST & SULLIVAN**  
SMART E-METER MARKET CUSTOMER  
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**2011**

## Cutting edge solutions enable proactive value creation for Mitsubishi Engineering-Plastics's customers.

The metering industry has no more secrets to us. With a demonstrated multiyear track record, Mitsubishi Engineering-Plastics is ideally positioned to offer the necessary engineering materials solutions for every stage of smart meter design.

Whether it involves tailored solutions for water meters, gas meters or electricity meters, our extensive portfolio of for instance XANTAR® and lupilon® PC & blends, lupital® POM, and NOVADURAN® PBT, fully meets the already existing requirements, but is also fit to quickly match and adapt to upcoming development wishes and challenges. When it comes to integrated 3D miniaturization and MID possibilities, we are the global leader in high performance Laser Direct Structuring (LDS) materials, enabling key differentiators to smart meter manufacturers.

Our secret to success is that our expert teams partner not only with our customers, but also with partners further along the value chain, in order to deliver the best solutions. By offering sustainable solutions at the design stage, technical support during each step and proactively participating in smart meter developments, Mitsubishi Engineering-Plastics stands out from the competition in this market.

With our global footprint, Mitsubishi Engineering-Plastics has the ability and resources to deliver results and be your global partner for innovative added value along the entire smart metering value chain.

Please contact us to find out what our expert-teams can do for you:  
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# CREATING CUSTOMER VALUE USING INNOVATIVE MATERIAL SOLUTIONS FOR SMART METERING

By Hans Wilderbeek, Application Development Manager, MEP

**Continuous monitoring and communication using smart electricity, gas and water meters constitutes an essential part of the currently ongoing global developments of smart grid infrastructures. Despite its global character, the degree of implementation of small and large scale meter replacement projects varies substantially for each region.**

Within for instance the European Union, the rationale for smart metering originates from the need for energy supply security, encouraging reliable, safe, affordable and sustainable energy supplies. One of the implications is the encouragement of the use of energy efficient measures and technologies to reduce energy consumption. To this end, end-users should have available individual meters indicating the precise actual consumption at an indicated moment in time.

The transformation of conventional energy meters into smart meters has important consequences and opportunities for utility companies and meter manufacturers. With an estimated figure of for example 240 million smart meters to be installed in 2020 in Europe alone, the sheer size of the logistical process for design, implementation and installation over a number of years will become clear. Furthermore, the individual member states in Europe show different stages of implementation of the smart meter replacement process, based on substantial differences in strategy, legal and regulatory status. Another complication is the observation that requirements of meter designs can vary considerably per country. Aside from important alignment challenges in the communication protocols, the design of smart meter housings can pose a variety of technical demands on the housing materials.

## CUSTOMER VALUE ENHANCEMENT

On a generic level, the choice of metering housing materials is generally dictated by the meter's purpose in the first place. Commonly, engineering plastics such as polycarbonate (PC), polyacetals (POM) and to a lesser extent also polyesters (PBT) and others are used for their easy processing enabling virtually endless lightweight design possibilities, along with dimensional stability, flame retardance if required, high temperature resistance and custom colourability. Other important assets are their outstanding performance both in mechanical strength, impact, low friction and wear when needed as well as long term properties such as weathering and UV stability.

However, the intricate individual country and utility dependent requirements often require a tailored material solution approach beyond the use of so-called common material grades.

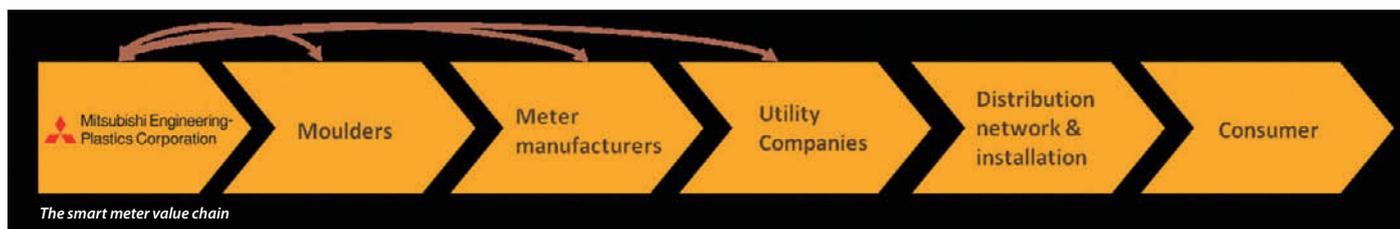
Within the wide array of engineering plastic material suppliers, one global supplier particularly stands out for its unique approach in creating customer value in the smart metering segment. With a production portfolio comprising all engineering thermoplastic materials commonly used for conventional and smart meters, such as PC (XANTAR®, lupilon®), POM (lupital®) and PBT (NOVADURAN®), high performance plastics supplier Mitsubishi Engineering-Plastics (MEP) is ideally positioned to offer the necessary solutions for every stage of smart meter design and production process. Moreover, with a demonstrated multiyear track record in developing and supplying enclosure and metering housing materials, the company also brings the necessary experience in this field. However, its strategic approach towards the smart electricity, water and gas meter application area has particularly enabled a streamlining of research and development efforts, leading to the delivery of various innovative and tailored solutions.

An essential discriminating factor in the market is MEP's intention of partnering not only with its immediate customers, but also with participants further along the value chain, such as smart meter and utility companies, in order to deliver sustainable solutions. MEP is actively involved at the design stage of the meters, enabling the company to understand the exact customer requirements and needs, and to work towards cost optimization with respect to design from the initial stage itself. Interactivity is a key element here, which results in added value to all participants involved. As an example, reduction of the housing wall thickness could be realized through the integrated working approach, which aims at reducing material consumption, without compromising on other properties such as ductility, hydrolytic stability and fire retardance. This differentiating approach has not gone unnoticed, as illustrated for example by the 2011 Frost & Sullivan European Customer Value Enhancement Award in the smart e-meter market to MEP. This recognizes the inordinate focus on implementing strategies that proactively create value for MEP's customers with a focus on improving the return on the investments that customers make in its services or products.

## TAILORED INNOVATIVE MATERIAL SOLUTIONS

With major development and replacement projects ongoing all around the world, it is essential to have a fully compliant material portfolio in place, which can not only meet the already existing metering requirements, but is also fit to quickly match and adapt to upcoming development wishes and challenges.

Especially for water metering, several tailored and proven unreinforced and reinforced lupital® POM grades are available



to meet the various water approval requirements for worldwide venues, according to for instance NSF and WRAS norms.

Because of its intrinsically higher operating temperature, PBT can be the appropriate choice for several metering parts or complete housings, depending on regional requirements. Possible warpage issues associated with the semi-crystalline nature of the base material have been successfully overcome by developing a completely new set of NOVADURAN® PBT grades for metering designs that enable the combination of the intrinsic good basic properties of light weight PBT with low warpage, good surface quality and excellent chemical resistance characteristics.

Within the lupilon® PC portfolio, a variety of grades are globally available meeting metering customer demands, ranging from standard flame retardant materials showing V-2 ratings in UL94 regulated burning tests to higher classed V-0 grades at thin design wall thicknesses and glass reinforced V-0 materials, to name just a few. The material performance in combination with quality and consistency has enabled a consistent and convincing track record of this material line up for metering applications all over the Asian and American markets.

MEP has strengthened its already extensive product portfolio further with a versatile added value line up of XANTAR® polycarbonate grades and blends, specifically tailored to the global smart metering developments. Both existing grades as well as newly developed grades meeting enhanced requirements with an emphasis on long term stability and robustness have been introduced.

Added value type grades comprise for instance, fully UL94-listed transparent V-0 flame retardant grades allowing wall thickness designs down to 2 mm (XANTAR® RX 2124), as well as high flow XANTAR® C (PC/ABS) grades combining mechanical integrity and excellent surface appearance.

A special glass reinforced polycarbonate XANTAR® G2F 23 R, demonstrates a high HDT temperature level of 145°C, whilst still maintaining its ductile impact performance, which makes it the ideal material of choice for not only meter back covers but also for current carrying parts such as terminal blocks, thus eliminating the need for design and approval of separate materials within a single design.

Within the flame retardant PC range, XANTAR® RX 2125 has recently been developed by MEP to be the world's first UL94 listed V-0 @ 0.75 mm bromine- and chlorine-free polycarbonate applicable in all colours. This enables customers with a further wall thickness reduction where critical, thus helping to reduce part costs further, at the same time setting no limitations to design options. In line with MEP's sustainability focus, all materials use eco-friendly flame retardant technologies. On top of that, performance is further fine tuned to match regional complementary requirements such as glow wire requirements or low corrosivity and low smoke evolution upon fire following possible malfunctioning of internal electronics.

Next to PC with its intrinsic flame retardance, high operating temperature, excellent mechanical performance and high dimensional stability, blends such as the PC/ABS XANTAR® C family are also employed for metering housing for their high flow characteristics and further enhanced stress cracking resistance and low temperature impact performance. Agile development in close collaboration with the customer of new tailor-made grades with an emphasis on long term stability and robustness proved to be essential in realizing the stringent approvals in for instance the large scale EDF smart replacement project in France. This gives a

clear signal to the market that MEP is able to create added value for customers, by enabling shorter development times and thus providing customers with an important competitive edge.

A whole new family of PC materials, XANTAR® XRM, was developed to meet even the most stringent requirements of the metering market. These grades combine high operating temperature with excellent impact performance even down to extreme sub-zero temperatures. Their outstanding long term dimensional stability is an important asset for additional design freedom and creating tamper-proof housings. Along with excellent long term hydrolysis resistance, UV- and environmental stress crack resistance and high retention level of mechanical properties, these materials are already today successful solution providers for the most demanding environments in metering business.

## ELEVATING METERING TO THE NEXT LEVEL BY 3D INTEGRATION OF ELECTRONICS AND PLASTICS

Diversification, styling, further miniaturization by integration and cost reduction are important trends in the metering industry. Being able to have a competitive edge over competition can prove an essential differentiator in the design and marketing of smart meter designs. Laser direct structuring (LDS) is becoming increasingly popular as the MID technology to enable an increased number of novel functions available inside housings and covers. With LDS, tailored plastic materials are activated locally using a laser, and subsequently metalized exclusively in the activated areas, thus enabling a fast, highly flexible and 3D design of electrically conductive tracks. For metering designs this enables the further miniaturization and integration of designs, thus enabling completely new design possibilities and further cost reduction.

MEP is the global leader in high performance LDS materials with its extensive XANTAR® LDS range. This comprises coloured HB and flame retardant PC and PC blend materials optimized for excellent practical impact strength as well as excellent signal performance for communication purposes.

## CONCLUSION

The starting point of MEP's strategic and proactive approach in the smart metering market has been to understand the diversity among countries and consequently legislation. This has enabled MEP to move a step ahead in the process by laying down a high performance materials technology roadmap to cater to the market quickly. With its global footprint, innovative joint product development, strong dedicated technical support at each step and consistent focus on quality and supply reliability, MEP has the ability and resources to deliver results and be the global partner for innovative added value along the entire smart metering value chain. ■



Example of a smart meter



### ABOUT THE AUTHOR:

Hans Wilderbeek holds a PhD degree in Chemical Engineering from Eindhoven University of Technology. He has an extensive materials and applied electronics background, holding over 30 patents and patent applications. He started his professional career in 2001 with Philips, before joining DSM Engineering Plastics in 2008. Since 2010, he has worked as Application Development Manager at Mitsubishi Engineering-Plastics Corporation, where the global smart metering segment is one of his key responsibilities.

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### ABOUT THE COMPANY:

Mitsubishi Engineering-Plastics Corporation (MEP) is a leading supplier of engineering plastics and focuses on developing new materials to meet the changing needs of end users whilst at the same time supporting customers' product development activities. The MEP Portfolio includes XANTAR® polycarbonate and blends, lupilon® and NOVAREX® polycarbonate resins; Remy® polyamide MXD6 resin; NOVADURAN® polybutylene terephthalate resin; Lupital® Polyacetal resin; lupiace® and LEMALLOY® modified PPE resins. [www.m-ep.co.jp](http://www.m-ep.co.jp) / [www.xantar.com](http://www.xantar.com)