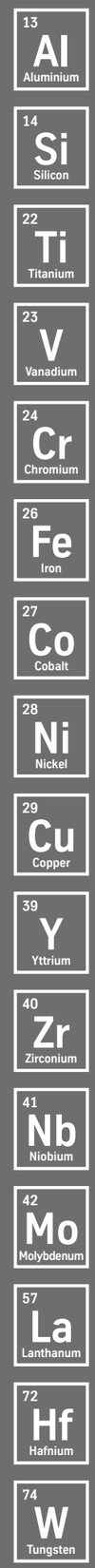

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VDM
Elements

At home in the elements.

Nature is wonderful, if often unpredictable. It challenges our skills and courage as we face its elemental forces and defy extremes. Fire, water, earth and air govern our lives – and Outokumpu VDM is in its element with each.

We develop materials for use in fiery heat, in icy waters, at soaring heights and deep down in the earth. Materials made to last, resisting heavy mechanical, thermal and chemical stresses, sometimes all three simultaneously.

Our alloys are made from a wide spectrum of elements from the periodic table. The solutions we develop are just as various as the specific requirements for the different types of applications. We understand the power of the elements.



Taming the elemental force of fire.

Fire is heat and light, but it is also a devastating elemental force. In it, the fascinating powers of creation and destruction wait to be harnessed. Fire makes metals malleable and fuses elements together. Without fire, industrialization is unthinkable. Exploiting the heat of the flames without unleashing them beyond control is the secret of technological progress – to this day. With our metals, fire can be tamed: resistance to high temperatures is a key property of modern materials from Outokumpu VDM. For combustion chambers and a whole host of other applications.



13 Al Aluminium
14 Si Silicon
22 Ti Titanium
23 V Vanadium
24 Cr Chromium
26 Fe Iron
27 Co Cobalt
28 Ni Nickel
29 Cu Copper
39 Y Yttrium
40 Zr Zirconium
41 Nb Niobium
42 Mo Molybdenum
57 La Lanthanum
72 Hf Hafnium
74 W Tungsten

Quenching the world's thirst.

The oceans are the origin of all life on earth. In many cultures, the gushing spring is the symbol of purity, birth and beginning. But despite this, mankind's relationship with water is a mixed one: it is the indispensable elixir of life, but it can also hollow out stone and erode even steel. Drinking water is a scarce commodity, although more than two thirds of our planet are covered by water. We make salty water usable: corrosion resistance is an essential feature of modern special alloys from Outokumpu VDM and makes them an ideal material for the use in seawater desalination plants.

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Utilizing our Earth's resources.

Earth is the fertile basis of life for plants, animals and mankind alike. No wonder, then, that "Mother Earth" is the symbol of Nature in countless myths. Her natural resources are the life energy for the progress of civilization and technology. Extracting them from the depths of the Earth's interior, where pressures and temperatures are far beyond imagination, is a technically complex endeavour that takes an extreme toll on the materials used. We make this task manageable: modern materials from Outokumpu VDM resist extreme mechanical loads – even at high temperatures. For example in geothermal power generation, where they harness energy from our geological past for a sustainable future.

Living the dream of flying.

The air we breathe: what more fundamental need do we have? Invisible, odourless and seemingly weightless, it symbolizes the immaterial in many cultures. Floating through the air with the wind, an ancient dream of mankind, has long become reality but has lost none of its wonder. In our days, machines as wide as a football field can take to the skies. We make it possible: titanium ensures low weight; ultra-pure superalloys boast outstanding high-temperature strength and high fatigue resistance – Outokumpu VDM produces both of these materials. Optimally suited for use in high-performing aircraft turbines.

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There is good reason for our success:

our corporate history.

Our company and its predecessors stand for innovation and progress – worldwide. Materials development at VDM is closely linked to numerous innovations in the history of mobility and technology. Many of these innovations became a hallmark of their time.

Our corporate history started 150 years ago in Germany in the valleys of the Lenne and Verse. Ore was found in abundance there in the rocks of the Sauerland mountains; the two rivers provided hydro power around the clock, and the regional forests offered ample wood for use as fuel.

No wonder that it was here that iron ore mining was discovered and developed. No wonder that it was here that people built their livelihoods on melting and casting. No wonder that Carl Berg, the founder and name giver of one of our predecessor companies, was the first to supply double bronze wire for telegraphs to the postal service at the end of the 19th century. Soon after that he became the pioneer of lightweight construction. In 1898, he delivered the material for the first Zeppelin: Victoria aluminium, a material he developed and patented himself. The hull and individual components of the famous airship were manufactured at Werdohl.

Basse & Selve, another predecessor based in nearby Altena, specialized in vehicle and engine construction: in the 1920s the first mid-sized vehicles equipped with aluminium pistons were made there. In 1930 the two family-owned enterprises merged with several other medium-sized companies to form Vereinigte Deutsche Metallwerke AG (VDM).

Only a few years later, engines up to 300 HP strong from Altena were powering the first large aeroplanes. At the same time, the VDM variable pitch propeller was being developed in Werdohl. At the end of the 1950s, the BMW 507 was built. The front wing of the iconic automobile came from VDM. Today we produce dense forged titanium for the hydraulic block of the brake system in the A380 Airbus.

Extremely light, extremely strong, extremely resistant – we have always been experts in special materials. In the 1950s and 60s our main focus was on semi-finished products in copper and brass alloys. Then stainless steels were added in the 70s. That was also about the time we started producing nickel alloys at our new melting plant in Unna. Today, our portfolio of materials comprises high-alloy special stainless steels, nickel alloys and cobalt alloys, and titanium and zirconium – materials with very specific characteristics.

From the start we have continuously developed in line with the advancing demands of our customers. Today we are among the world's leading manufacturers of high-performance alloys.



1 Oil and gas production

Supply and control lines on the depths of the seafloor: whether it's water millions of years old, sulfurous sediments or, of course, oil – our materials ensure their reliable and eco-friendly extraction.

2 Ship engines

Modern diesel exhaust valves can measure up to two metres high, and they are exposed to ever higher temperatures as engine outputs increase. VDM materials defy heat and heavy oil – thanks to their corrosion resistance.

3 Refineries

Distillation columns separate crude oil into various high-grade products. Alloys from VDM protect tanks and piping systems from the highly aggressive mixtures at temperatures up to 400 °C.

4 Chemical process industry (CPI)

Packaging, cable sheathing and varnishes are often based on acrylic and acetic acid. Zirconium tanks and piping systems are protected against these aggressive substances by means of a self-passivating oxide layer.

5 700 °C power plants

700 °C and extremely high pressures up to 350 bar: only high-performance alloys like ours can enduringly resist such a continuous inferno in power plants; and strongly boost their overall efficiency as they do so.

6 Flue gas desulfurization

The scrubber section in flue gas desulfurizing plants: temperature fluctuations, acids, salty dust. We create materials to withstand it all. We've been cleaning the air that way for more than 20 years now.

7 Seawater desalination

In many of the world's regions the sea is the only source of drinking water: titanium alloys from VDM ensure the corrosion resistance required in seawater desalination plants.

8 Solar thermal power

Sunlight heats the carrier fluid in absorber tubes to as high as 400 °C. Here VDM materials protect the vacuum between the glass tube and the metal pipe – thanks to their precisely tailored expansion behaviour.

9 Burners in gas heating systems

Modern gas heating systems generate lots of heat from very little gas. Our high-temperature resistant alloys ensure prime efficiency over a long service life.

10 Energy-saving fluorescent lamps

Energy-saving lamps are eco-friendly – as long as they remain sealed. When heated, our materials expand at exactly the same rate as the ceramic bulb's socket. So current – but no air – reaches the noble gas.

11 Household appliances

In toasters, ceramic hobs, hairdryers and wherever the going gets hot: protective oxide layers on filaments made from our alloys ensure trouble-free operation throughout a long service life.

12 Spark plugs and glow plugs

No combustion engine can run without a spark plug or a glow plug – or without wires like those from VDM. They provide reliable and efficient ignition in central electrodes and glow plugs.

13 Engines and exhaust systems

Turbo chargers make engines lighter and more fuel-efficient – but also much hotter. With our high-temperature alloys we support more eco-friendly vehicle construction.

14 Piezo electric injectors

Piezo electric injectors in diesel engines allow faster and more precise timing control. Made from our materials, they reduce fuel consumption while maintaining the level of engine performance.

15 Catalytic converters

Catalytic converters made from extremely thin foils: short warm-up phases for immediate function, low exhaust backpressure for full engine performance – and our high-temperature alloys for a long service life.

16 Tank trucks

Acids and bases, often at high temperatures: the transportation of these products requires tanks with the highest possible corrosion resistance. We supply the materials it takes.

17 Aircraft

Extremely strong and as light as possible: with our materials, flying becomes safer, more eco-friendly and more efficient.

18 Electric locomotives

Overhead lines carrying 15,000 Volt: too much for the starting phase. Starting resistors from VDM alloys reduce the charge and make for a gentle start to your journey.

19 Overhead power lines

As the charge increases, high-voltage cables heat up and can begin to sag badly. But not when they are made from our materials: they transport current safely and even improve the line efficiency.

20 Geothermal energy

The deeper, the hotter and often also the saltier: the challenges in sourcing geothermal energy are extreme. Tubes made from our corrosion resistant nickel alloys bring this energy to the surface – safely and continuously.

“What drives me is a passion for new horizons: anticipating what our customers may need five or ten years from now, identifying trends and developing custom-made solutions. To me, that's what makes our work so fascinating.”

Dr. Jutta Klöwer,
Head of Research & Development

We make progress happen.
With passion.

VDM alloys are indispensable in making processes work successfully in many key technologies. We know what our customers need, we know the properties of our materials – and we know how to match the two with precisely the right alloy. For at VDM only the best solution is a good solution. That's why our products are tailored individually and accurately to each customer's requirements. We work with our customers to develop such tailored solutions, drawing on our broad and comprehensive portfolio of alloys. A crucial instrument here are computer-aided simulations. They let us calculate the properties of a material even before it is ever melted, which saves the need for time-consuming test series. Quality material produced in the shortest time possible: that's the objective of our development work.

Innovation is programmed into this objective. We want to take the world a little step further with each of our solutions – through yet higher energy efficiency, yet more effective climate protection, and yet more responsible conservation of resources. With us, research is an obligation and a passion. The scientists in our R&D division are all highly qualified – and they are both gifted visionaries and good listeners. They always think that bit beyond what is possible at present – to what may be necessary in the future. And they always think of our customers first – so that whatever they want to realize will become reality.

We guarantee highest quality. Through competence.

Jet engines, high-temperature power plants, offshore platforms: the conditions in which our products find their applications are often extreme. At a height of ten kilometres, at higher and higher temperatures, or deep down in the Earth's interior – people must be able to rely on the materials used. So needless to say, the highest possible quality is one of the core values at VDM. It provides the greatest possible safety.

The raw materials we process are exclusively high-grade and they are subject to stringent requirements. Our production facilities are state-of-the-art. Seamless controls and checks ensure the high standard of all our processes, which are embedded in a continuous improvement system. All the decisive production steps are carried out, without exception, on our own equipment. This ensures optimum control of all the relevant parameters and enables us to reliably meet agreed delivery deadlines.

Successful materials development requires well-founded science in modern laboratories. All our researchers and developers are highly qualified scientists and experienced experts. If you might say that reality is sometimes tougher than laboratory conditions, please be assured: we are equally at home in both.

Our knowledge is traditionally rooted in practice: many of our employees are the third or even fourth generation of their family in the metal industry – people with a passion for alloys. These are the people who use their knowledge and skills to create quality. And quality is paramount with us. That's why we have a superb, comprehensive employee development programme in place: Outokumpu VDM has received numerous awards as an outstanding employer.



"Process development and optimization in one of the most modern forges in Europe are a challenge for any young engineer. Here I have found the freedom for creative development that I have always wished for."

Dipl.-Ing. Julien de Vogüé, Head of Process Development, Unna Forging Plant

We protect the environment and resources – out of good sense.

"The materials we develop help our customers to save resources. And our production is as eco-compatible as is technically possible."

Dr. rer. nat. Rainer Behrens, Materials Engineer at the Altena Works

The cradle of VDM is a region of unique natural beauty. Lush forests, gushing springs, clear rivers: here, in the heart of the Sauerland region, is where our company has grown up. Anyone as close to nature as we are does not need to learn respect. We are practically born with it.

In the 19th century, when industrial metal processing began in our region, the raw materials were extracted on our doorstep. Lumbering, coal mining, extracting ores: the work was hard and dangerous. The strength and effort involved in raw materials production was such an immediate experience that responsible, efficiency-oriented handling of these resources has always been a matter of course. For us, conserving resources is part of our culture and not just another trend topic. Our materials, including all swarf and chips, are 100% recycled. We use processed titanium scrap when melting titanium ingots in our electron beam furnace, which is the only one in Europe.

Environmental compatibility makes good economic sense: modern, eco-friendly production plants are standard at VDM. Continuously optimized, certified production processes ensure the same efficient production standard around the globe. The materials we develop help our customers to meet today's steadily rising requirements for better environmental compatibility – because they are lighter and more resistant. As a consequence, our alloys are being increasingly specified for applications in the field of alternative energies such as geothermal and solar energy and for making unusable resources useful, for example through desalinating seawater.

We support success.
Through proximity.

We want to offer each of our customers the best solution – which is always the one that brings success. Its primary origins do not reside in the research laboratory, behind closed doors – they are in communication. The principle underlying our search for solutions involves close collaboration at every stage of the concept development, intensive discussions and an ongoing technical and professional exchange with our customers. The better we know our customers, the more precisely we will understand and meet their needs. Furthermore, this exchange helps us to identify future trends in materials at the same time.

Success needs reliability. We therefore attach the utmost importance to long-term partnerships – with customers as well as with our suppliers. Dependable business relationships have grown over years, sometimes decades, of cooperation with our partners: maximum reliability and a quick perception of our customers' needs help us to put our high quality claim into practice.

We are active around the globe with our close-knit sales and service network, because personal contacts create the basis for trust and quality – in all cultures. This is one of our core believes. We are always there – no matter where our customers need us. At VDM, internationality is not a result of globalization. It is a central element of our proximity aim. For proximity is the foundation of mutual understanding: linguistically, professionally, and personally. This is our strength and our pride, as one of the world's leading manufacturers of high-performance alloys.



We are mapping a successful future.
In dialogue.

Saving valuable resources, ensuring mobility for all, and providing for a human element in worldwide urbanization: these are tremendous tasks that we are facing, and the list could go on. Outokumpu VDM has always been keen to tackle new challenges. And we will continue – in collaboration with our customers – to do everything in our power to find technical solutions to the pressing issues of our time.

The materials we develop, produce and supply worldwide are indispensable for the practical implementation of these demanding tasks. They are particularly well-suited to solutions that combine sound economic sense and sustainable utilization. However, to go on operating at the forefront of materials development, we require an environment that supports our ultramodern production processes. In our ongoing dialogue with associations, media and politics we rely on a transparent depiction of the preconditions for future-oriented research and economic production.

One of these preconditions is the availability of highly skilled workers and qualified engineers. At present our people are among the best in the industry – worldwide. To make sure it stays that way, top-quality trainees will need top-quality training. We are committed to this: at a local level through partnerships with schools, and internationally through cooperation programmes with universities and research institutes.

With our technical achievements and sustained commitment, we are successfully mapping out the future – together with our customers, employees and partners.

We look forward to your challenges – at any place in the world.
Talk to us.

Dr. Jürgen Olbrich
President & CEO



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