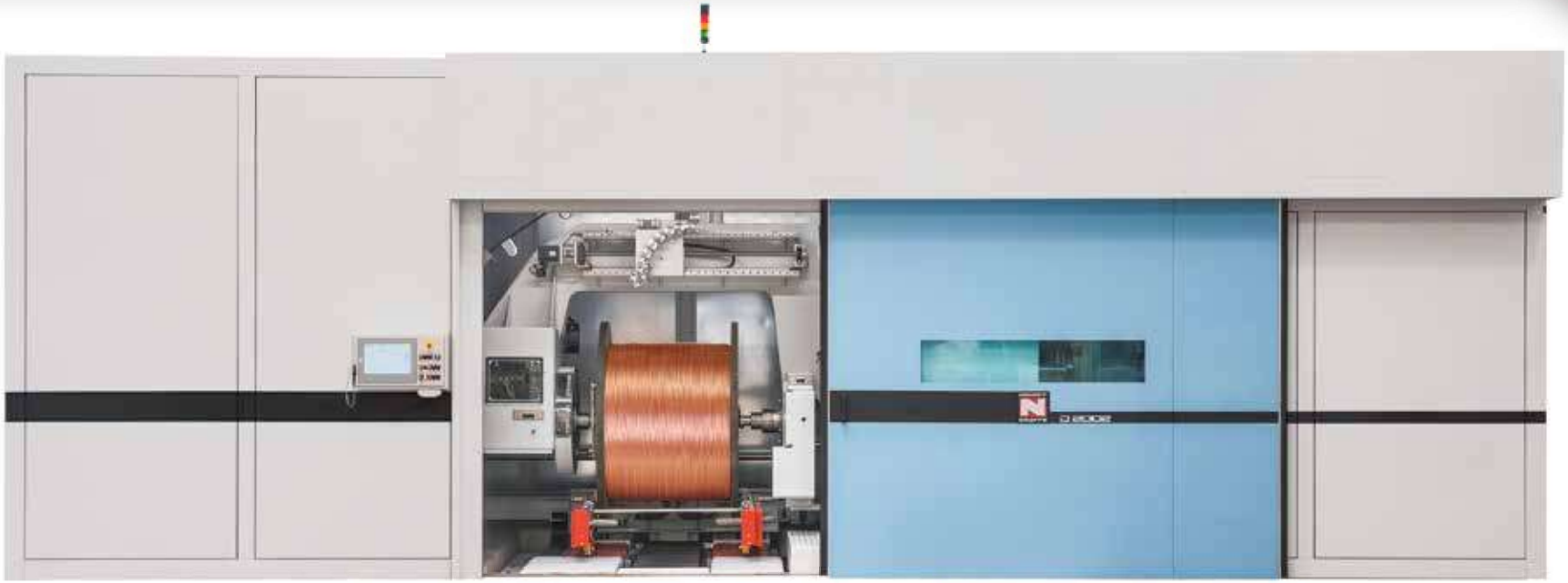
NIEHOFF Magazine

Expertise, Customer Driven, Service – **in Good Hands with NIEHOFF**

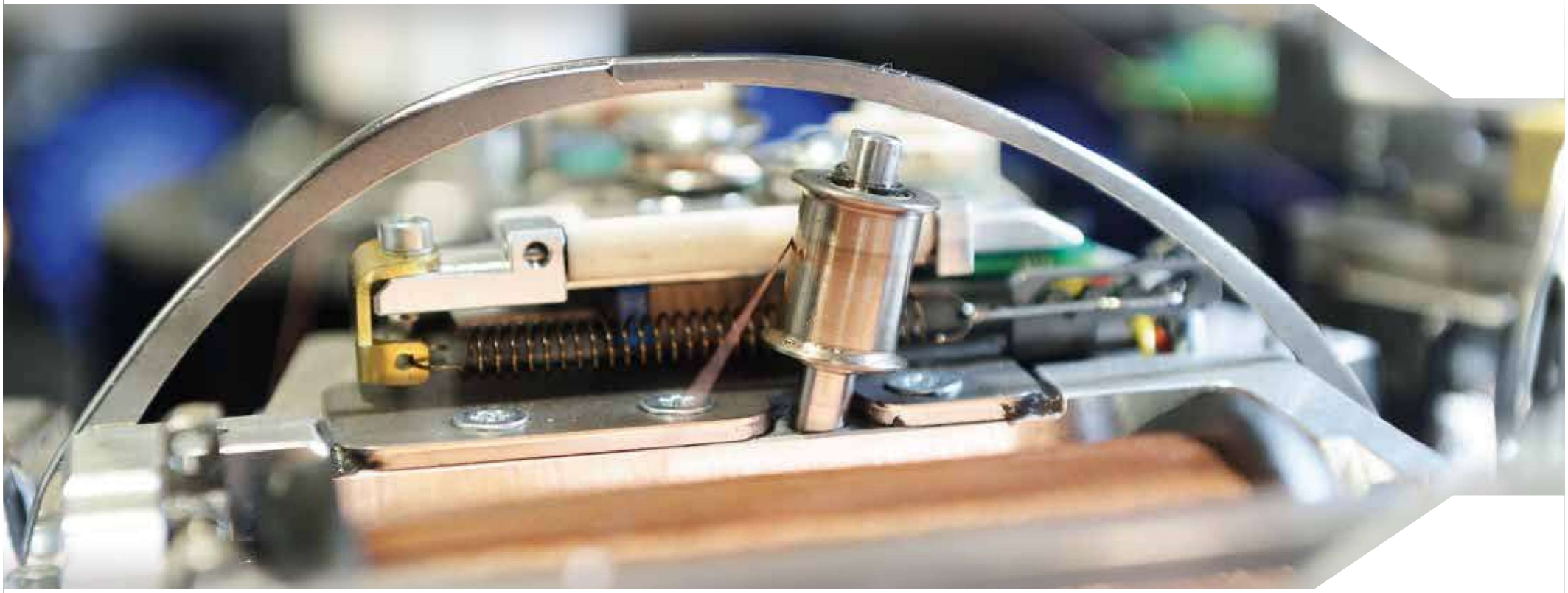
2/2021



D 2002

Robust – Efficient – Highly productive

NIEHOFF GRUPPE



Innovative – Patented - Convincing

You manufacture cable screenings or braids from copper, aluminum, stainless steel or artificial yarns and fibers for diverse applications. High productivity, economical use of materials and faultless products are what you require from your equipment. Your braiders must run reliably, at top production speed and unattended for extended periods. Space requirements must be low and all braiding products you manufacture must be of perfect quality.

What we offer: the latest model of our BMV rotary lever arm braiding machine series. The BMV 16 type including three patented innovations – for your success.

How you benefit: You will increase your braiding output by 10 % and, simultaneously, reduce your braiding material consumption by 15 % or even more. With the help of the integrated NIEHOFF WTC system you control your braiding process and document the uniform braiding wire tension.

What will convince you: the ideas behind the details. Let´s talk about them.

Expertise, Customer Driven, Service – in Good Hands with NIEHOFF

Convincing Quality

Innovative Solutions

Worldwide on Site

NIEHOFF GRUPPE

Editorial

Dear Friends of NIEHOFF,

Energy efficiency, resource conservation and sustainability have since long enjoyed high priority at NIEHOFF. On the following four pages of this issue of NIEHOFF Magazine you can find out more about business processes within our company and special features of the machines and lines developed and built by us. They are characterized by sustainable properties that give users clear competitive advantages. Digital technologies are also becoming increasingly important for efficient wire and cable production, as shown by the presentations at the virtual "Industry 4.0 Conference" held in place of the Interwire trade show (pages 8–10). Our contribution to this topic is the NIEHOFF Digital Assistant+ app described on page 11.

Products from the wire and cable industry are needed to implement a major government investment program to modernize the US infrastructure (pages 12–17). NIEHOFF and its subsidiary NIEHOFF ENDEX North America Inc. (NENA) help North American wire and cable manufacturers take advantage of market opportunities.
One of these companies using NIEHOFF technology is Sam Dong America. The company is one of the world's leading manufacturers of magnet wire and bare copper products (pages 18–19).

Recently, NIEHOFF has delivered the first double twist stranding machine type D 2002 to a well-known manufacturer of power cables. The machine is the largest model of the D series of bunching and stranding machines (pages 20–21).

The service contribution deals with the overhaul of a multiwire drawing machine type MMH 101 with 80,000 operating hours. Now, the machine is in as new condition again with a 12-month warranty (pages 22–23).

One highlight of the "Wire & Cable 2021 Virtual Conference" organized by the CRU Group last May was probably the virtual real-time tour through the NIEHOFF factory in Schwabach, which you can read more about on page 25 in the news section.

We wish you good health and all the best in every respect for the rest of this year and the year ahead. And of course we hope you enjoy reading this issue of NIEHOFF Magazine.

Ralf Kappertz Elena Graf Bernd Lohmüller

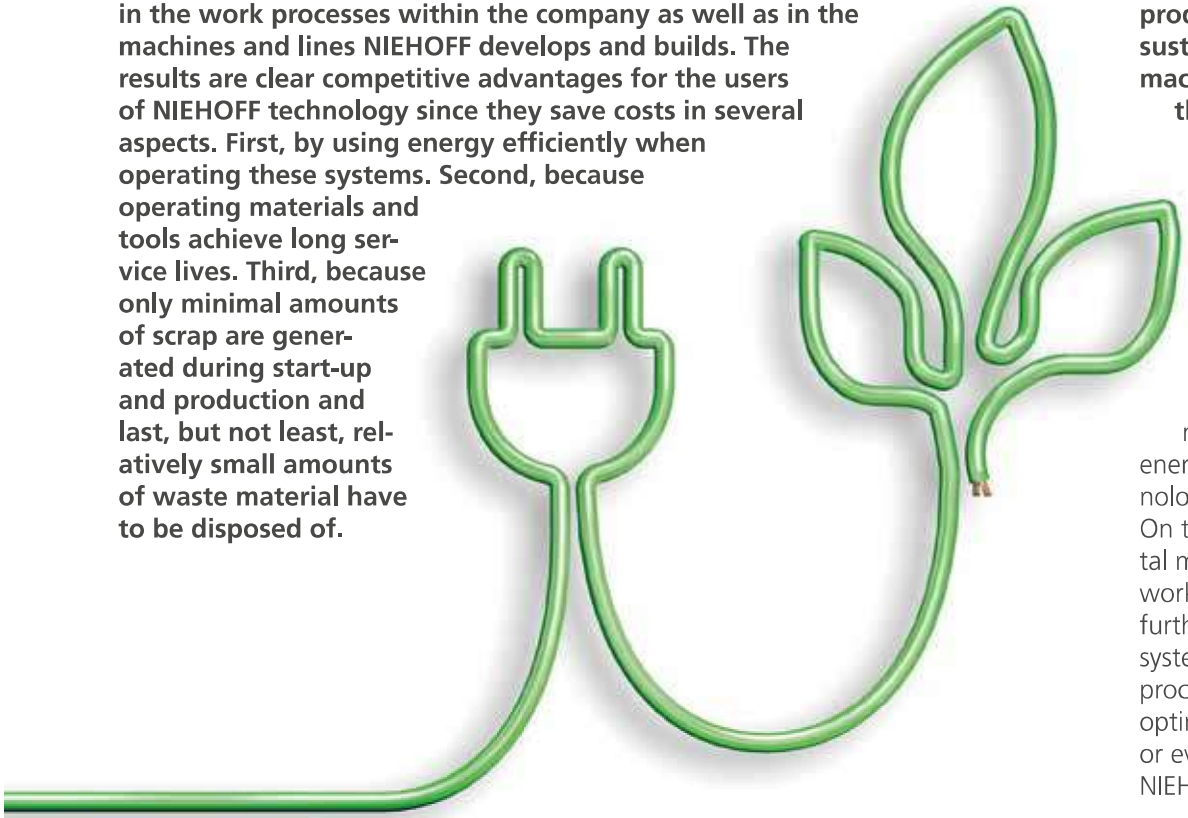
Schwabach, November 2021

Contents

Positive ecological and economic effects

Ecology, sustainability and responsibility at NIEHOFF

Energy efficiency, resource conservation and sustainability have long been high on NIEHOFF´s agenda. This is reflected in the work processes within the company as well as in the machines and lines NIEHOFF develops and builds. The results are clear competitive advantages for the users of NIEHOFF technology since they save costs in several aspects. First, by using energy efficiently when operating these systems. Second, because operating materials and tools achieve long service lives. Third, because only minimal amounts of scrap are generated during start-up and production and last, but not least, relatively small amounts of waste material have to be disposed of.



But the best way to get an idea of the sustainability-oriented production at NIEHOFF and the sustainable properties of our machines and systems is to read this article.

Sustainable production

During the planning of the current NIEHOFF factory at the Schwabach site, the latest findings in the fields of factory construction, operating logistics, manufacturing technology, occupational safety, energy efficiency and building technology were taken into account. On the basis of our environmental management system, we are working to continuously implement further improvements. Through the systematic use of lean methods, processes along the value chain are optimized and waste is reduced or even eliminated. In addition, NIEHOFF continuously invests in modern energy-saving production facilities. In addition, we continuously invest in modern production facilities that save energy.

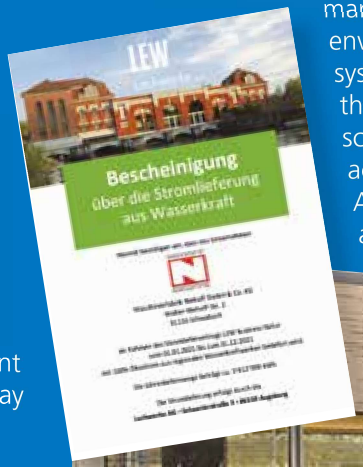
Undercutting energy standards by 45 %

The factory in Schwabach with its primary energy requirement of 190 kWh/m²a undercuts the standard value of 347 kWh/m²a set by the German Energy Saving Ordinance (EnEV) 2009 significantly by 45 %. NIEHOFF uses only renewable sources to cover our energy requirements.

BLUEcoMPETENCE
Alliance Member
Partner of the Engineering Industry Sustainability Initiative

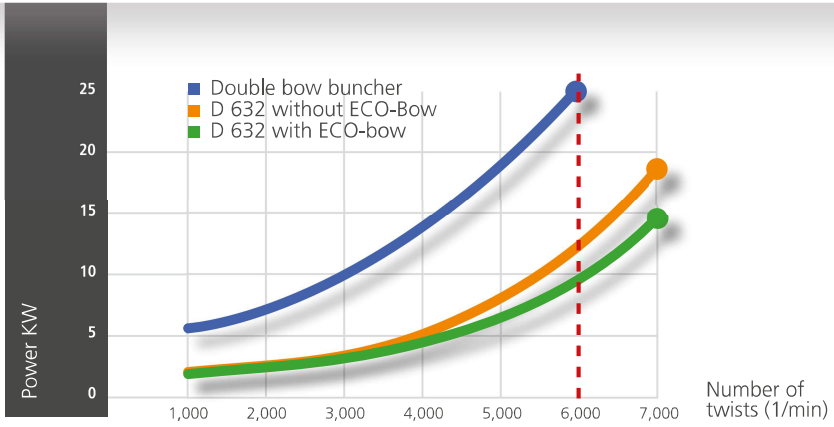
Geothermal energy and green electricity

For our factory in Schwabach and the plant in Leuterschach, we use electricity generated CO_2-free from hydropower. Simultaneously, geothermal energy is used for the heating and cooling technology. The geothermal heating and cooling system consists of 162 earth probes in a depth of 85 m combined with heat pumps. In addition, we make use of the waste heat generated during working processes as well. For example, 60 to 70 % of the heat energy required in the paint shop is saved by recovering heat from exhaust air. We designed our paint shop in such a way that no solvents are necessary and no wastewater has to be disposed of. Special radiant ceiling panels ensure that there is an almost constant temperature in the factory halls over the entire height of the room. The equipment of all buildings also includes an LED lighting system that is controlled by monitors.

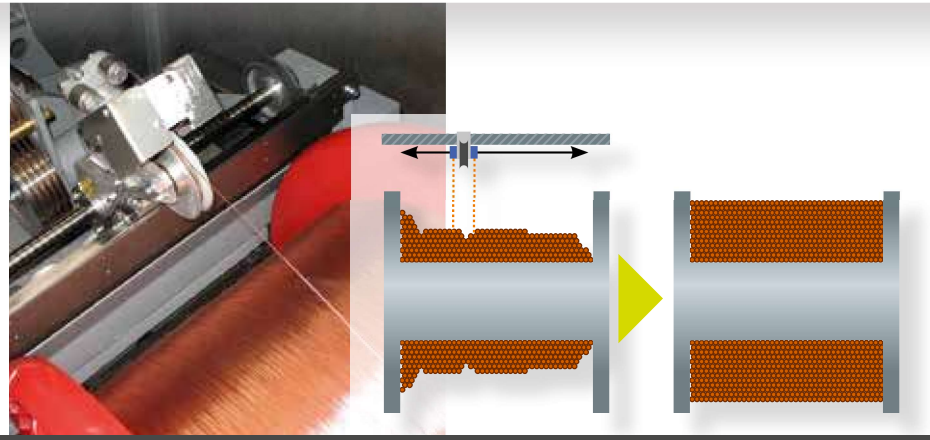


Environmental management

In 1998, NIEHOFF was one of the first wire and cable machinery manufacturers to introduce an environmental management system. Shortly afterwards, the Schwabach and Leuterschach sites were certified in accordance with the EC Eco-Audit Regulation 1836/93 and the ISO 14 001



Comparison of power consumption



NBAT laying system (NIEHOFF Bunching Automatic Traverse)

environmental management standard. The environmental management system based on this standard and the European environmental management system EMAS (Eco-Management and Audit Scheme) and the production processes are continuously checked by independent environmental experts.

Blue Competence and EcoVadis

NIEHOFF participates in the Bavarian Environment and Climate Pact and supports the Nuremberg networks for sustainability as a partner. Since 2021, we have also been a member of the "Blue Competence" sustainability initiative of the German Mechanical Engineering Industry Association VDMA and have committed ourselves to apply to the twelve sustainability principles for mechanical and plant engineering (www.bluecompetence.net). With a view to our corporate social responsibility (CSR), NIEHOFF is audited by EcoVadis, an international platform for sustainability ratings.

Sustainable systems for the wire and cable industry

We have designed all our machines and lines in such a way that they help their users to sustainably reduce the consumption of energy and resources. The following examples may illustrate this on the basis of technical data.

Latest generation of NIEHOFF RBD lines

The use of the latest generation of NIEHOFF rod breakdown (RBD) lines with a wire drawing machine type MSM 86 + annealer type R 502 + an automatic double spooler type SND 631 enables energy cost savings of 38 % compared to the use of a legacy RBD line (M 85 + R 500 + SY 500 D built in 1982) e.g. for the production of annealed copper wire drawn from 8 mm diameter to 2.05 mm. While an M 85 line has a power consumption of 129 kWh/t for the whole process (drawing, annealing and spooling), the MSM 86 line needs only 79 kWh/t. The difference of 50 kWh/t corresponds to savings of 38 %. Considering an annual output of 50,000 t and an energy price of 0.085 €/kWh * [1], the following calculation can be made:

50 kWh/t x 50,000 t/a x 0.085 €/kWh = 212,500 €/a

Therefore, with the latest generation of RBD lines from NIEHOFF more than 212,000 €/a of energy cost savings can be achieved compared with a legacy gear driven RBD line. This amount is equivalent to 2.5 million kWh.

Another major customer benefit of an MSM 86 RBD line is its low wire breaks and scrap rate. For production of annealed copper wire drawn from 8.0 mm inlet diameter to a finished diameter of 1.8 mm, wire break statistics show that there is

RBD line type MSM 86 + R 502

an average wire break after a production of 950 t. On an output of 50,000 t/a this means only 52 wire breaks per year, i.e. approximately one wire break per week. Considerable costs can also be saved with reduced rates of scrap. In the case of modern RBD lines the total scrap rate in production process is less than 1.0 %.

Modern double twist bunchers

Another example of machines which enable considerable energy cost savings is the D 632 type double twist bunchers equipped with an ECO-Bow. For the production of e.g. 7 x 0.254 mm with 6,000 twists/min the following calculation can be made: While a conventional double bow machine has a power consumption of 25 kW, the D 632 with ECO-Bow consumes only 9.6 kW. The difference that is saved amounts to:

15.4 kW x 0.085 €/kWh = 1.31 €/h

At 7,000 operating hours per year the energy cost savings are:

7,000 h/a x 1.31 €/h = 9,170 €/a

This amount is equivalent to 107,882 kWh.

Further major user benefits of the D 632 are the automatic traverse system NBAT (NIEHOFF Bunching Automatic Traverse) and the controlled winding tension regardless of the spool filling quantity. Because of the NBAT no operator is required for the adjustment of reverse points and the correction of "hills and valleys". Considering the fact that the run time for filling a spool with a 7 x 0.156 mm strand is four days, considerable costs can be saved with reduced operator interventions. The controlled winding tension ensures that there is no stretch of strands. Furthermore, very tight tolerances from empty to full spool of +/- 0.3 % are maintained. Such tight and repeatable tolerances allow to exploit the lower tolerance limits of specifications.

Further development of energy prices

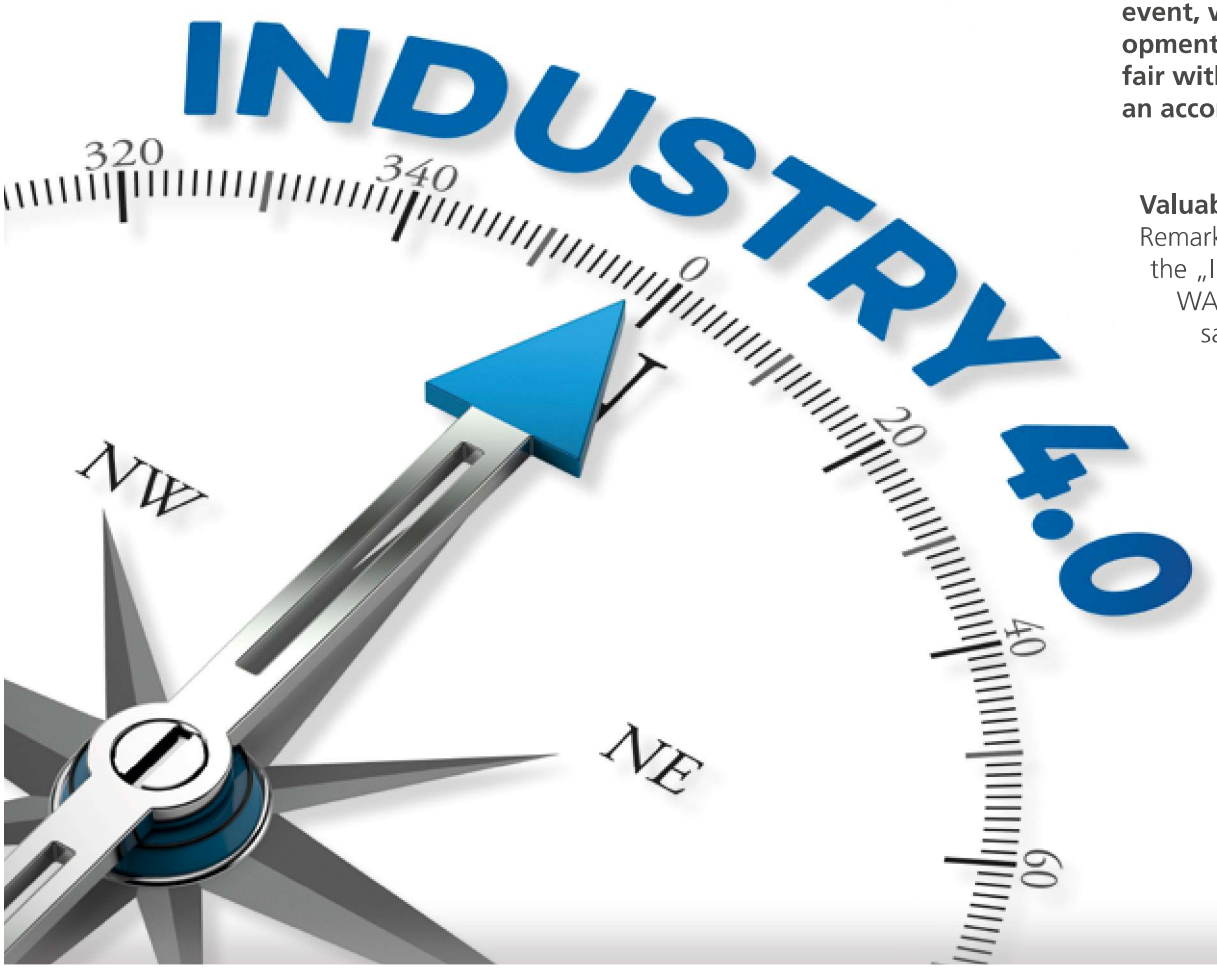
The calculations were made using the energy prices of 2020. There already is a significant increase of prices in 2021 that will continue in 2022, thus making energy savings even more important.

* According to statista, 0.085 €/kWh was the average industrial energy price in Germany for the year 2020.

[1] A. Breitkopf: Strompreise für die Industrie in Deutschland bis 2020 (Electricity prices for industry in Germany until 2020; in German). statista, Hamburg, September 8, 2021. https://de.statista.com/statistik/daten/studie/155964/umfrage/entwicklung-der-industrie-strompreise-in-deutschland-seit-1995/

The wire and cable industry and its digital future

Review on a virtual conference on Industry 4.0



The Wire Association International (WAI) had to cancel this year's Interwire trade fair due to the ongoing Covid-19 pandemic but was able to host the „Industry 4.0 Conference". The two-day virtual event, which took place last October, was the logical further development of the initial concept that envisioned an attendance trade fair with a special exhibition area called "Industry 4.0 Pavilion" and an accompanying conference program with lectures on this topic.

Valuable for everyone

Remarking on the introduction of the „Industry 4.0 Conference", WAI President Tom Heberling said, "Offering this conference virtually is valuable for everyone who wants to understand how Industry 4.0 technologies apply to wire making. We are thrilled that the speakers – originally scheduled for Interwire – are cued up and ready to bring their expertise and energy to the program. We've adjusted our expectations upward since attendance is convenient for all."

The situation

Many production processes are nowadays automated and digitally integrated. A gigantic amount of valuable data is constantly being generated and can be collected by sensors and actuators. For humans it is practically impossible to comprehend these data without assistance. Industry 4.0 tools and methods can process the data and help us to understand them – and to use them.

Becoming increasingly important

Industry 4.0, sometimes also called "The Fourth Industrial Revolution", is the information-intensive transformation of manufacturing. It started about ten years ago as a result of the emergence and application of digital technologies and Internet

DIGITAL FUTURE

technologies enabling the development of fully automatized production processes. The digital technologies that are emerging today, are expected to shape the world tomorrow. Since its beginnings, Industry 4.0 has been playing an increasingly important role in the wire and cable industry. It can benefit from these data to monitor and measure the performance of processes.
These technologies – such as Big Data, Internet of Things (IoT), smart factories, process automation, robotics, Virtual Reality (VR), and data analytics – support manufacturing companies to increase the efficiency of their activities, to respond quickly to changes and market demands and to introduce new customer service models or even to open new business areas. Moreover, these technologies facilitate more effective and timely decisions by the managers.

With a view to individual requirements

Wire and cable manufacturers are confronted with the question which technologies are most suitable for their individual purposes and goals. In the conference, which was comprised of more than 25 presentations, specialists from machinery building and software companies gave the 550 attendees, according to a WAI press release, the chance to gain the information they need in this groundbreaking field and to ask questions to the lecturers.

The way to smart wire and cable factories

Leading software suppliers described the application possibilities of their software packages and Information Technology (IT) solutions which – for example – help to identify changes, suggest the corrective actions and even immediately adjust the production plan. Such changes could be modified orders of the customers, the shortfall of deliveries or the consequences of deliveries which did not pass quality tests.
Today there is a vast selection of software offer – including software packages for cable design, product data management (PDM), production order management (POM), enterprise resource planning (ERP), detailed planning and scheduling (DPS), shop floor control and data collection (SFC), supervisory control and data acquisition (SCADA), and manufacturing execution systems (MES) – which helps the users to further develop their factories into smart cable factories.
NIEHOFF, even not being a software company, had been attentive to the application of electronic technologies in the wire and cable industry already more than 30 years ago. In 1988, the technical journal "Draht" published an editorial article from NIEHOFF, which described the scheme of Computer Integrated Manufacturing (CIM) in a wire factory with the electronic linking of machines, processes and management levels.

The value of machine and process data
During the operation of machines and production lines a huge quantity of meaningful data arises and becomes available by sensors. Certain data tell a lot about the condition of machines and production systems. Leading wire and cable machinery builders have developed software technologies which can be used to collect and analyse such data. In this way, the users of the machinery gain an insight into the quality of machine and production processes. Data analyses help to detect weaknesses, emerging risks or even hitherto unknown performance potentials. With a view to increasing energy and raw material costs, such analyses are an important tool to keep operating costs low. One of the machinery builders that offer such data handling technologies is NIEHOFF, with its Digital Assistant+ app (s. page 11).

The wire and cable industry supports Industry 4.0
Wire and cable manufacturers need to adapt their operating processes by means of Industry 4.0 technologies to remain competitive. At the same time, the wire and cable industry is delivering power to further developing Industry 4.0 technologies with its products and services which, by the way, are indispensible for their functioning.

Exciting future
The „Industry 4.0 Conference" showed that there are many possibilities for wire and cable manufacturers to use Industry 4.0 tools. The one and only solution does not exist. Wire and cable manufacturers must decide which technologies are best suited for their specific purposes. NIEHOFF and its subsidiary NIEHOFF ENDEX North America Inc. (NENA) have extensive experience combined with a process know-how gained in more than 70 years. Therefore, NIEHOFF and NENA can support wire and cable manufacturers with valuable suggestions concerning production processes. In any case, the digital future will continue to be exciting.

Increasing the OEE of NIEHOFF machinery

NIEHOFF's Industry 4.0 offer to the wire and cable industry

Three modules

1 With the **"Basic"** module the causes of malfunctions can be detected ("Trouble Shooting"), spare parts can be quickly and easily identified and related inquiries can be sent to the NIEHOFF service by just clicking twice.

2 The **"Premium"** module helps with machine malfunctions and supports communication with the NIEHOFF remote service to handle error messages easily and directly.

3 The **"Machine and Process Monitoring"** module quantitatively and statistically shows the Key Performance Indicators (KPI), gives the user a clear picture of the machine condition and its temporal development, and supports preventive maintenance as well as process monitoring.

NIEHOFF has developed Industry 4.0 solutions that increase the added value of NIEHOFF machinery. The result of this work is the NIEHOFF Digital Assistant+ involving several advantages for its users.

The NIEHOFF app and its benefits

The NIEHOFF Digital Assistant+ app is an indispensable aid if you aim at increasing the overall equipment effectiveness (OEE) of your NIEHOFF systems. The app makes machine and production processes transparent enabling the users to identify critical developments at an early stage, and consequently, to react quickly to them.

Practical experiences

Those of our customers who already use the app confirm that on the one hand it is a very good monitoring tool because it allows access to the current status of the most important production parameters – also historical data – whenever and wherever one wants to get this information. These data also show the optimization potentials to be exploited. On the other hand, service calls, regular and preventive maintenance measures and repairs can be scheduled in time, thus reducing unscheduled downtimes. In addition, the app can help to optimize ordering and storage of spare parts.

Flexible application possibilities

The app can be used on PCs and / or mobile devices with Android or iOS software platforms and supports the users of NIEHOFF machinery in the areas of management, production, purchasing and maintenance. In its current version, the app contains three modules.

As a standard feature

From the beginning of April 2021 onwards, all new NIEHOFF machines delivered to Europe are equipped with the **"Basic"** module.

The industry is recovering noticeably

The North American and especially the US market

The US, with a population of more than 330 million and a gross domestic product (GDP) of more than 18.3 trillion € and ahead of the PR China, the largest economy in the world [1] [2], will experience an economic boom in 2021. "The industry is making a noticeable recovery" reported Germany Trade & Invest (gtai), the economic development agency of the Federal Republic of Germany, in July 2021 [3]. After having suffered an economic downturn as a result of the Covid-19 Pandemic in April 2020, economic growth in the US has now continued for the 13th month in a row (as of June 2021): A number of economic stimulus programs supported the US economy from March 2020 to March 2021 and stimulated consumption. Another government investment program is aimed at modernizing the infrastructure. The US Senate passed a USD1.2 trillion bipartisan package in August 2021 to shore up the country's aging and outdated infrastructure. It is projected that there will be USD550 billion in new federal spending over the next five years, among others USD65 billion to rebuild the electric grid, USD65 billion to expand the broadband internet infrastructure, and USD7.5 billion to build a national network of charging infrastructure for electric vehicles [4] and [5]. For implementation of the numerous projects, the products of the wire and cable industry will be indispensable. The energy, automotive, and construction sectors are three important areas which will require wire and cables.

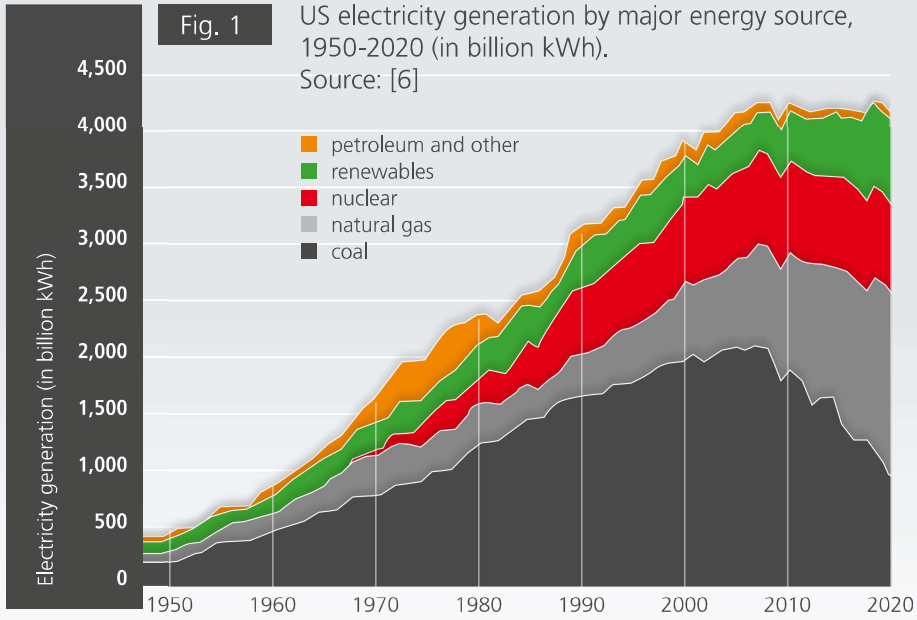


Fig. 1 US electricity generation by major energy source, 1950-2020 (in billion kWh). Source: [6]

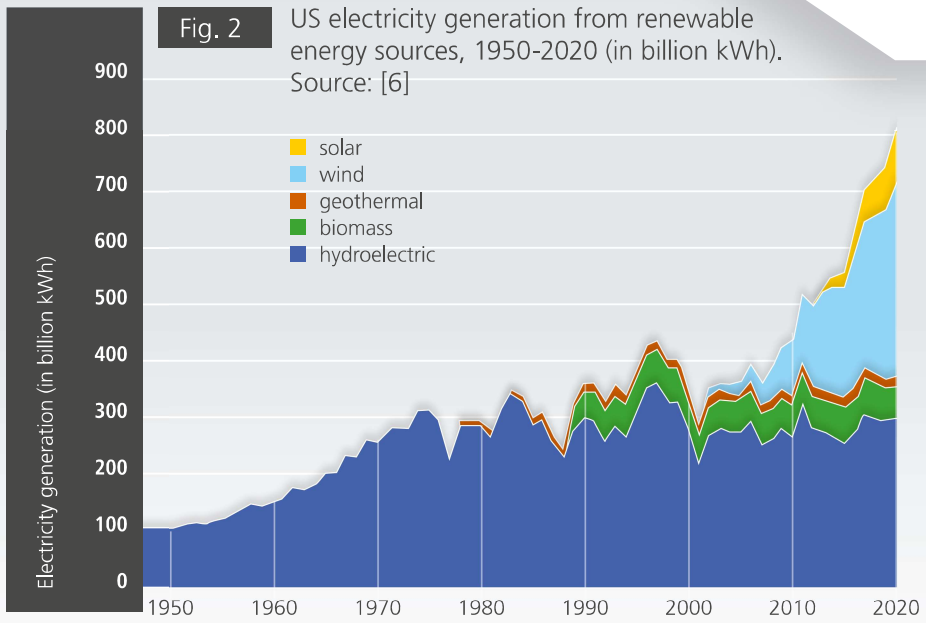


Fig. 2 US electricity generation from renewable energy sources, 1950-2020 (in billion kWh). Source: [6]

The energy sector

The three major sources for electricity generation used in the United States are fossil fuels, nuclear energy, and renewable energy sources. In 2020, the total US electricity generation amounted to 4,009 billion kWh with 792 billion kWh coming from renewable energy sources [6]. Renewable energy sources have thus supplied about 20 % of the total US electricity generated and provide an increasing share of US electricity (Fig. 1). The main categories of renewable energy sources were wind energy, hydropower, and solar energy.

Wind energy was the source of about 8.4 %, hydropower of about 7.3 % and solar energy of about 2.3 % of total US electricity generation. Considering only renewable energy sources, wind energy had a share of 43 % and hydropower a share of about 37 %. The two main types of solar electricity generation technologies are photovoltaic (PV) and solar-thermal power (Fig. 2). The growth of the transmission and distribution (T&D) network, the increased demand for electricity from renewable energy sources and the integration of decentralized electric power plants will drive the electric wire and cable market in North America [7].

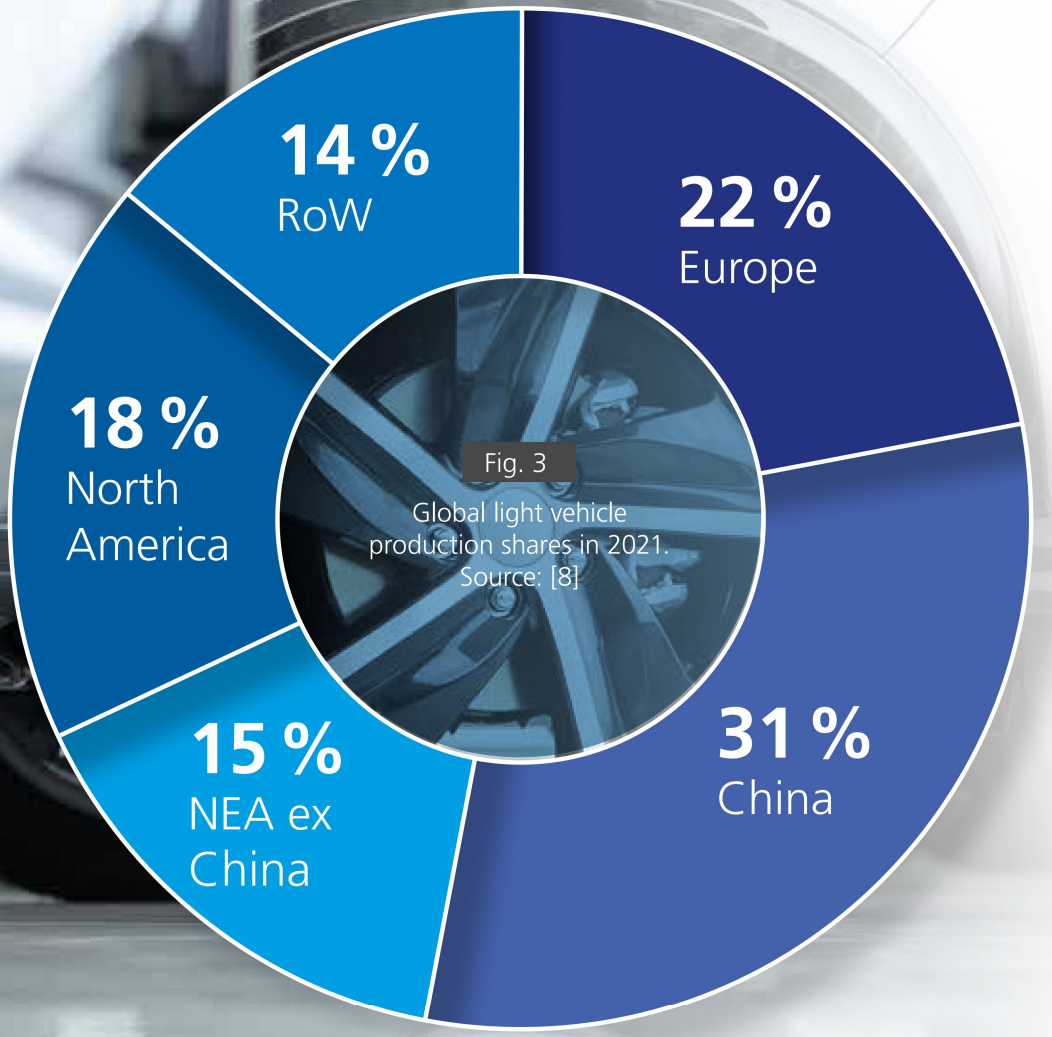


Fig. 3
Global light vehicle production shares in 2021. Source: [8]

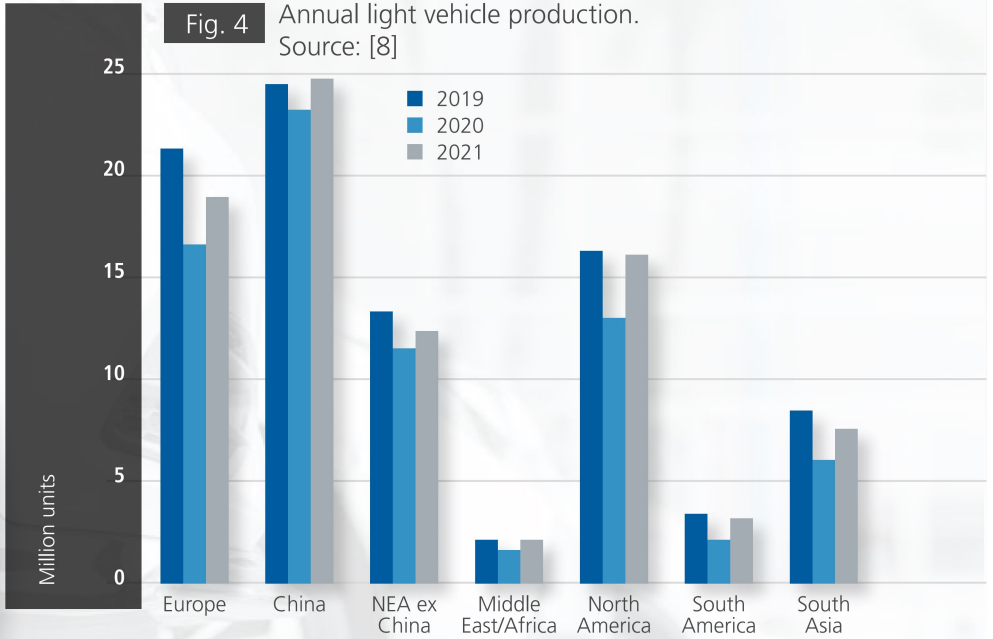


Fig. 4 Annual light vehicle production. Source: [8]

The automotive industry

Light vehicle production growth is driven by Northeast Asia including mainland China, North America, and Europe, which together account for close to 90 % of the global production of light vehicles, i.e. vehicles weighing less than six tons (Fig. 3). In 2019, global light vehicle production was about 89 million units, but due to the Covid-19 Pandemic, vehicle production decreased by about 14 million units in 2020.

For North America, the information provider IHS Markit Automotive forecasts an increase by 24 % in 2021 (Fig. 4) [8].
Fig. 5 shows the development of the car production in the US [9]. The decline to 1.06 million units in September might be in relation with the chip delivery shortages [9a]. Following the Covid-19 disruption, sales of motor vehicles in the US rebounded in May 2020 and the US auto sector began to recover in

Fig. 5 Car production in the US (in million units). Source: [9]

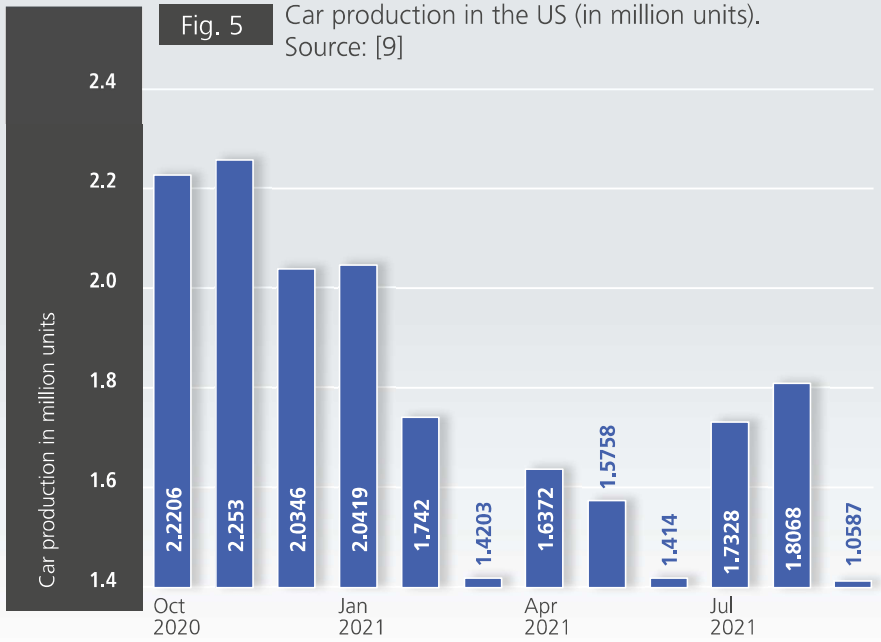
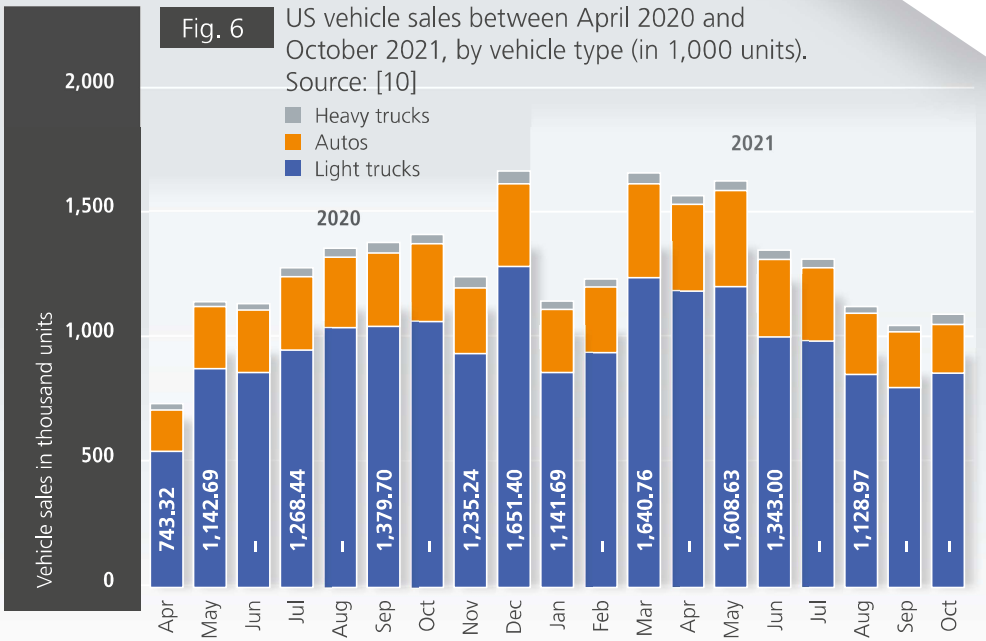


Fig. 6 US vehicle sales between April 2020 and October 2021, by vehicle type (in 1,000 units). Source: [10]



the third quarter of 2020. Sales of motor vehicles in the US reached between 14 and 15 million units in 2020 [10]. Fig. 6 shows the development of vehicle sales. At just under 839,200 unit sales, light trucks remained the largest US auto market segment in October 2021, up from roughly 792,500 unit sales in September 2021 and down by approximately 19.7 % year-on-year [10].

The construction sector

The market size of the US construction sector was valued at around USD1.4 trillion at the end of 2020 and was expected to decline further in the next year [11]. While the overall construction put in place in the US – residential and non-residential combined - declined by around 0.2 % between 2019 and 2020, spending on private construction continued to grow in 2020 as the construction of private residential and non-residential buildings saw some of the largest ever-recorded figures (Fig. 7). Construction costs, however, changed significantly in 2020, due to two major developments. First, many US construction firms mention that worker shortages are a big challenge in 2021 and beyond. Second, there are significant shortages on construction materials such as lumber. The price of softwood veneer and plywood, for instance, grew by over 13 % between March

LITERATURE

[1] Wirtschaftsdaten kompakt – USA (Compact economic data – USA; in German). gtai, Berlin, May 27, 2021. https://www.gtai.de/gtai-de/trade/wirtschaftsumfeld/wirtschaftsdaten-kompakt/usa/wirtschaftsdaten-kompakt-usa-156602

[2] Laenderdaten.info. Größte Volkswirtschaften 2020 nach Bruttoinlandsprodukt (Major economies in 2020 by gross domestic product; in German). https://www.laenderdaten.info/groesste-volkswirtschaften.php#:~:text=Größte%20Volkswirtschaften%202019%20nach%20Bruttoinlandsprodukt%20%20%20,%20%2041.507%20%2046%20more%20rows%20

[3] Ullrich Umann, Heiko Steinacher: USA stehen vor dem größten Boom seit den Reagan-Jahren. Konjunktur und wichtigste Branchen (USA is facing the biggest boom since the Reagan years. Economy and most important industries; in German) gtai, Washington, D.C., San Francisco, July 5, 2021. https://www.gtai.de/gtai-de/trade/specials/special/usa/usa-stehen-vor-dem-groessten-boom-seit-den-reagan-jahren-233810

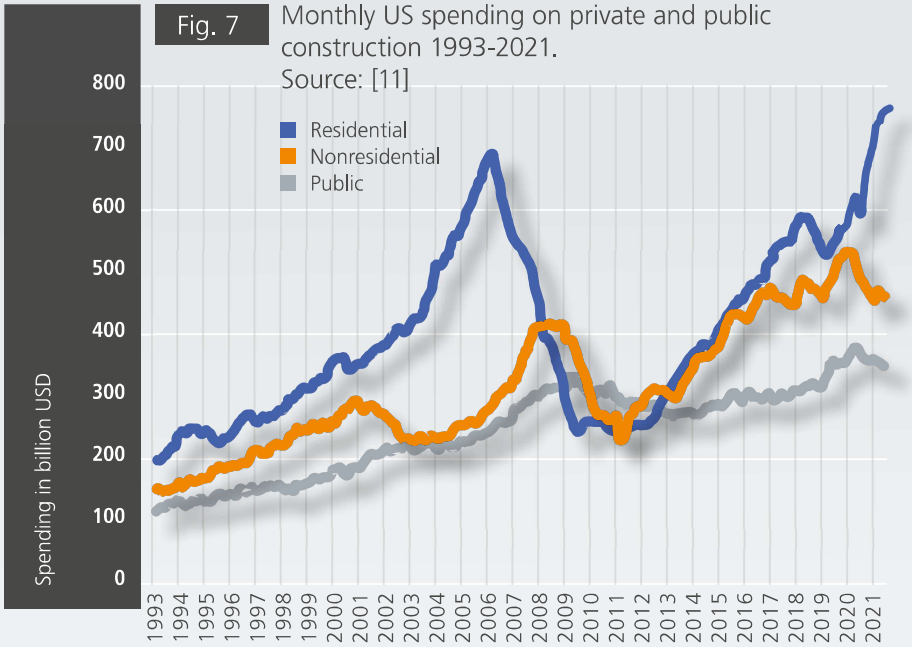


Fig. 7 Monthly US spending on private and public construction 1993-2021. Source: [11]

2021 and April 2021. Combined, these two changes led to significant differences in construction costs across various cities in the US [11]. Fig. 8 gives an idea of the development of residential construction starts.

The utility sector and additional industries

Growing integration of renewable technologies along with expansion of high and ultra high-voltage DC transmission (HVDC & UHVDC) systems will drive the product adoption across utility segment. The utility segment in 2019, accounted for over 27 % of the market share across the North America wires and cable industry. Increased on-site power generation technologies along with the ongoing smart control networking initiatives will further fuel the industry trends. Also the increasing emphasis towards the integration of wide-ranging frequency distribution links coupled with the growing concerns for energy-efficiency will drive the demand for electrical cable across utilities [7]. Furthermore, increasing investments towards the establishment of manufacturing facilities and expansion of building infrastructure will propel the market demand for wire and cable. The adoption of the Internet of Things (IoT) and smart & advanced technologies across a range of applications has also enhanced the demand for various types of telecom and data cables. The country is witnessing substantial investments in its manufacturing and service sectors, which will proliferate the demand for various types of cables. Moreover, the growing focus replacing old electrical equipment with more advanced systems will further boost the product demand across the country [7].

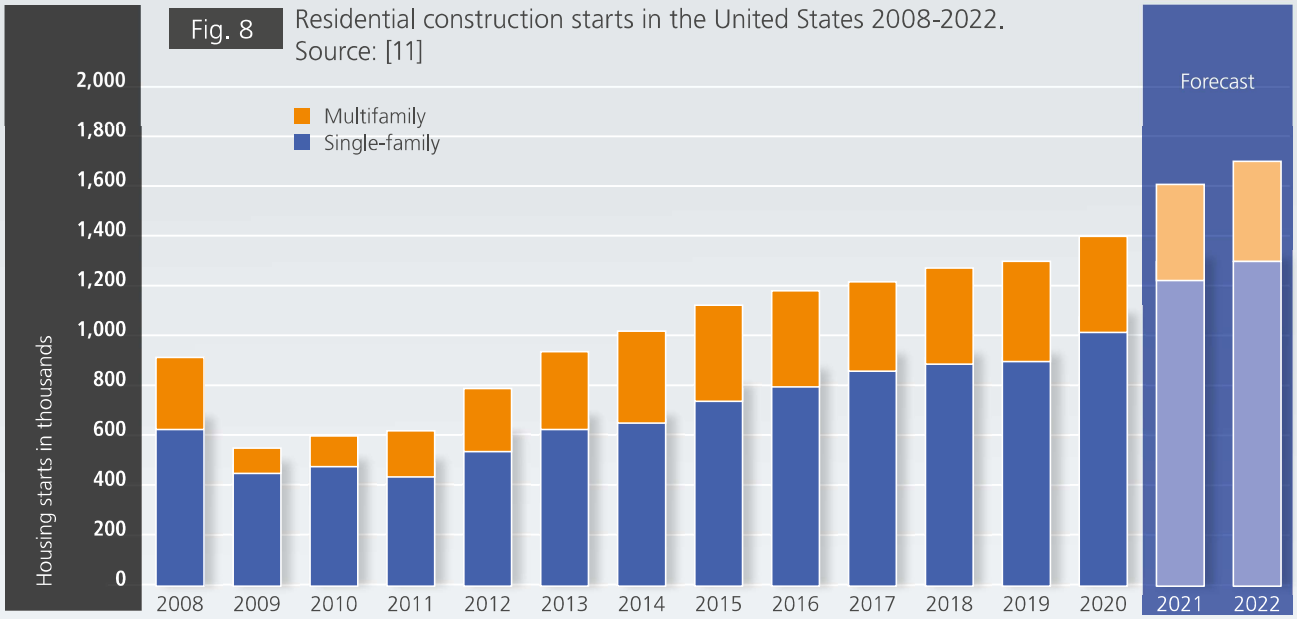


Fig. 8 Residential construction starts in the United States 2008-2022. Source: [11]

The wire and cable market

The market research and consulting firm Verified Market Research valued the size of the North American copper wire and cable market at USD10.8 billion in 2020 and projects that it will reach USD14 billion by 2028, growing at a CAGR of about 3.4 % from 2021 to 2028 [12].

NIEHOFF, NENA and the North American wire and cable industry

Cables for energy and for data transmission must meet high demands. In order to be able to meet these requirements, cable manufacturers need production equipment which enables a high quality production and high productivity at reduced operational costs. NIEHOFF and its subsidiary NIEHOFF ENDEX North America Inc. (NENA) supply precisely such systems together with a process know-how based on more than 70 years of experience. That is why NIEHOFF and NENA are your first-class technology and development partner when it comes to making use of market opportunities particularly in economically challenging times.

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Wherever there is energy there is Sam Dong

Sam Dong America, Inc., Delaware, Ohio USA

The Sam Dong factory in Delaware, OH

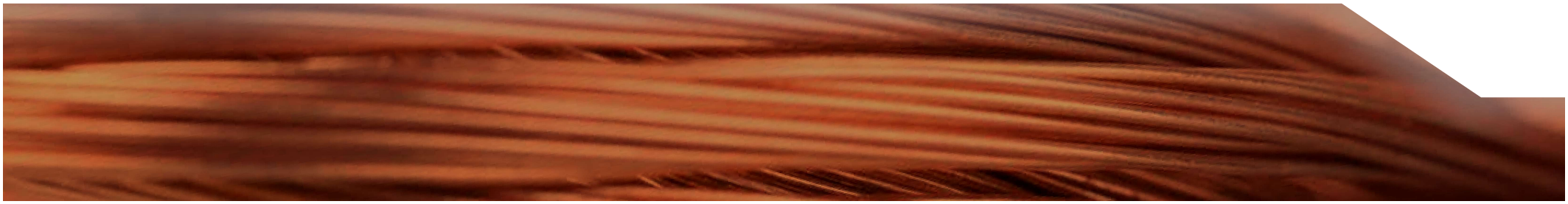
Sam Dong is one of the world's leading manufacturers of enameled wire and bare copper products. The company, headquartered in South Korea, was founded in 1977 and began supplying products to the USA soon thereafter. In order to efficiently meet demand from American customers, Sam Dong established a manufacturing facility in Rogersville, TN, in 2007. Two years later, another factory was opened in Delaware, OH. Today, Sam Dong employs about 270 people in the USA. The company has developed several special processes, including the production and use of oxygen-free high conductivity copper (OFHC), which is used for critical magnet wire applications.

Production processes

OFHC is a specialized form of LME Grade A copper that is melted, then cast, and finally refined in a nearly oxygen-free environment. By combining the OFHC refining process with a CO gas deoxidization method, Sam Dong creates a type of copper whose oxygen content is of less than 10 ppm (ASTM Standard). This material is more workable than standard copper and, simultaneously, owns a higher electrical and thermal conductivity, making it the ideal choice for high-performance electrical components.

Production

Sam Dong produces its copper flat wire in in-house integrated cast stations, drawing machines, and rolling mills. Cable products are made from one or more wires, usually coated or insulated. Power cables are more complex than wires and consist of various insulating layers, enamel or sheathing that protect the wire from interference and everyone who comes in contact with it from the electrical charge.



Products
The product range comprises OFHC rod, CTC (continuously transposed conductors), paper insulated rectangular wire, bare wire, enameled rectangular and round wire, copper strip and foil, as well as specialty copper alloys and copper wire with different shapes.

Markets and Applications
Sam Dong´s US factories supply the North and South American markets with their products. "Wherever there is energy there is Sam Dong" – the company slogan shows that its products in the form of stator and winding coils are used in many fields. They are employed in telecommunication equipment, railway vehicles and aircraft, electrical equipment and hand-tools, generators, solar and wind-power systems for green energy, commutators, transformers and equipment for power distribution, industrial motors, automobiles and medical equipment.

Sam Dong and NIEHOFF/NENA
Maschinenfabrik NIEHOFF and its subsidiary NIEHOFF ENDEX North America, Inc. (NENA) and Sam Dong share very similar values, goals and self-commitments. We as the NIEHOFF Group are delighted to assist Sam Dong with our expertise, experience and customer service in manufacturing highest quality winding magnet wire products and to reinforce Sam Dong´s position as a technological leader.

Left: A view into the quality testing department

Right: A view into the wire drawing hall

Sam Dong

Sam Dong America, Inc.
801 Pittsburgh Drive, Delaware,
OH, 43015, USA
Phone: +1 740 363 1985
E-mail: sales@samdongamerica.com
Web: https://samdongamerica.com

Gigantic dimensions

The double twist stranding machine type D 2002

NIEHOFF has recently delivered the first double twist stranding machine type D 2002 to a well-known manufacturer of power cables. The machine is the largest model of the D series of bunching and stranding machines (Figs. 1 and 2).

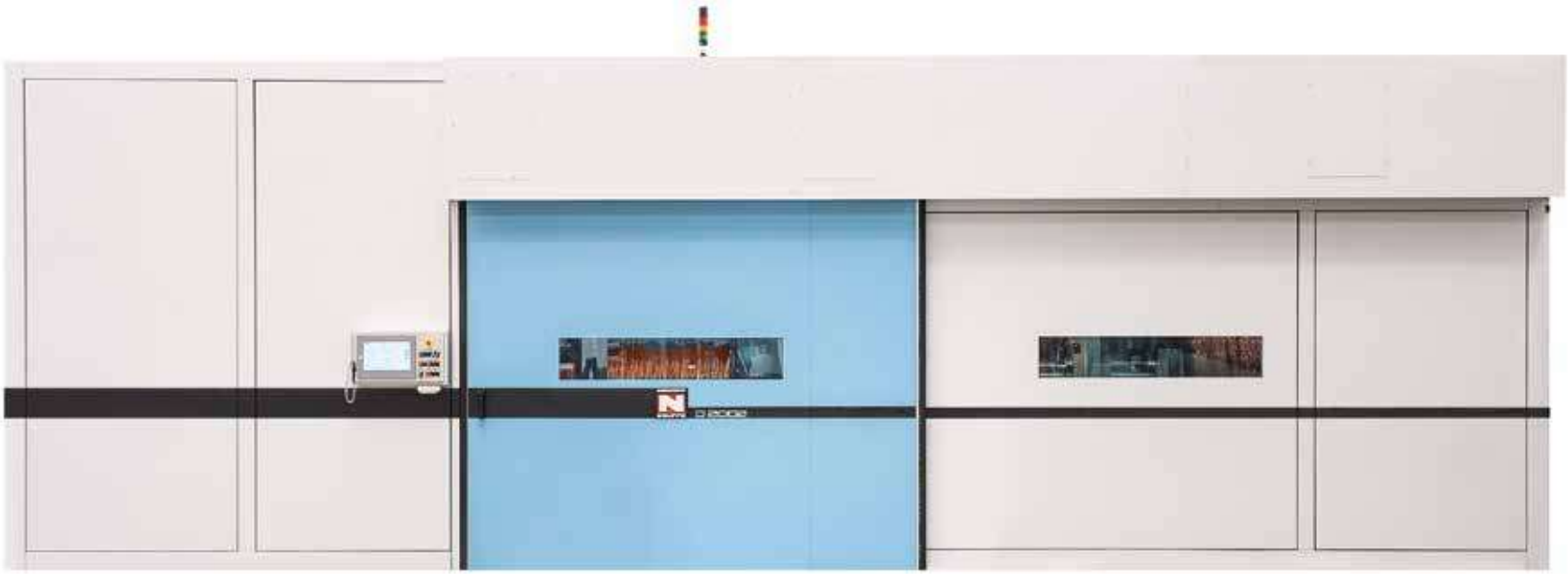


Fig. 1. The double twist stranding machine type D 2002

Technical Data D 2002

max. line speed	150 m/min	compacting Cu	300 mm²
max. line speed	1000 twist/min (tpm)	compacting Al	400 mm²
wire diameter	1.5 – 4.8 mm	lay length (steplessly variable)	50 – 500 mm
strand cross section		max. cable diameter	30 mm
conductors, Al + Cu, Class 5	16 – 400 mm²	max. spool size	
AWG – KCMIL	5 – 800	flange diameter	2000 mm
conductors Class 2 Cu	16 – 400 mm²	spool width	1500 mm
AWG – KCMIL	5 – 800	max. spool wight	12,000 kg

For larger power cables

The D 2002 is able to strand up to 61 wires, accepts spools with a flange diameter of 2 m and is designed for a spool weight of up to 12 t. The machine operates in combination with an external rotating pay-off type PTD 1000. NIEHOFF's philosophy to completely test lines before they are shipped to the end user is also valid for the new D 2002. Due to the gigantic dimensions of the D 2002 a completely new reinforded concrete foundation with a huge pit had to be installed in NIEHOFF's manufacturing facility where the large stranding lines are assembled and tested.

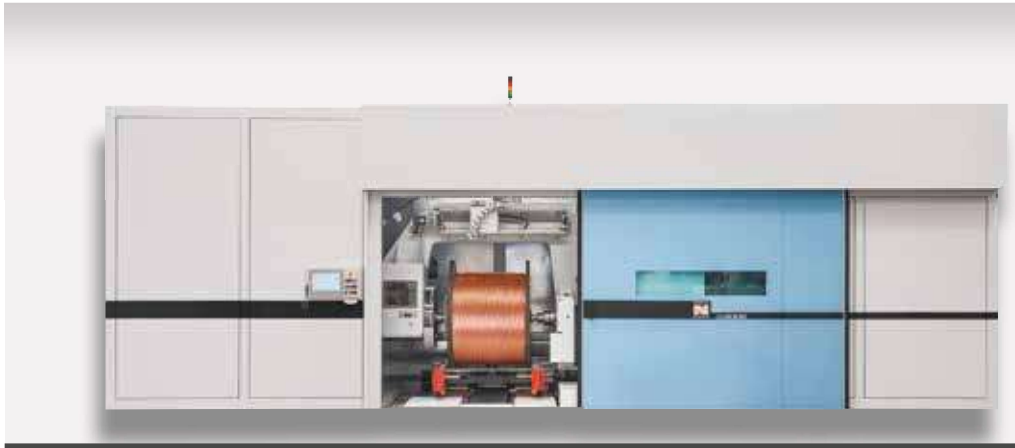


Fig. 2. View into the working area of the D 2002

Fig. 3. The D 2002 accepts spools with a flange diameter of 2 m

Fig. 4. Another characteristic is the energy-saving one bow design and the NBAT laying system

Areas of application
The D 2002 is mainly used for stranding large cross-sections up to 500 mm² made of 61 wires for LV and MV power cables. They can be round compacted or sector shaped. Also flexible conductors up to 400 mm² can be bunched.

Equipment
The D2002 is characterized by its energy saving single bow design. The machine also includes the automatic traversing with flange detection for perfectly wound conductors. It is designed with an optimized conductor path as well as rollers and capstan with large diameter to contribute to a soft treatment of the stranded conductor and thus to high product quality. The second twist pulley can be easily replaced by path of rotating dies that ensure lowest friction and highest product range. The conductor is compacted by external rotating dies with lubrication, whereby a compacting degree of up to 13 % is possible. Likewise, 3 pairs of sector rollers can be used granting the best sector shape. Water-blocking tape can be applied when producing MV conductors offering high machine flexibility. Loading platform with pusher contributes to an easy and safe spool loading/unloading process.

Operation
Ergonomic criteria were also taken into account in the design and simplify the work of the operator: The working height is 1300 mm. Operation is carried out via color touchscreen. Information, instructions, maintenance advice, stored recipes and system status messages are displayed on the screen in the language of the operator.

Documentable production security
The wireless telemetry for all signals increases production security and simplifies maintenance. A number of sensors monitor the quality of the stranding process, for example the temperature of the rotor bearings and the vibrations of the rotor. Production parameters can be recorded, documented and evaluated in accordance with Industry 4.0, so that a permanent proof of quality can be generated and archived. This database is also suitable for demonstrating consistently high quality in the context of customer audits or the like.

Extensive experience
NIEHOFF has been developing and building machines for the cable industry for more than 50 years, including the double twist bunching and stranding machines of the D series. The designers at the NIEHOFF headquarters together with their colleagues of NST (NIEHOFF Stranding Technology S.L.) – all of them having many years of experience in building such machines – are responsible for the development of the new machines.


Fig. 1


Fig. 2


Fig. 3


Fig. 4

Revitalized and powerful again

MMH 101 overhaul after 80,000 operating hours

NIEHOFF has been developing and building high-quality machines for the wire and cable industry for more than 70 years. They are extremely stable in value and therefore it is worthwhile to have them overhauled by NIEHOFF specialists after years of use. After such a rejuvenation, these machines are once again in as new condition and are characterized, among other things, by increased process reliability. As an additional big plus, NIEHOFF offers a 12-month warranty.

Why overhaul is so important?
NIEHOFF recommends having machines overhauled from an operating time of 40,000 hours, because then the bearings have reached their service life and the risk of unexpected machine downtime increases considerably. If the machine continues to be operated, the risk of bearing damage also increases as the running time increases. Such damage can cause very costly consequential damage such as damage to the bearing seat or destruction of shafts and gears. All this is prevented by timely overhaul of the machine. Another argument in favor is the fact that the performance of a machine can be increased by up to 30%. We usually carry out such an overhaul within three weeks - from shutting down the machine to putting it back into operation.

A current example
The NIEHOFF team of experts responsible for machine overhauls has a lot to do. One of the current projects is a multiwire drawing machine type MMH 101. The machine is equipped with two levels and designed to draw 16 copper wires in 31 drafts. In May 2005, it was commissioned at a NIEHOFF customer and was then in operation for a good 80,000 hours.
This remarkable operating time indicates that NIEHOFF machines have a large safety reserve, even beyond the recommended guideline value of 40,000 operating hours for an overhaul.

What has been overhauled?
The machine was dismantled at the customer's site and brought to the NIEHOFF headquarters in Schwabach (Figs. 1 and 2). Even on the outside, it was evident that the machine had been used intensively over a long period of time (Figs. 3, 4 and 5). The first measures after

Fig. 8

Fig. 5

Fig. 6

Fig. 7

disassembly included cleaning all components (Figs. 6 and 7). Then all bearings were replaced with new ones and new sealing flanges with labyrinth seals and other small parts were installed. In addition, some gear components had to be replaced. After assembly, the technically updated machine was subjected to a final inspection and repainted (Figs. 8 and 9). Then it was transported back to the user, where it was reinstalled and put into operation again.

Fig. 9

What else is possible to overhaul the MMH at customer´s site?

In the case described, the mechanical part of the machine was overhauled. In other cases, the electrical part is also modernized during an overhaul. This is particularly recommended if there are no longer any spare parts available for control and drive components. This was not the case here.

Knowledge, documentation and OEM parts

NIEHOFF specialists are best qualified to overhaul NIEHOFF machines. They know the machines down to the last detail, have access to complete documentation of all data required for a proper overhaul, and are absolute experts because they carry out such measures on an ongoing basis. Most of the spare parts required for an overhaul are manufactured in-house at NIEHOFF in OEM quality on state-of-the-art machining equipment. Purchased parts are also guaranteed to meet NIEHOFF's high quality standards.

Performance improvement and sustainability

With modernization measures, NIEHOFF supports its customers in manufacturing in an energy- and resource-efficient way. And we can demonstrate the performance increases that can be achieved through modernization. In addition, the NIEHOFF Original+ After Sales Service develops many components for retrofitting existing NIEHOFF machines. They support users in reducing their operating costs.
In the meantime, our customers also benefit from the experience gained by NIEHOFF, now a partner in the "Blue Competence" sustainability initiative of the German Engineering Federation (VDMA; www.bluecompetence.net), in the area of sustainability.

Fig. 1. The MMH 101 on delivery (front)

Fig. 2. The MMH 101 on delivery (rear side)

Fig. 3. View of part of the piping system

Fig. 4. Detail of the machine base

Fig. 5. Machine base as delivered

Fig. 6. A gearbox during overhaul

Fig. 7. A gearbox during overhaul

Fig. 8. The overhauled and repainted machine

Fig. 9. The overhauled and repainted machine

Fig. The NIEHOFF team at wire Russia 2021 with Bernd Lohmüller, NIEHOFF Managing Director.

Successful participation at wire Russia 2021

Maschinenfabrik NIEHOFF and NIEHOFF of Russia, its Moscow-based sales and service branch, call the wire Russia trade fair last June a great success. The show was the first transregional trade fair held as an attendance fair again. Before, some events for the wire and cable industry had had to be postponed due to the Covid-19 pandemic. Bernd Lohmüller, NIEHOFF Managing Director and part of the team at the NIEHOFF booth, said: "We could see that exhibitors, customers and visitors were delighted to meet again in person. They also appreciated staff members from Germany being present at our booth. The customers hadn't expected that and were therefore pleasantly surprised." In short, this great response with the booth sometimes being so busy that there were no more places available, was a great pleasure for the NIEHOFF team, who were the only ones at the whole trade fair that presented a machine (a double twist bunching machine type D 632) in operation on the booth. The visitors on the NIEHOFF stand mainly came from Russia, but also from Azerbaijan, Belarus, Kazakhstan, and Uzbekistan and brought with them numerous interesting questions and inquiries as well as ideas for completely new projects.

Next NF Wire Forum in September 2022 at NIEHOFF

SEP
2022

Due to the ongoing Covid-19 pandemic, the NF Wire Forum / NE Drahtforum consortium had to cancel the NE Drahtforum conference that was to be held in Hamburg last September. The next conference, the NF Wire Forum, is planned as a traditionally-attended event at the NIEHOFF headquarters in Schwabach near Nuremberg on September 21 and 22, 2022. The first day will offer the opportunity to join a factory tour. The second day will be dedicated to an all-day conference program in German language on the main topic "sustainability". The lectures will deal with current trends in the areas of energy efficiency, sustainable production, materials, drawing media and filtration, drawing tools, basic knowledge and mechanical engineering. The NF Wire Forum / NE Drahtforum

NE Drahtforum

consortium is supported by AURUBIS AG (copper manufacturer), BALLOFFET GmbH (drawing die manufacturer), CARL BECHEM GMBH (lubricant manufacturer), the association Deutsches Kupferinstitut (German Copper Institute) DKI and Maschinenfabrik NIEHOFF (manufacturer of wire drawing machinery). The consortium partners have joined forces to bundle their specialist knowledge and to regularly inform the wire industry about news from the supplier industry for the non-ferrous (NF) wire industry.
More information:
https://www.nf-wireforum.com

Florian Faul

Events

wire
09 – 13 May, 2022
Düsseldorf, Germany

Note: Due to the Covid-19-Pandemic, changes and/or postponements are possible.

Virtual visit of the NIEHOFF factory

One of the highlights of the "Wire & Cable 2021 Virtual Conference", organized by the business intelligence company CRU Group last May, was a virtual live site visit of the NIEHOFF factory in Schwabach. During this guided 45-minute tour Florian Faul, NIEHOFF Sales Manager, took the viewers along on his walk through the factory giving interesting explanations. An online camera filmed him, so the participants could follow him in real time and listen to what he said.
The main topic of the visit was "sustainability". That was the reason why the participants also gained an insight into the geothermal cooling and heating system of the factory and the air conditioning system of the factory halls. This system ensures a constant hall climate throughout the year in the factory being an important prerequisite for consistent manufacturing conditions and, as a consequence, consistently high product quality.
Florian Faul presented the apprenticeship training center, which also plays a significant role with a view to sustainability, followed by a stop at the monitoring boards in a shop floor management area. At this point, manufacturing data are made visible and used for daily meetings according to a Continuous Improvement Process (CIP) in order to increase sustainably the quality of production processes and to eliminate or reduce waste. Further stops were the incoming goods department, the machining area, the machine assembly department, the automatic storage system and the dispatch by air as "known consignor". Florian continued the tour through the key components manufacturing with Kanban supply, the ecologically working paint shop, the machine testing department and stopped at some machines ready for shipment.
From time to time the CRU moderator forwarded questions from the participants to him, which he answered on the spot. The tour was followed by a 15-minute session open for questions addressed to the experts.
As we can see from the positive reactions of the approx. 70 participants, this virtual live site visit was well received.