CONTROL TECHNIQUES

UNIDRIVE

HIGH PERFORMANCE, SCALABLE & FUTURE-PROOF

AC DRIVES, HIGH PERFORMANCE

DRIVE OBSESSED

THE ULTIMATE UNIVERSAL DRIVE

UNIDRIVE M

1 - 4,200 hp Heavy Duty
(0.75 kW - 2.8 MW)
208 - 230 V | 380 - 460 V | 575 V | 690 V

Control Techniques has set the standard in motor control since 1973.

Every company has a flagship; a product that leads the charge. For us, it's Unidrive, our high-performance drive family.

Unidrive is the accumulation of almost half a century of motor control expertise, and it is the embodiment of what Control Techniques is all about. Unidrive is our crown jewel.

In 1996, we were the first to integrate the control of multiple motor types into one physical product, and hence the universal drive concept was born. Now, more than a million motors across the world rely on a Unidrive.

Unidrive integrates, with all of its benefits, seamlessly into your system. Plus, with its scalable control and motion architecture, it's the drive for what you need today and for where you want to go tomorrow.

PERFORMANCE CONTROL
MATCHED FOR EVERY TYPE OF MOTOR

The bread and butter of Control Techniques is honing our unique motor control algorithms, taking pride in our craft as any good craftsman would.

This ensures that our Unidrive M drives offer the highest control stability and bandwidth for every industrial motor type. Unidrive M enables maximum machine throughput in every application and with every motor, from AC induction motors to dynamic linear motors and from energy saving hybrid permanent-magnet motors to high performance servo motors.

Feedback

The built-in, ultra-flexible speed and position feedback interface supports a wide range of feedback technologies from robust resolvers to high resolution encoders, including SinCos, EnDat, SSI, HIPERFACE and BiSS.

Sensorless

Unidrive supports sensorless control of induction, permanent-magnet, and hybrid PM motors, reducing system cost and improving robustness.

High performance and high power

With Unidrive there is no compromise between power and control performance. Unidrive supports high output switching frequencies throughout the power range, making it the drive of choice when your application demands uncompromised high-performance control at high powers.

Control

High bandwidth motor control supporting switching frequencies up to 16 kHz, for open and closed loop induction, servo and hybrid PM motors, giving up to 3,000 Hz current loop bandwidth and 250 Hz speed loop bandwidth.

Unidrive, with its high-speed variants, is suitable for applications where output frequencies above 600 Hz are needed, such as spindles and centrifuges.

Universally applicable

Having one universal drive in control of multiple parts of the application radically simplifies machine design. Your engineering team only have one product to learn, allowing them to spend more time on other tasks.

It also means a single, universal replacement for any maintenance, repair or operational need.

CAN-DO DRIVES

CASE STUDY:

PACKAGING FIRM BLOWS MAINTENANCE ISSUES AWAY BY CONVERTING FROM DC TO AC DRIVES

BPI Packaging solutions is a manufacturer of flexible packaging film, with seven sites in the UK and Romania. The Winsford, UK site produces innovative, sustainable film used in various applications from NHS PPE to surgical waste bags. In a bid to become more efficient BPI decided to convert from DC to AC drives. Seven extruders were converted to Unidrive M and Dyneo+ solutions. By swapping to AC the customer benefitted from 30% energy savings, lower maintenance cost and improved machine performance.

BPI Solutions, UK and Romania

SAVE ENERGY THROUGH A WIDE RANGE OF ENERGY FEATURES

Unidrive M has been designed to bring improved energy efficiency to all applications, delivering up to 98% efficiency, minimizing losses during the conversion process.

The easy common DC bus configuration of the drive enables braking energy to be recycled within the drive system, reducing energy usage and eliminating external supply components. Even more, Unidrive M series drives can be configured in a regenerative mode, providing an Active Front End (AFE) for regenerative AC drive systems.

Application of an AFE not only results in the most energy efficient solution but also dramatically reduces supply harmonics.

Meanwhile, in some applications drives can sit idle for significant periods, but even in such scenarios energy can be saved with the low power standby mode of Unidrive M drives.

Nidec hybrid permanent-magnet motors

Pairing Unidrive M with Nidec's Dyneo+ hybrid permanent-magnet motors, delivers exceptional efficiency levels across all operating speeds, especially at lower speeds where the efficiency is much higher in comparison to induction motors.

The energy savings possible can result in a quick return on your investment and will continue to save you money day after day, with the important added benefit of a lower carbon footprint.

Dyneo+ hybrid permanent-magnet motor

INTEGRATED SAFETY
THE NEW PARADIGM OF SYSTEM DESIGN

Modern industrial processes face a three-fold challenge: the constant demand for increased machine throughput, matched by a parallel need to reduce complexity and points of failure, all the while ensuring the health and safety of human operators and allowing them interaction with the running process.

Modernizing system design, replacing traditional electro-mechanical safety components with the capabilities of the latest generation of variable speed drives, is the new standard across industries to increase efficiency and availability.

Unidrive offers integrated single or dual Safe Torque Off (STO) inputs, certified to SIL3 / PLe, providing an elegant and more reliable solution over traditional motor contactors.

Enhanced, decentralized motion safety with the MiS210

Relying only on a centralized safety PLC can mean additional cost through complexity of the wiring and the safety software.

The MiS210 safety option for Unidrive extends the built-in STO with motion safety capability and enables decentralized flexibility with the option of safety over network connectivity. This can reduce demand upon - and therefore reduce the cost of - the central safety PLC, with the additional benefit of reduced wiring and faster reaction times.

The safety module simply clicks into place, with no screws or other mounting requirements. Once fitted, the safety functions provided by the MiS210 are seamlessly incorporated into the drive's feature set. Taking advantage of the Safe EnDat protocol, the MiS210 achieves up to SIL3 / PLe with just a single encoder.

The MiS210 has been independently assessed by TUV Rheinland to meet the following standards:

- IEC 61508 SIL3
- IEC 62061
- ISO 13849-1 PLe
- IEC 61800-5-2
- European Machinery Directive 2006/42/EC

MiS210 adds the following motion safety functions to Unidrive:

- Safe Stop 1 (SS1)
- Safe Stop 2 (SS2)
- Safely Limited Speed (SLS)
- Safe Operating Stop (SOS)
- Safe Direction (SDI)
- Safe Speed Monitor (SSM)
- Safe Emergency Stop (SES)
- Safely Limited Position (SLP)
- Safely Limited Acceleration (SLA)
- Safe Brake Control (SBC)
- Two Hand Control (STHC3)

Additionally, these motion safety functions can be controlled over the following safe networks:

- Safety over Ethernet with CIP Safety
- Fail Safe over EtherCAT, FSoE

MULTI-PROTOCOL

A SINGLE DRIVE THAT DOES IT ALL

Control Techniques' philosophy has always been to support innovators, regardless of which communications protocol they may use. It's for them that we've developed the most flexible high-performance drive platform on the market.

Having multiple protocols supported by one drive means that different systems can share one design, reducing engineering effort and complexity, and helping to rationalize inventory of parts and spares.

But we didn't stop there. Today Unidrive M series drives offer EtherNet/IP, PROFINET RT, Modbus/TCP and RTMoE as standard, on a single drive platform, simultaneously.

With this, Unidrive M delivers even more performance and extends the range of supported applications and achievable topologies. Using only the standard on-board communications it is possible to connect an HMI via Modbus TCP/IP, simultaneously with a high performance connection to a central PLC using EtherNet/IP or PROFINET RT.

CONTROL TECHNIQUES RTMoE	✓ 250 µs drive-to-drive synchronous data transfer
EtherNet/IP	✓ Support for RPI as low as 2 ms
Modbus TCP/IP	✓ Maximum of up to 10 concurrent connections
PROFINET	✓ Support for 1 ms cyclic link cycle times

RTMoE

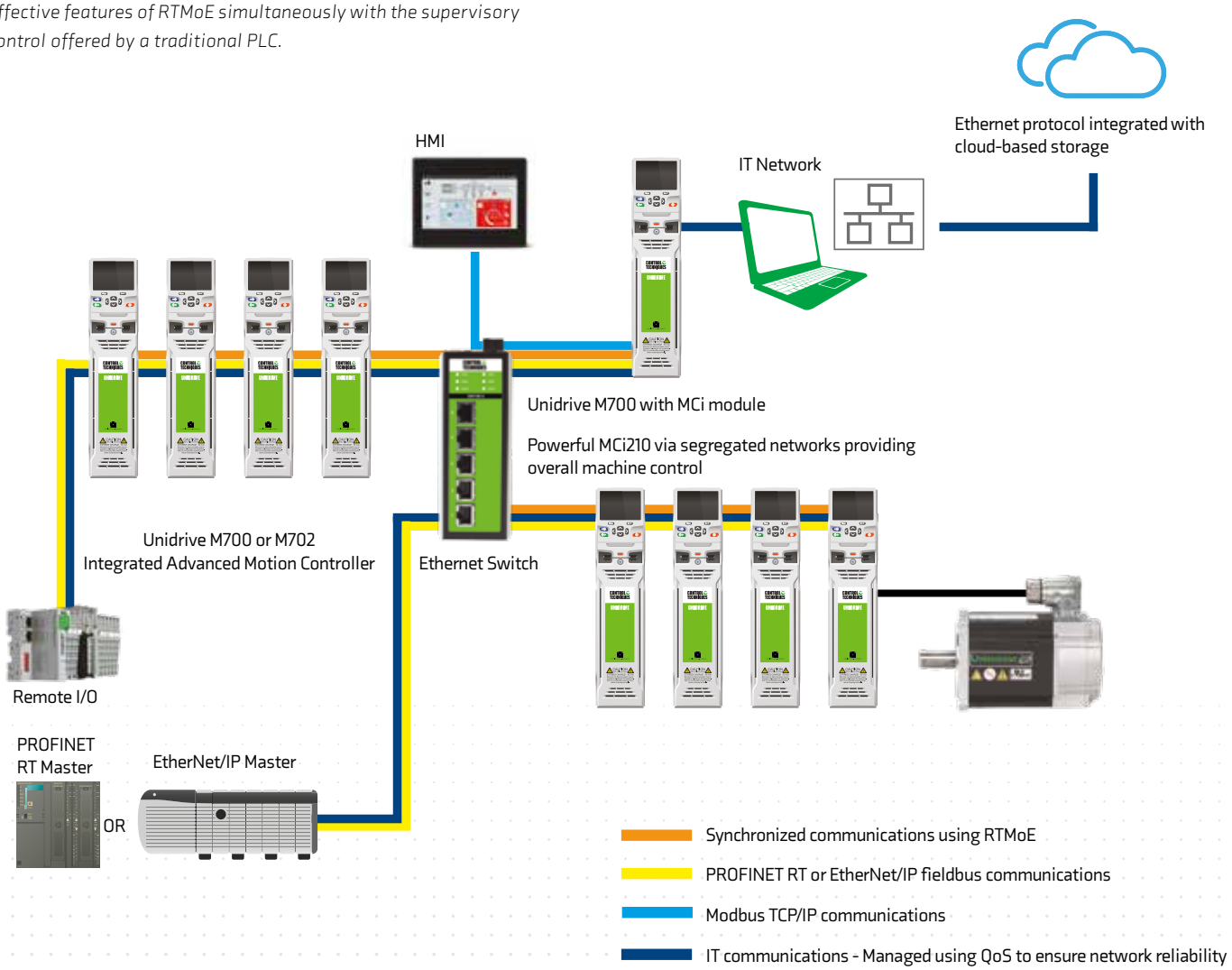
Real-Time Motion over Ethernet (RTMoE) is included as standard on Unidrive M700 and M702 drives. It provides synchronized communication between drives at 250 µs cycle time, using the Precision Time Protocol as defined by IEEE1588 V2. Inter-axis synchronization using RTMoE delivers the ability to implement complex, highly accurate electronic line-shaft applications without the need for a powerful PLC. Therefore it's all at a fraction of the cost of other solutions available on the market today.

Traffic management

Every Ethernet based Unidrive incorporates dedicated network switches that allow the drives to be conveniently daisy-chained together; reducing the system wiring cost and saving valuable panel space. Using these dedicated switches also means that traffic on the network is perfectly managed to prevent network overload and the inherent performance degradation that may otherwise bane similar systems.

Cost-optimized integration

The diagram below gives an illustration of the flexibility that Unidrive can bring, exploiting the high performance, cost-effective features of RTMoE simultaneously with the supervisory control offered by a traditional PLC.



EFFORTLESS SYSTEM INTEGRATION

Truly comprehensive

Integration is at the heart of everything we do. Our modular drive expansion systems are designed to allow integration into virtually any setup.

Unidrive supports a multitude of control bus technologies from the state of the art to traditional fieldbuses.

For synchronized systems Unidrive offers high performance communications over EtherCAT and POWERLINK. For non-synchronized systems there's PROFINET, EtherNet/IP and Modbus TCP/IP.

Unidrive is equally at home in new designs as well as retrofit and modernization projects. We support CANopen, INTERBUS, PROFIBUS and DeviceNet.

SI-EtherCAT

SI-CANopen

SI-POWERLINK

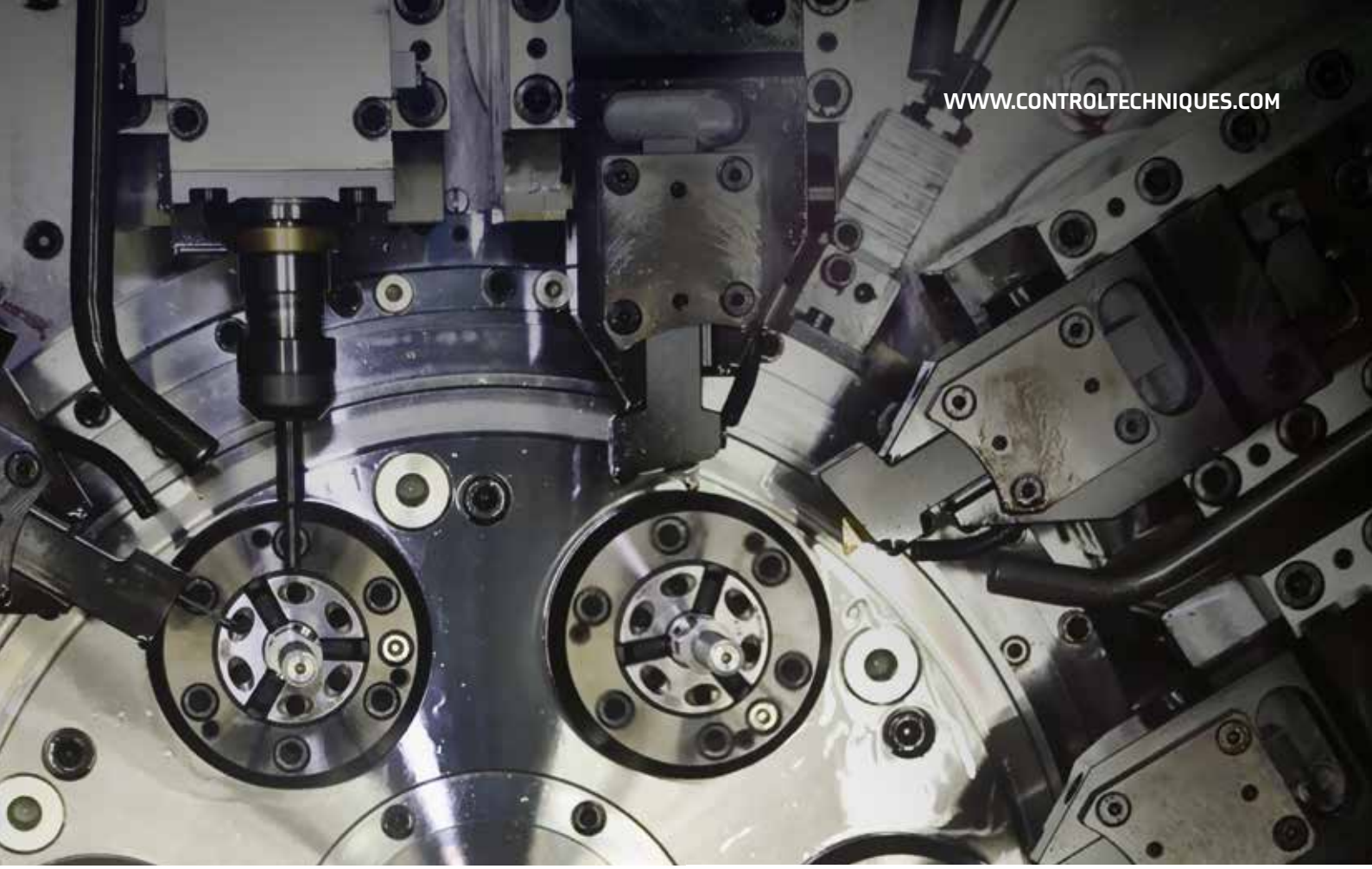
SI-INTERBUS

SI-PROFINET

SI-PROFIBUS

SI-Ethernet

SI-DeviceNet



PLC Controlled Motion

PLC Controlled Motion facilitates the integration of Control Techniques drives into major PLC architectures, simplifying the process to the point where our drives can be swapped into an application in a matter of hours.

A single installation will load all the function blocks and documentation required, as well as example projects to get the application up and running as quickly as possible. With the guided setup sequence provided inside the Connect software tool, users are taken through the setup process step-by-step, resulting in a ready-to-use configuration that can be loaded straight into the drive.

Utilizing the high-performance Advanced Motion Controller inside Unidrive M once again yields significant performance benefits, and gives the possibility to create complex motion completely decoupled from the performance and computational power of the external PLC.

Frequency Control

Allows frequency control of an open-loop axis.

RPM Control

Allows speed control of a closed-loop (including sensorless) axis.

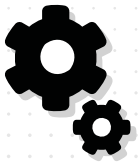
Speed Control

Allows speed control of an axis, with dynamic control over motion parameters. With dedicated jogging reference.

Position Control

Single motion or up to 10 index moves can be defined and executed.

Multiple homing modes.



Electronic Gearbox Control

Electronic gearbox synchronized motion to another PLC Controlled Motion axis.

Master reference switchable during PLC run-time.

Multiple homing modes.

SCALABLE [MACHINE] CONTROL

On-board PLC

Incorporating the latest ARM microprocessor technology, programs for logic and IEC 61131-3 motion and sequencing with real-time tasks are fully supported.

Advanced Motion Controller

The Unidrive M700 series integrates a 1.5 axes Advanced Motion Controller, allowing motion functions to be synchronously carried out on the drive at 250 µs cycle time, minimizing system latencies and maximizing performance. By implementing motion control on the drive, the system design can be liberated from being tied to specific PLC vendors, at the same time reducing the computational load on the external PLC or even replacing it altogether.

Key features of the Advanced Motion Controller include:

- 250 µs cycle time
- Motion profile generator
- Electronic gearbox
- Simple cam profiles with point-to-point selectable interpolation
- Homing functions
- High speed position freeze (Touch probe)

PTi210 Motion Made Easy® controller

1.5 axis motion controller for quick and easy motion control

Configure and program Unidrive M700 drives and motion control in minutes with intuitive PowerTools Studio software.

The software provides an unparalleled setup and commissioning experience suitable for all skill levels. Professional motion control software engineers, infrequent users, or someone with no servo experience can equally use this interface to program drives.

MCi integrated machine controllers

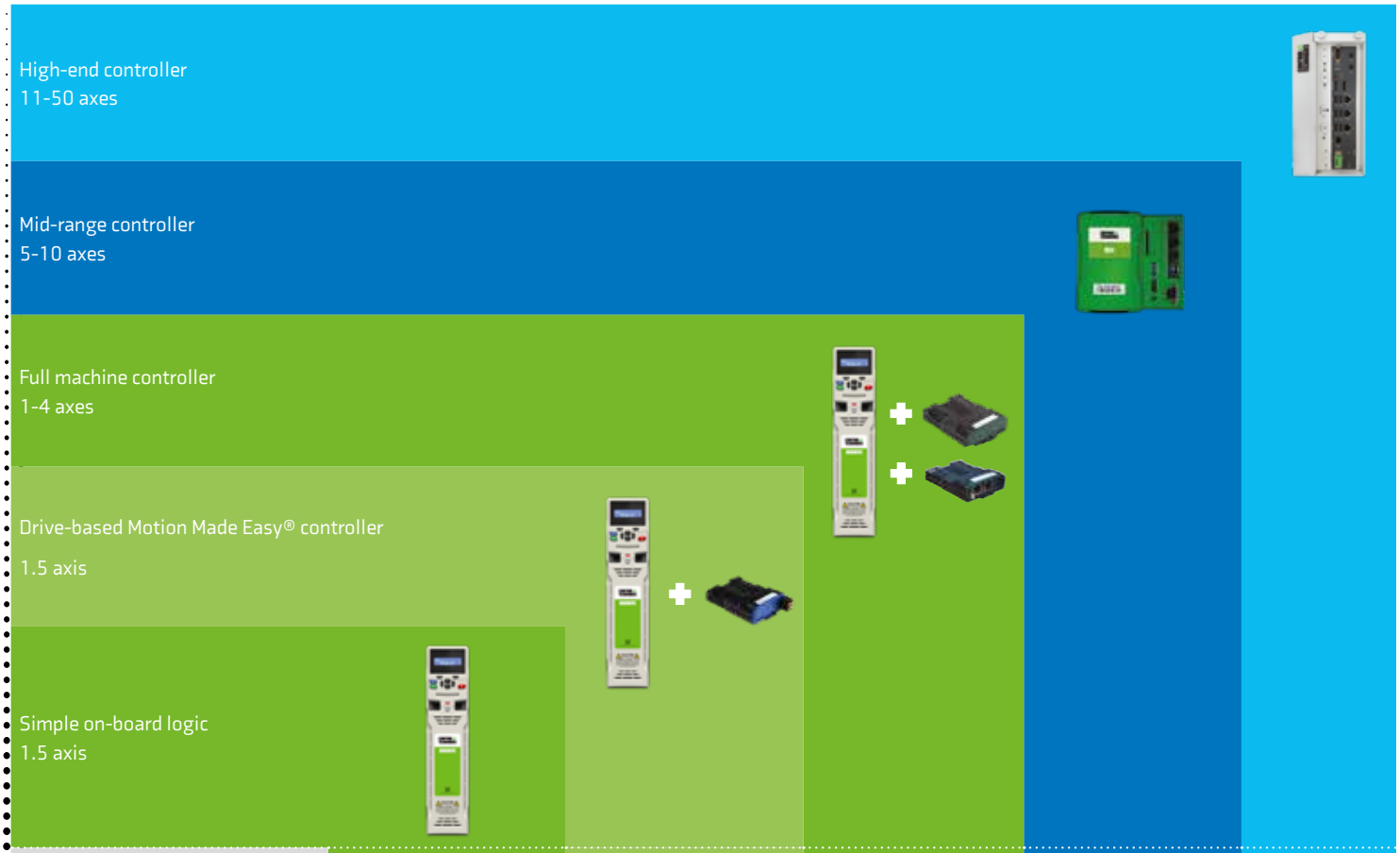
Second processor for PLC programs and multi-axis control

MCi modules add a powerful second processor to Unidrive M, extending the drive's system and machine control capabilities to run application programs up to four times faster than a standard PLC.

MCi programs can access and manage Unidrive M's embedded Advanced Motion Controller across a wide range of networks, providing perfectly synchronized multi-axis machine performance.

The modules are powered from the drives internal power supply, which means less wiring and less physical space is required. They work seamlessly with external components such as I/O, HMIs and other networked drives through Unidrive M700's native communication ports and System Integration modules.

The MCi210 also provides two additional Ethernet ports with an internal network switch.



	Built-in Advanced Motion Controller	PTi210 Motion Made Easy® Control Module	MCi200/MCi210 Integrated Machine Control Modules	MCe Stand-alone Multi-axis Machine Controller	MCz Industrial PC
Multi-axis control	1.5 axis	1.5 axis	1-4 axes	5-10 axes	11-50 axes
Speed control	✓	✓	✓	✓	✓
Positioning	✓	✓	✓	✓	✓
Electronic gearbox	✓	✓	✓	✓	✓
Homing functions	✓	✓	✓	✓	✓
Simple cam profiles	✓	✓	✓	✓	✓
Advanced cam profiles		✓	✓	✓	✓
High speed position freeze	✓	✓	✓	✓	✓
Digital cam switch		✓	✓	✓	✓
Interpolated Motion				✓	✓
	Drive based			Controller based	

For more information on our MCe & MCz stand-alone machine controllers, please visit our website or contact one of our sales representatives.

APPLICATION PROGRAMMING SOFTWARE

Fast Programming and Commissioning

PowerTools Studio

PowerTools Studio provides a simple configuration and programming interface for motion control.

Rapid motion control configuration is possible in 5 easy steps with intuitive graphical screens:

1. Hardware selection – select drive, motor and feedback devices from lists
2. User Unit set up – pick your own units and scaling, no complex math required
3. I/O set up – drag and drop I/O points to drive and motion functions, no programming required
4. Motion set up – intuitive screens provide easy set up of indexing, jogging , gearing and camming functions
5. Optional Programming – up to 1,000 lines of code is available for more complex applications

Machine Control Studio

The Machine Control Studio programming environment provides a flexible and intuitive environment for programming automation and motion control features.

The software provides programming for:

- Onboard PLC
- MCi200 or MCi210 integrated machine control modules
- Ethernet network data configurations

Familiar automation programming languages

The programming environment is fully IEC 61131-3 compliant and therefore familiar, fast and easy to use for control engineers around the world. The following IEC 61131-3 programming languages are supported:

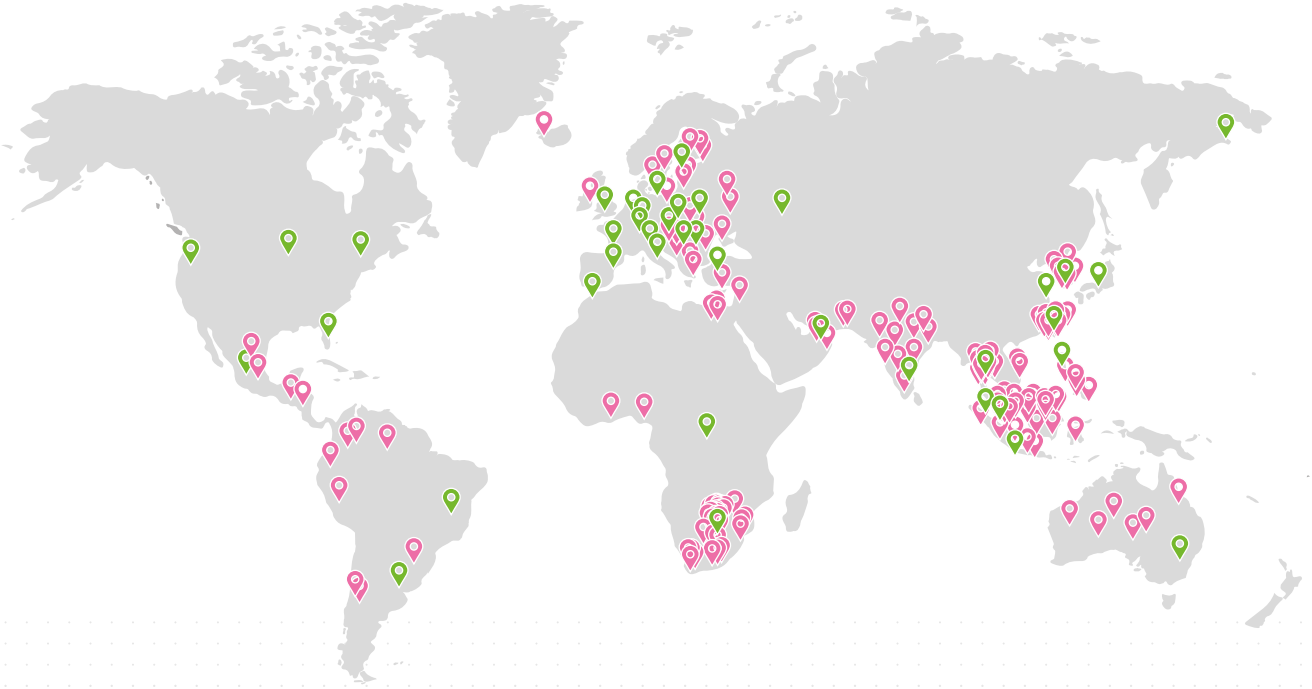
- Structured Text (ST)
- Function Block Diagram (FBD)
- Structured Function Chart (SFC)
- Ladder Diagram (LD)
- Instruction List (IL)
- Continuous Function Chart (CFC)

GLOBAL
DRIVE OBSESSIVES

Over the years our Control Techniques teams have used the flexibility of the Unidrive platform to develop packaged software solutions for a myriad of applications.

Through diverse application engineering expertise distributed across the world in our Drive Centre and Partner network, we have built up a vast résumé of software and experience that is yours to draw upon when you choose Unidrive.

Our Global Application Community exists to maintain connections across this network to ensure Control Techniques continues to provide class-leading drive applications support, wherever you are.



Globally organized expertise, development and support.

- **Drive sales, technical support, repair and application expertise**
- **Country Partners - sales, support and application expertise**

Visit controltechniques.com or scan the QR code to find your nearest drive center or distributor

USING UNIDRIVE

WE MAKE IT QUICK AND EASY

Control Techniques' keypads, memory devices and software tools make it easy to access the full feature set of Unidrive M drives, allowing users to optimize drive tuning, back-up the configuration set, and troubleshoot quickly and painlessly.

Connect

Our Connect PC tool is for commissioning, optimizing and monitoring drive and system performance. Its development draws from our extensive user research, using human centered design principles to give a superior user experience.

- Direct connection to drives via serial or Ethernet simplifies and speeds up commissioning
- Task-based drive operations are simplified with intuitive graphical tools in a familiar Windows environment
- Dynamic drive logic diagrams and enhanced searchable listings bring clarity to the commissioning and fault finding processes
- Drive and motor performance can be optimized with minimal drives knowledge
- Multiple communication channels for a more complete overview of the system
  - » Automatic drive discovery gets you up and running in the shortest possible time

Configuration security

Access to our drives' configuration can be set across multiple levels and secured with a PIN code. So deciding who has access to which settings can be entirely in your control.

With the commissioning done, parameter sets and small PLC programs can be backed-up or restored from Smartcards and with the Connect PC tool, as well as copied from one drive to another, including from legacy products.

Standard SD cards can also be used for quick and easy parameter and program storage with an available adaptor. SD cards provide massive memory capacity allowing a complete system reload if required, and can be easily programmed on a common PC.

FREE DOWNLOAD

Drive set-up

Quickly find everything you need for quick and easy installation of your drives.

Visit: www.drive-setup.com

FREE DOWNLOAD

Diagnostic Tool

Quickly solve any error codes that the drive may show. You can download our Diagnostics Tool app at:

controltechniques.com/mobile-applications

HIGH POWER MODULES AND PRE-ASSEMBLED PACKAGED DRIVES

High power modular drives

Unidrive M's modular offering gives you never before seen flexibility in building compact, reliable high-power solutions. Paralleled together, Unidrive M can control asynchronous and synchronous motors up to 4,200 hp (2.8 MW). At the top of the modular drives range, the Frame 12 is a 700 hp (500 kW) single module that delivers unmatched power density, while keeping both footprint and system costs to a minimum.

The Unidrive M modules can be paralleled together into a wide range of flexible solutions to solve all system needs, including Active Front End and multi-pulse rectifier configurations.

Efficient system build

Designing and building a high power packaged drive takes immense engineering knowhow. Most people don't have that expertise in-house. But we do. And we've put it all into our DFS freestanding drives.

The packages are designed to make the most of our high power modular drives, benefiting the applications that need them the most. The results are maximum energy efficiency in an ingress protected package.

Our packaged drives come pre-assembled, easy to set up, with all necessary system components included. Even more, we can ship your freestanding drive to you at very short lead times.

CAN-DO DRIVES

CASE STUDY:

INCREASED PRODUCTIVITY AND ENERGY SAVINGS FOR GLOBAL RETREAD COMPANY, HELPING 9 MILLION TYRES COVER MORE MILEAGE

The installation of two M700 drives - 1000 hp (750 kW) each, connected to a common gearbox - has helped the company achieve significant business performance improvements. The plant has seen an approx. 10% monthly energy saving since deploying the technology, not only saving money but contributing to a lower carbon footprint.

Bandag, Johannesburg, South Africa

CASE STUDY: BIG THINKING INCREASES CAPACITY FOR TEST RIGS

Established in 1946, Rewinds & J. Windsor is one of the largest independently owned electric motor and rotating equipment repairers in the UK. Operating across three sites, the company offers a range of electrical, mechanical, and electronic engineering services across the UK and Ireland. The company's motor testing facility in Liverpool, tests, builds, and repairs a wide range of motors from wind turbines to big brand car motors.

The Challenge

Recently, Rewinds & J. Windsor's test rig broke down. At 335 hp (250 kW), it had limitations on the size of the motor it could test.

The company took action to find an easy to use alternative which could test bigger motors, to allow it to expand in-house capabilities.

The Solution

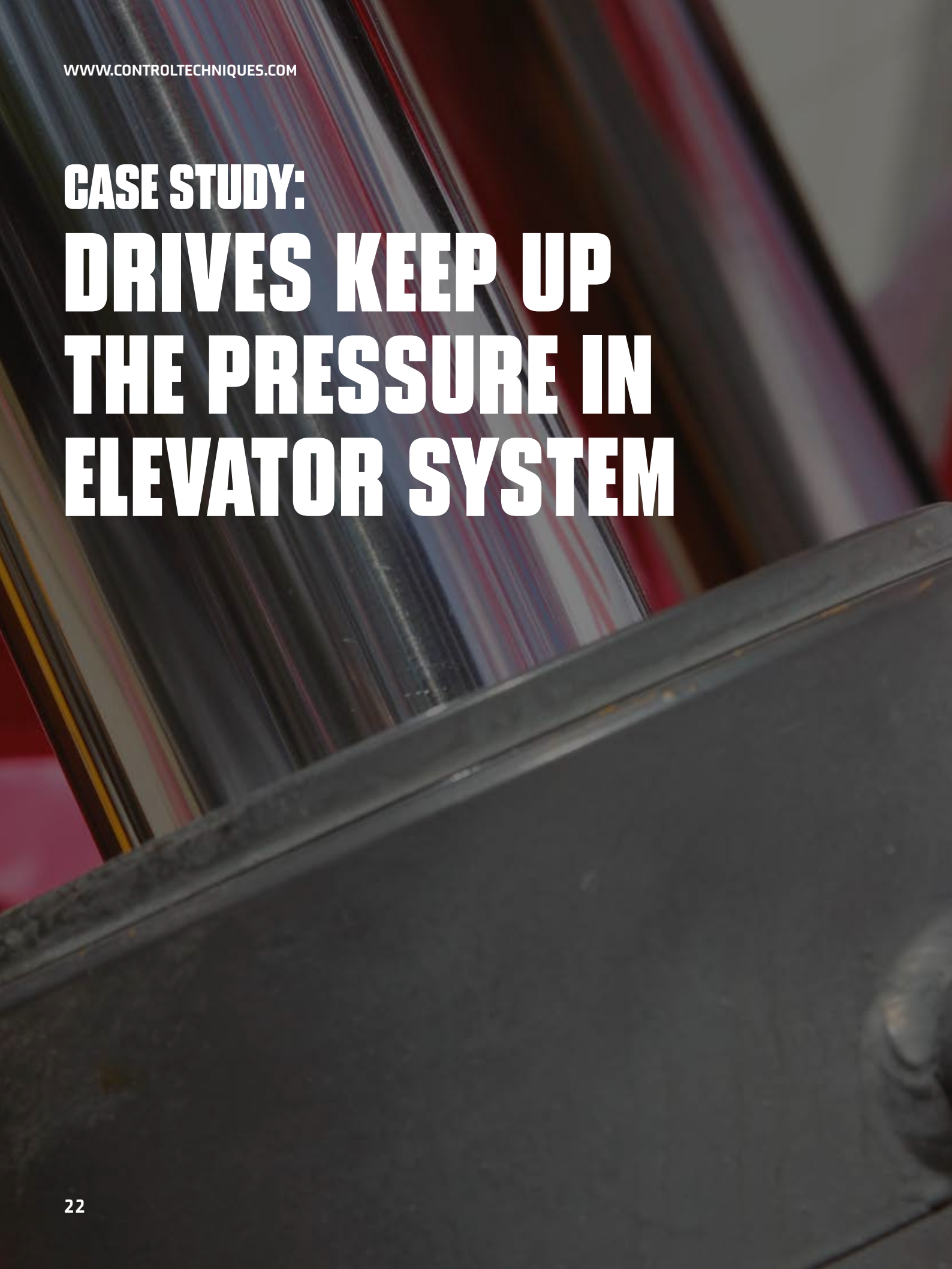
A 670 hp (500 kW) Control Techniques' DFS drive, was just the solution. The pre-assembled, ready to install drive cubicle system, is designed for use in high power applications where energy saving and high ingress protection are essential.

Apostolos Papadopoulos, Area Sales Manager UK North West, Control Techniques, said, *"The DFS drive provided Rewinds & J. Windsor with a fast and easy to install solution; the product was in stock and shipped within days from order."*

The Benefit

"The Control Techniques' DFS drive cubicle is doing everything we want. The upgrade to the new system has increased our flexibility as a firm. Moving from our old 335 hp (250 kW) drive to 670 hp (500 kW) means we can now test much bigger motors, up to 1MW in-house, reducing our service costs. We can now take on more work and test and repair other companies motors."

Paul Challiner
Rewinds & J. Windsor, Electrical Department Manager



CASE STUDY:

DRIVES KEEP UP THE PRESSURE IN ELEVATOR SYSTEM

HYDRAULIC COUNTERWEIGHT WITH FOUR-QUADRANT PUMP

Bucher Hydraulics of Neuheim, Switzerland design and manufacture the world's most advanced hydraulic elevator systems. Incorporating Unidrive AC drives from Control Techniques, the MRL-System BERIPAC™ offers a unique combination of high-quality ride, high efficiency and low electrical energy costs, with a usage of up to 180 rides per hour without the need for an oil cooler.

The Challenge

Bucher is famous for its innovations, including their electronically controlled LRV valve that is insensitive to changes in pressure and temperature.

They brought significant energy savings to elevator production, as well as shorter travel times and virtually eliminated creep-to-floor. Striving for further system improvements, Bucher was seeking a way to improve elevator control.

The Solution

Having carried out considerable research, Bucher decided to use AC drives from Control Techniques and created BERIPAC™, which uses a hydraulic counterweight with four-quadrant pump.

It has direct-to-floor operation and has eliminated the need for an oil cooler.

The company chose the Unidrive series from Control Techniques for pump motor control as it is "the one which we consider has the best combination of accuracy and reliability – plus outstanding international support", said Bucher Hydraulics Product Manager, Mr Grab.

The powerful Bucher controller receives multiple feedback signals, such as temperature, oil pressure and car position, from an absolute encoder and, on receiving a request, calculates the required riding curve. As the lift car comes down the shaft, its potential energy is released in the form of oil pressure that is stored in a hydraulic accumulator. On rising in the shaft, this energy is released in a controlled way via the pump to the pulling cylinder to minimize the additional electrical energy that is required.

The Benefit

The compact, two-part elevator control cabinet can be sited almost anywhere and encompasses the elevator controller and Unidrive, as well as the hydraulic cabinet with emergency controls and 45-liter fluid tank.

*"**This system sets new standards in ecology and economy.** The closed loop control and continuous approach to floor produces a ride comfort that is as good as the best on the market and this is in part due to the **dynamic response and consistent, accurate following of the calculated speed curve.**"*

Mr Grab | Product Manager

UNIDRIVE THE DRIVE FOR

TORQUE CONTROL

EXTRUSION SEE PAGE 4
TEST RIGS SEE PAGE 20
CASTING SEE PAGE 30
WINDING

SPEED CONTROL

HYDRAULIC PUMPS SEE PAGE 22
CRANES SEE PAGE 32
HOISTING SEE PAGE 28
PRINTING
CONVEYORS

POSITION CONTROL

STACKING SEE PAGE 26
RETREADING SEE PAGE 19
LABELING
PACKAGING

YOUR INDUSTRY AND APPLICATION

- Precision torque control with up to 250 µs update rate
- Sensorless control of induction, permanent-magnet and hybrid PM motors
- 98% efficient, minimal energy lost during the power conversion process
- Easy common DC bus configuration, dynamic braking, and regenerative mode
- Full spectrum of stand-alone, modular and pre-assembled drives up to 4,200 hp (2.8 MW)
- On-board PLC to execute programs for logic and sequencing

- Fully configurable S-ramps
- High bandwidth speed loop and switching frequencies supported up to 16 kHz
- Built-in, universal feedback interface supporting everything from resolvers to incremental and absolute encoders
- Stationary autotune
- Low acoustic noise due to adjustable multi-speed fan and intelligent thermal management
- Integrated Safe Torque Off (STO) input(s), certified to SIL3 / PLe

- Support for virtually all control bus technologies, including traditional fieldbuses and serial communications
- Effortless integration into PLC architectures with PLC Controlled Motion
- Built-in, 1.5 axis advanced motion controller with cam profiles, homing, and electronic gearbox
- Scalable integrated motion control reduces demand on, or can entirely replace, a central PLC
- Comprehensive motion safety functions, including over safe networks

CASE STUDY: ACCURACY SOLUTION FOR MEAT PROCESSING & PACKAGING

OEM ACHIEVES SOLUTION IN UNDER THREE MONTHS

A large, premium OEM customer chose Control Techniques as its partner to work on a crucial project increasing production, accuracy and throughput at a food and beverage manufacturer for meat processing and packaging machines.

The Challenge

Previously the OEM company produced only filling machines for their meat manufacturer; now they were challenged to supply a complete production line encompassing mincing, portioning, transporting and packaging.

The filling machine produces up to 300 portions of hamburgers per minute, transported via conveyor to a stacker where they are placed into stacks of six hamburgers top on each other. The finished goods then need to be secured before being transported to the packaging station.

The Solution

Working closely with the OEM, Control Techniques quickly found a solution for the new stacker machine that would synchronize six pairs of paddles to stack and secure the hamburgers. They are then transported via conveyor to the packing station where they are packed in trays ready for distribution.

The OEM needed an extremely dynamic solution to secure and stack 300 hamburgers per minute with an error rate of <1%.

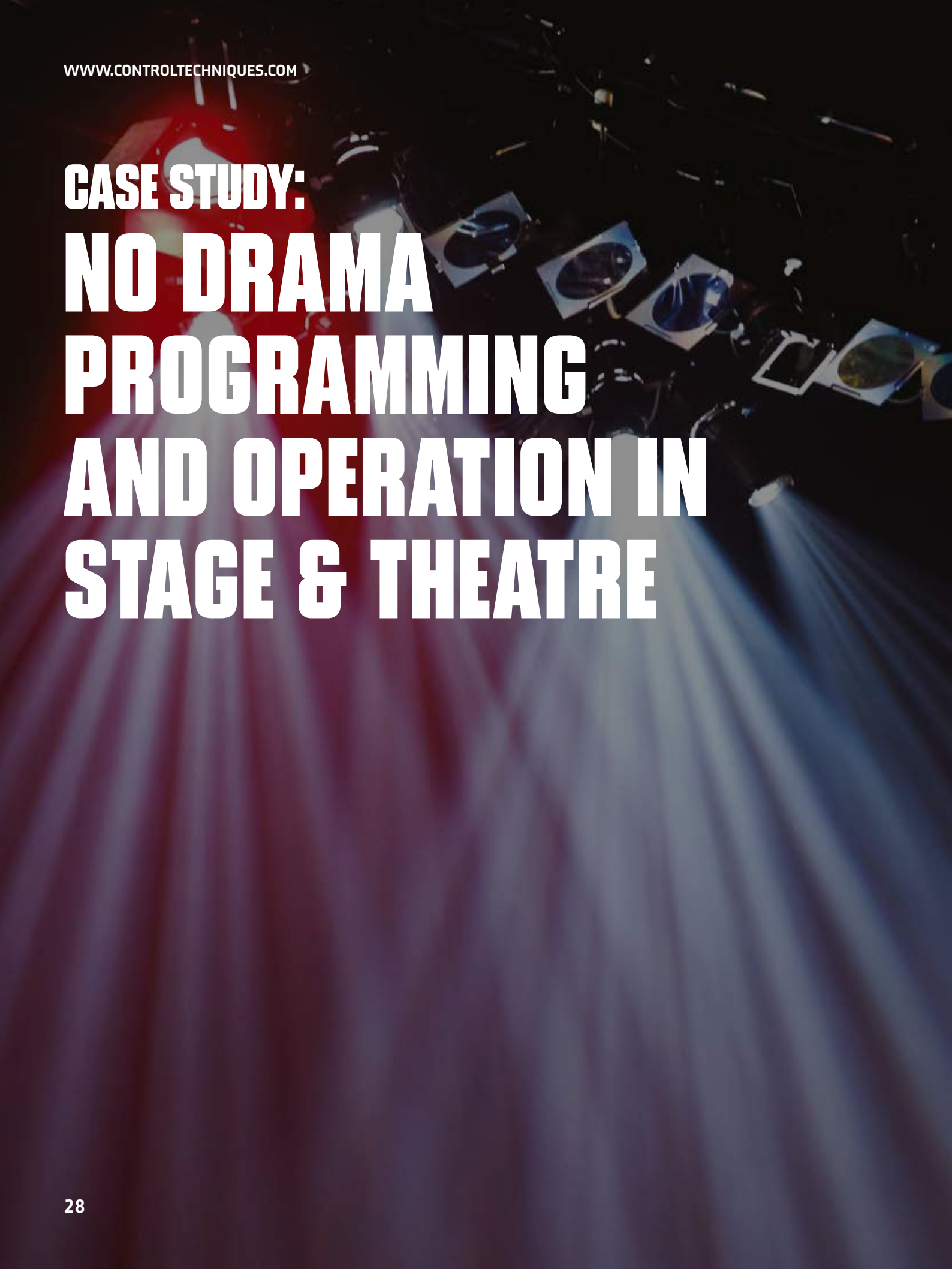
Since the OEM is now producing the complete production line for its customer, the machines must be flexible and efficient in adapting to the needs of the end-user, in order to stack the exact number of hamburgers required by their customers at any one time.

The production line features Unidrive M as frequency controller, together with Unimotor HD motors. The real game-changer though is that the dynamic stacking process could be achieved without external PLC control. Control Techniques' solution was to create the required accuracy with an internal MCi210 module using the Ethernet bus, in combination with Unidrive M's onboard advanced motion controller (AMC). All status information about the system is displayed on a HMI via Modbus TCP.

The Benefits

Control Techniques once again excelled, by completing the entire project from conception, to design and testing all in less than three months.

The key factor for this OEM was the fast and efficient service they received from Control Techniques again on this project, giving them the confidence that future projects will be handled with the same speed, professionalism and efficiency.



CASE STUDY: NO DRAMA PROGRAMMING AND OPERATION IN STAGE & THEATRE

CUTTING EDGE AUTOMATION

As part of a four-year $137 million transformation at the Royal Shakespeare Theatre in Stratford-upon-Avon, Dutch theatre automation company Trekwerk was responsible for the renovation of the over-stage installation. The contract was awarded to Control Techniques' Rotterdam Drive Centre and around 100 AC drives and servo motors were used throughout the project.

The Challenge

The challenge was to automate the movement of back-drops and scenery, and the complex system of lighting arrays, which included the development, design, manufacture and installation of 60 winches plus hoists for 30 light arrays.

Often different productions are performed in the matinee and the evening and the RSC has just two hours to complete the changeover, so it must be swift and easy to control.

The theatre renovation was designed to bring actors and audiences closer together with stage remodeling and lighting effects that could only be achieved with the cutting-edge electronics offered by Trekwerk and Control Techniques.

The Solution

A total of 46 drives were fitted to 60 winches with at least half positioned above the thrust stage.

Any of these could be configured for different duties from lifting scenery to controlling actors' 'flight'. Sixteen of these winches were positioned in the 'slot area' specifically for reconfiguring the stage and 14 unique Trekwerk Synchro Disc winches provided silent five-line lifting of the 'flybars' for rapid scenery changes during productions.

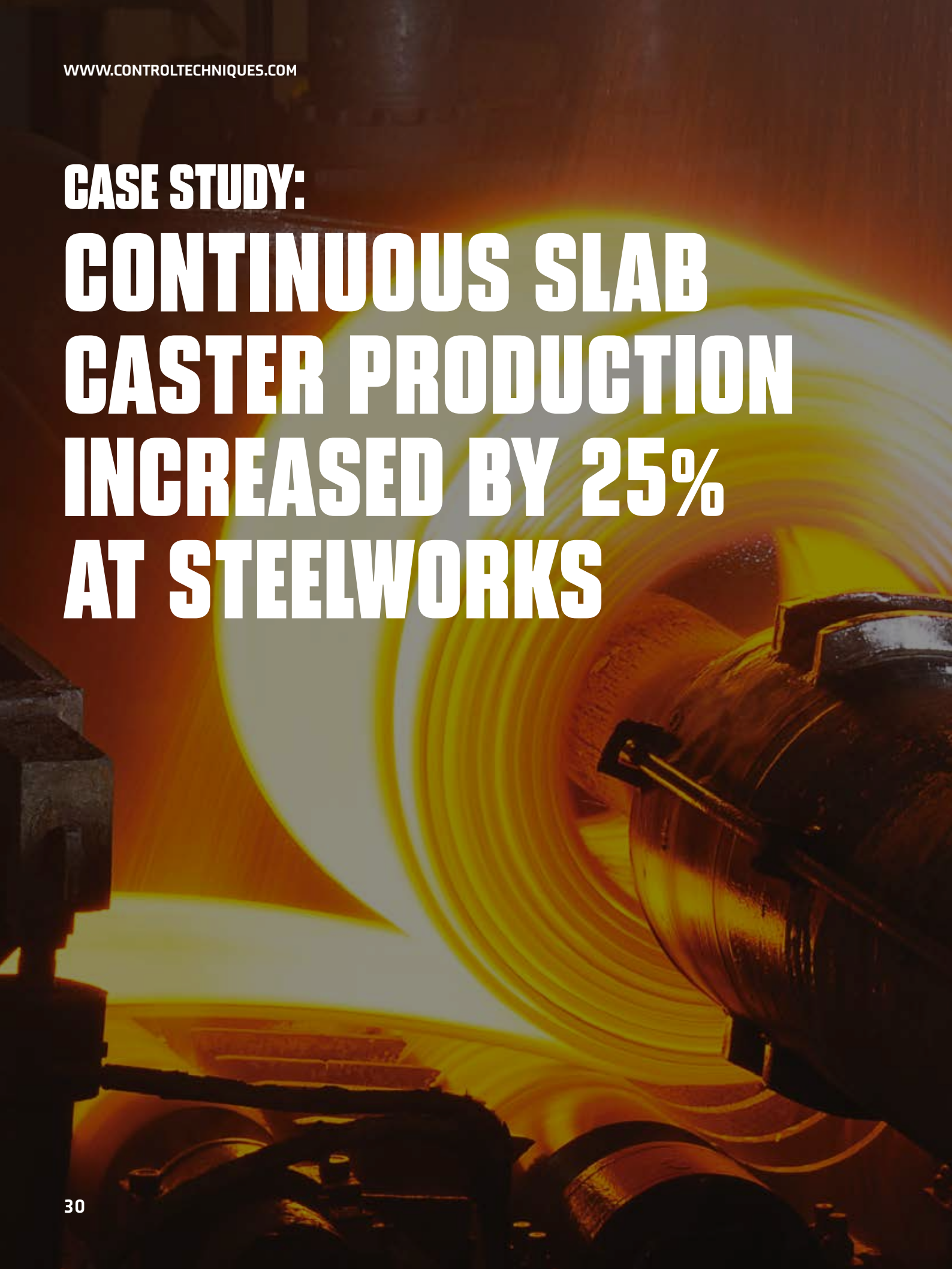
All of the winches were fitted with Control Techniques 20 hp (15 kW) Unidrive AC drives operating in servo mode and twinned with Unimotor 190 fm servo motors, fitted with double encoders for precise positioning and speed control.

The Benefits

All drives communicate with each other using Control Techniques' own high-speed network, as well as communicating with the Trekwerk control system.

Three TNM control desks were pre-programmed with all critical movements for each performance and override joy-stick control can be used to provide manual speed up/slow down control to maintain synchronicity.

The detailed motor movements are programmed within the second processor module in each drive, and all programmed movements can be reviewed in the 3D graphics within the control system to flag up any potential problems and eliminate any chance of collisions.



CASE STUDY: CONTINUOUS SLAB CASTER PRODUCTION INCREASED BY 25% AT STEELWORKS

Control Techniques drives feature on the continuous lab caster at Corus steelworks in Port Talbot, South Wales, controlling critical operations at the head of the line The total output of the plant, up to 3.5 million tons a year, is dependent on drives from Control Techniques.

The Challenge

Continuous Caster 3 (CC3) was a completely new operation, designed to increase plant output 25%.

Previous contracts for Control Techniques had been upgrades, re-utilizing existing DC drives. On this project, the team considered the potential benefits of reduced motor maintenance and the reduced downtime from a switch to AC.

The Solution

Two new AC Drive Motor Control Centers (Form 4 MCCs), employing 60 AC Unidrive variable speed drives and Leroy Somer AC motors were supplied.

New AC motors were also supplied by Control Techniques fitted with digital encoders and brakes on the vertical part of the caster. The drive control included on-board intelligence/specific application software, part of which included closed loop to open loop changeover in the event of a feedback device failure, thus ensuring the Caster continues to run.

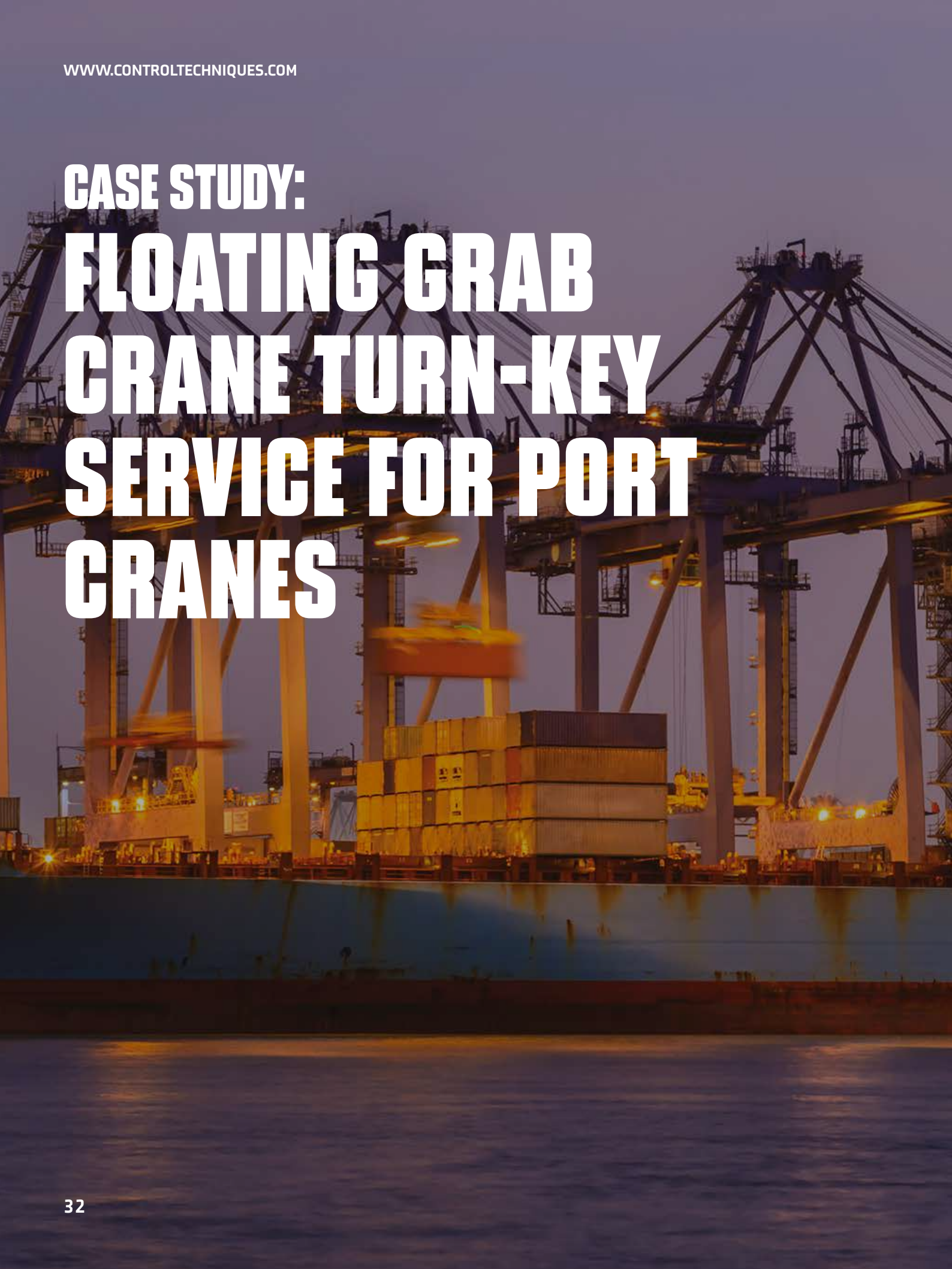
The Benefits

Key to the success was the PID-based load sharing system, pre-programmed into each Unidrive AC drive, using the on-board facility of the plug-in application modules.

The software's success, with reduced wear and tear and more consistent casting speed, is evident in the motor current trends. Rethread times are also much faster, with any limitations being factors other than the drives/electrics on the strands, the end result is a much more stable and reliable drive control system and superior speed control, leading to greater productivity and improved product quality.

"The whole system is more modular. The intelligence in the system is distributed rather than central, and this means that just one Unidrive is designated as the master and communicates with the plant PLC. *This Master then communicates with all the other strand drives, keeping them digitally synchronized. For reasons of dual redundancy, "Automatic Seamless Master Transfer"– passes Master control to the next drive in line, in the event of failure. This means that, if necessary, the line could be run manually."*

Roger Morgan | Corus Concast Engineer



CASE STUDY: FLOATING GRAB CRANE TURN-KEY SERVICE FOR PORT CRANES

Four floating grab cranes in Amsterdam, mainly used for ship to quay bulk handling, have been retrofitted with drives from Control Techniques. The two 16-ton cranes with Unidrive AC variable speed drives, the two 25-ton cranes have been fitted with Mentor DC drives.

The Challenge

On conventional cranes the slewing motion is controlled by a system of slip-ring motors and rotor resistors, which doesn't work well at low speeds.

The sudden changes in torque between resistor steps waste energy and the system requires regular maintenance. When replacing the slip-ring motors with a modern drive system the results can be disappointing. It is almost impossible to control the swaying of a crane's load with a conventional speed-controlled drive system hence why a different solution was sought.

The Solution

Control Techniques provided a turn-key service, including design, engineering, software & programming, the building the panels, final installation & on-site commissioning at IGMA Amsterdam.

Squirrel cage AC motors controlled the movements of the hoist/grab closing (2x215 hp) driven by 2 large frame Unidrives, and the luffing (1x50 hp) and slewing (2x 50hp) were driven by a 75 hp Unidrive. It is a standard drive system configuration with a single quadrant rectifier and brake choppers.

A diode bridge rectifier supplies the inverters for hoist, slewing and luffing via a common DC-bus giving high reliability. Large brake choppers are required to convert potential energy stored in the hoisting system, or kinetic energy stored in the moving masses, into heat, since no regeneration into the grid can take place. The brake resistors are mounted outside the control panel. The crane control system requirements include slewing control, grab hoisting and closing and load dependent speed control on the hoist movement. The software functionality was achieved without a PLC, using the integrated software solution inside a plug-in programmable application module built-in to the drive.

The Benefits

The innovative solution provided cost savings by eliminating the need for an additional PLC.

And met all of the needs of crane builder – standard sizes, ease of programming and energy efficiency – and the needs of the user of exceptional reliability, flexibility in operation, ease of maintenance, safety and low spares requirement.

Cost savings | **Easy to maintain** | **Extremely reliable** | **Energy efficient** | **Easy to program**

UNIDRIVE

SPECIFICATIONS

Environmental safety and electrical conformance
IP20 / NEMA1 / UL TYPE 1 (UL open class as standard, additional kit needed to achieve Type 1)
Frames 3 to 8 achieve IP65 / NEMA4 / UL TYPE 12 rating on the rear of the drive when through panel mounted
Frames 9, 10 & 11 achieve IP55 / NEMA4 / UL TYPE 12 rating on the rear of the drive when through panel mounted
Ambient temperature -4 °F to 104 °F (-20 °C to 40 °C) as standard. Up to 131 °F (55 °C) with derating
Humidity 95 % maximum (non-condensing) at 104 °F (40 °C)
Altitude: 0 to 9900 ft (3000 m), derate 1 % per 330 ft (100 m) between 3300 ft (1000 m) and 9900 ft (3000 m)
Random Vibration: Tested in accordance with IEC 60068-2-64
Mechanical Shock Tested in accordance with IEC 60068-2-29
Storage temperature -40 °F to 131 °F (-40 °C to 55 °C) or up to 158 °F (70 °C) for short-term storage
Electromagnetic Immunity complies with EN 61800-3 and EN 61000-6-2
With onboard EMC filter, complies with EN 61800-3 (2nd environment)
EN/IEC 61000-6-3 and EN/IEC 61000-6-4 with optional footprint EMC filter
EN/IEC 61800-5-1 (Electrical Safety)
EN/IEC 61131-2 I/O
Safe Torque Off, independently assessed by TÜV to IEC 61800-5-2 SIL 3 and EN ISO 13849-1 PLe
UL 508C (Electrical Safety)

Features and specification table		M600	M700	M701	M702
Performance	Current loop update: 62 µs	✓	✓	✓	✓
	Heavy Duty peak rating: 200 % (3 s)	✓	✓	✓	✓
	Maximum output frequency: 599 Hz (open loop), 550 Hz (RFC-A & RFC-S)	✓	✓	✓	✓
	Switching frequency range: 2, 3, 4, 6, 8, 12, 16 kHz (3 kHz default)	✓	✓	✓	✓
	High performance current controllers	–	✓	✓	✓
On-board intelligence	Programmable Logic Control (PLC)	✓	✓	✓	✓
	Real-time tasks	✓	✓	✓	✓
	Digital lock control	✓	✓	✓	✓
	Advanced Motion Controller	–	✓	✓	✓
On-board comms	Ethernet (2 switched ports): EtherNet/IP, Modbus/TCP, RTMoE and PROFINET RT	–	✓	–	✓
	RS485: Modbus RTU	✓	–	✓	–
Mechanical attributes	Tile mounting on sizes 3, 4, 5	✓	✓	✓	✓
	Unidrive SP compatible mechanical footprint	✓	✓	✓	✓
	Common DC bus connections	✓	✓	✓	✓

Features and specification table		M600	M700	M701	M702
Parameter back-up	Ethernet	–	✓	–	✓
	Serial port cloning	✓	✓	✓	✓
	SD card (using SD-Card Adaptor)	✓	✓	✓	✓
	Smartcard reader support	✓	✓	✓	✓
	Electronic motor nameplate parameter storage (HIPERFACE, EnDat 2.2)	–	✓	✓	✓
Feedback	Encoder and resolver feedback input	-	2	2	2
	Simulated encoder output	-	1	1	1
	Optional SI-Encoder/SI-Universal Encoder	✓	✓	✓	✓
On-board I/O	Analog input	3	3	3	-*
	Analog output	2	2	2	-
	Digital input	3	3	3	2*
	Digital output	-	-	-	2
	Bidirectional digital input or output	3	3	3	-
	Relay output	1	1	1	1
Machine Safety	Single-channel Safe Torque Off (STO) input, certified to SIL3 / PLe	✓	✓	✓	–
	Dual-channel Safe Torque Off (STO) inputs, certified to SIL3 / PLe	–	–	–	✓
Power and motor control	Stationary autotune for permanent magnet motors	✓	✓	✓	✓
	Mechanical load resonance compensation	–	✓	✓	✓
	Wide operating range back-up DC supply	✓	✓	✓	✓
	24 V control back-up	✓	✓	✓	✓
Other	Temperature controlled fan operation with user adjustable speed limit	✓	✓	✓	✓
	User replaceable fan(s)	✓	✓	✓	✓
	Conformal coating	✓	✓	✓	✓
	Standby mode (energy saving)	✓	✓	✓	✓

*Terminal 8 on the Unidrive M702, by default, is set as a digital input but can be configured as a motor protection thermistor input

Overload ratings by operating mode				
Operating mode	RFC from cold	RFC from 100 %	Open loop from cold	Open loop from 100 %
Normal duty overload with motor rated current = drive rated current (size 11 and below)	110 % for 165 s	110 % for 9 s	110% for 165 s	110% for 9 s
Normal duty overload with motor rated current = drive rated current (size 12)	110 % for 180 s	110 % for 10 s	110 % for 180 s	110 % for 10 s
Heavy duty overload with motor rated current = drive rated current (size 9A, 9E, 10, 11)	170 % for 42 s	170 % for 5 s	150 % for 60 s	150% for 7 s
Heavy duty overload with motor rated current = drive rated current (size 12)	140 % for 60 s	140 % for 10 s	140 % for 60 s	140 % for 10 s

UNIDRIVE
ORDERING GUIDE

Frame size	Dimensions H x W x D in (mm)	Weight lb (kg)	DC Bus Choke/AC Line Choke	
			Internal	External
3	14.4 x 3.3 x 7.9 (365 x 83 x 200)	9.9 (4.5)	✓	–
4	14.4 x 4.9 x 7.9 (365 x 124 x 200)	14.3(6.5)	✓	–
5	14.4 x 5.6 x 7.6 (365 x 143 x 200)	16.3(7.4)	✓	–
6	14.4 x 8.3 x 8.9 (365 x 210 x 227)	30.9 (14)	✓	–
7	20 x 10.6 x 11.0 (508 x 270 x 280)	61.7 (28)	✓	–
8	29.7 x 12.2 x 11.4 (753 x 310 x 290)	114.6 (52)	✓	–
9A	41.3 x 12.2 x 11.4 (1049 x 310 x 290)	66.5 (146.6)	✓	–
9E	41.3 x 12.2 x 11.4 (1010 x 310 x 290)	101.4 (46)	–	✓
10E	41.3 x 12.2 x 11.4 (1010 x 310 x 290)	101.4 (46)	–	✓
11E	46.9 x 12.2 x 12.3 (1190 x 310 x 312)	138.9 (63)	–	✓
12	68.9 x 11.6 x 20.7 (1750 x 295 x 526)	286.6 (130)	-	✓

PRODUCT CODE STRUCTURE

M700 03 4 0073 A 10101A B 100

Drive Range
M700 = Multi-protocol
M701 = RS485 Modbus RTU
M702 = Safety enhanced
M600 = Open loop
M000= Unassigned power module*

Frame Size

Voltage Rating
2 = 230 V
4 = 460 V
5 = 575 V
6 = 690 V

Current Rating (A):
Heavy Duty
Rating x 10

A = AC in AC out (with internal line choke)
D = DC in AC out (inverter)
E = AC in AC out (external line choke required)
T = AC in AC out (12 pulse rectifier plus inverter)

B = Brake Transistor included
N = No Brake Transistor

*M000 drives require additional control modules, see page 41

UNIDRIVE

MODEL NUMBER AND RATINGS

200/240 VAC +/-10%

Product Code M600/M700/M701/M702	Supply Phases	Heavy Duty			Normal Duty		
		Max Cont. Current (A)	Motor Power (kW)	Motor Power (hp)	Max Cont. Current (A)	Motor Power (kW)	Motor Power (HP)
Mxxx - 03200050A	3	5	0.75	1	6.6	1.1	1.5
Mxxx - 03200066A	3	6.6	1.1	1.5	8	1.5	2
Mxxx - 03200080A	3	8	1.5	2	11	2.2	3
Mxxx - 03200106A	3	10.6	2.2	3	12.7	3	3
Mxxx - 04200137A	3	13.7	3	3	18	4	5
Mxxx - 04200185A	3	18.5	4	5	24	5.5	7.5
Mxxx - 05200250A	3	25	5.5	7.5	30	7.5	10
Mxxx - 06200330A	3	33	7.5	10	50	11	15
Mxxx - 06200440A	3	44	11	15	58	15	20
Mxxx - 07200610A	3	61	15	20	75	18.5	25
Mxxx - 07200750A	3	75	18.5	25	94	22	30
Mxxx - 07200830A	3	83	22	30	117	30	40
Mxxx - 08201160A	3	116	30	40	149	37	50
Mxxx - 08201320A	3	132	37	50	180	45	60
Mxxx - 09201760A	3	176	45	60	216	55	75
Mxxx - 09202190A	3	219	55	75	266	75	100
Mxxx - 09201760E	3	176	45	60	216	55	75
Mxxx - 09202190E	3	219	55	75	266	75	100
Mxxx - 10202830E	3	283	75	100	325	90	125
Mxxx - 10203000E	3	300	90	125	360	110	150

380/480 VAC +/-10%

Product Code M600/M700/M701/M702	Supply Phases	Heavy Duty			Normal Duty		
		Max Cont. Current (A)	Motor Power (kW)	Motor Power (hp)	Max Cont. Current (A)	Motor Power (kW)	Motor Power (hp)
Mxxx - 03400025A	3	2.5	0.75	1	3.4	1.1	1.5
Mxxx - 03400031A	3	3.1	1.1	1.5	4.5	1.5	2
Mxxx - 03400045A	3	4.5	1.5	2	6.2	2.2	3
Mxxx - 03400062A	3	6.2	2.2	3	7.7	3	5
Mxxx - 03400078A	3	7.8	3	5	10.4	4	5
Mxxx - 03400100A	3	10	4	5	12.3	5.5	7.5
Mxxx - 04400150A	3	15	5.5	10	18.5	7.5	10
Mxxx - 04400172A	3	17.2	7.5	10	24	11	15
Mxxx - 05400270A	3	27	11	20	30	15	20
Mxxx - 05400300A	3	30	15	20	31	15	20
Mxxx - 06400350A	3	35	15	25	38	18.5	25
Mxxx - 06400420A	3	42	18.5	30	48	22	30
Mxxx - 06400470A	3	47	22	30	63	30	40
Mxxx - 07400660A	3	66	30	50	79	37	50
Mxxx - 07400770A	3	77	37	60	94	45	60
Mxxx - 07401000A	3	100	45	75	112	55	75
Mxxx - 08401340A	3	134	55	100	155	75	100
Mxxx - 08401570A	3	157	75	125	184	90	125
Mxxx - 09402000A	3	200	90	150	221	110	150
Mxxx - 09402240A	3	224	110	150	266	132	200
Mxxx - 09402000E	3	200	90	150	221	110	150
Mxxx - 09402240E	3	224	110	150	266	132	200
Mxxx - 10402700E	3	270	132	200	320	160	250
Mxxx - 10403200E	3	320*	160	250	361	200	300
Mxxx - 11403770E	3	377	185	300	437	225	350
Mxxx - 11404170E	3	417*	200	350	487*	250	400
Mxxx - 11404640E	3	464*	250	400	507*	280	450
M000 - 12404800T	3	480	250	400	608*	315	500
M000 - 12405660T	3	566	315	450	660	355	550
M000 - 12406600T	3	660*	355	550	755*	400	650
M000 - 12407200T	3	720*	400	600	865*	500	700

*At 2 kHz switching frequency

500/575 VAC +/-10%

Product Code M600/M700/M701/M702	Supply Phases	Heavy Duty			Normal Duty		
		Max Cont. Current (A)	Motor Power (kW)	Motor Power (hp)	Max Cont. Current (A)	Motor Power (kW)	Motor Power (hp)
Mxxx - 05500030A	3	3	1.5	2	3.9	2.2	3
Mxxx - 05500040A	3	4	2.2	3	6.1	4	5
Mxxx - 05500069A	3	6.9	4	5	10	5.5	7.5
Mxxx - 06500100A	3	10	5.5	7.5	12	7.5	10
Mxxx - 06500150A	3	15	7.5	10	17	11	15
Mxxx - 06500190A	3	19	11	15	22	15	20
Mxxx - 06500230A	3	23	15	20	27	18.5	25
Mxxx - 06500290A	3	29	18.5	25	34	22	30
Mxxx - 06500350A	3	35	22	30	43	30	40
Mxxx - 07500440A	3	44	30	40	53	45	50
Mxxx - 07500550A	3	55	37	50	73	55	60
Mxxx - 08500630A	3	63	45	60	86	75	75
Mxxx - 08500860A	3	86	55	75	108	90	100
Mxxx - 09501040A	3	104	75	100	125	110	125
Mxxx - 09501310A	3	131	90	125	150	110	150
Mxxx - 09501040E	3	104	75	100	125	110	125
Mxxx - 09501310E	3	131	90	125	150	110	150
Mxxx - 10501520E	3	152	110	150	200	130	200
Mxxx - 10501900E	3	190	132	200	200	150	200
Mxxx - 11502000E	3	200	150	200	248	185	250
Mxxx - 11502540E	3	254*	185	250	288*	225	300
Mxxx - 11502850E	3	285*	225	300	315*	250	350
M000 - 12503150	3	315	250	350	360	250	350
M000 - 12503600	3	360	250	350	410	300	400
M000 - 12504100	3	410	300	400	460	330	450
M000 - 12504600	3	460	330	450	510	370	500

*At 2 kHz switching frequency

690 VAC +/-10%

Product Code M600/M700/M701/M702	Supply Phases	Heavy Duty			Normal Duty		
		Max Cont. Current (A)	Motor Power (kW)	Motor Power (hp)	Max Cont. Current (A)	Motor Power (kW)	Motor Power (hp)
Mxxx - 07600190A	3	19	15	20	23	18.5	25
Mxxx - 07600240A	3	24	18.5	25	30	22	30
Mxxx - 07600290A	3	29	22	30	36	30	40
Mxxx - 07600380A	3	38	30	40	46	37	50
Mxxx - 07600440A	3	44	37	50	52	45	60
Mxxx - 07600540A	3	54	45	60	73	55	75
Mxxx - 08600630A	3	63	55	75	86	75	100
Mxxx - 08600860A	3	86	75	100	108	90	125
Mxxx - 09601040A	3	104	90	125	125	110	150
Mxxx - 09601310A	3	131	110	150	150	132	175
Mxxx - 09601040E	3	104	90	125	125	110	150
Mxxx - 09601310E	3	131	110	150	155	132	175
Mxxx - 10601500E	3	150	132	175	172	160	200
Mxxx - 10601780E	3	178	160	200	197	185	250
Mxxx - 11602100E	3	210	185	250	225	200	250
Mxxx - 11602380E	3	238*	200	250	275*	250	300
M000 - 12603150	3	315	280	500	360	355	550
M000 - 12603600	3	360	355	550	410	400	600
M000 - 12604100	3	410	400	600	460	450	650
M000 - 12604600	3	460	450	650	510	500	700

*At 2 kHz switching frequency

ACCESSORIES
ORDERING GUIDE

Optional Drive Programming and Operator Interface		Part No.
Connect PC Tool		
Machine Control Studio PC Software		
PowerTools Studio PC Software		
KI-Keypad		82400000016000
KI-Keypad RTC		82400000016300
Remote Keypad		82500000000001
Remote keypad RTC		82400000019600
Operator Interface (HMI)		eSMART04-MCh040 eSMART07M-MCh070
Smartcard		2214-0010
SD card using SD Card Adaptor		82400000016400
KI-485 Adaptor		82500000000003

Control Modules for M000 Modular Drives		Part No.
M600 / 700 / 701 / 702 Standard		MXXX-STANDARD00011100A01000
M600 / 700 / 701 / 702 Master		MXXX-MASTER00011100A01000
F600 Standard		F600-STANDARD00011100A01000
F600 Master Controller		F600-MASTER00011100A01000
H300 Standard		H300-STANDARD00011100A01000
H300 Master Controller		H300-MASTER00011100A01000
Follower Control		M000-FOLLOWER011100A0100

System Integration Modules			Part No.
Optional Input/Output	Remote I/O (M700/M701/M702 only)		
	SI-I/O		82400000017800
Applications with PLC or Motion Functionality	SI-Applications Plus compatible module which allows existing SyPTPro application programs to be re-compiled for M700		82400000016500
	SI-Apps Compact		82400000020700
	MCi200 Advanced machine control using industry standard IEC61131-3 programming languages		82400000017000
	MCi210 Extended advanced machine control using industry standard IEC61131-3 programming languages with simultaneous Connectivity to 2 separate Ethernet networks		82400000016700
	PTi210 Motion Made Easy module		82400000021400
Communications	SI-EtherCAT		82400000018000
	SI-PROFIBUS		82400000017500
	SI-Ethernet		82400000017900
	SI-DeviceNet		82400000017700
	SI-CANopen		82400000017600
	SI-PROFINET		82500000018200
	SI-POWERLINK		82400000021600
	SI-INTERBUS 500kbps		82400000021220
	SI-INTERBUS 2Mbps		82400000021230
Feedback	SI-Encoder		82400000018110
	SI-Universal Encoder		82400000018300
Safety	MiS210		82400000021100

Auxiliary Components	Frame Size	Part No.
Internal brake resistor	3	1220-2752
	4 & 5	1299-0003
DC bus paralleling kit	3	3470-0048
	4	3470-0061
	5	3470-0068
	6	3470-0063
	6 (connect to frame 3,4 & 5)	3470-0111
Through hole IP65 kit	3	3470-0053
IP65 / UL TYPE 12 rating is achieved on the rear of the drive when through panel mounted using the following kits.	4	3470-0056
	5	3470-0067
	6	3470-0055
	7	3470-0079
	8	3470-0083
Through hole IP55 kit	9A	3470-0119
IP55 / UL TYPE 12 rating can be achieved for frame sizes 9A and 9E using the following kits:	9E & 10E	3470-0105
	10D Inverter	3470-0108
	10C Rectifier	3470-0106
	11E & 11T	3470-0126
	11D Inverter	3470-0130
	11C Rectifier	3470-0123
UL type 1 conduit kit	3 & 4	6521-0071
	5	3470-0069
	6	3470-0059
	7	3470-0080
	8 & 9A	3470-0088
	9E & 10	3470-0115
	11	3470-0136

Auxiliary Components	Frame Size	Part No.
These mounting brackets ensure the drive can be mounted on existing Unidrive SP surface mount & Commander SK installations.	4	3470-0062
	5	3470-0066
	6	3470-0074
	7	3470-0078
	8	3470-0087
	9A (M700 only), 9E & 10	3470-0118
Finger-guard grommet	9 & 10	3470-0107
Lifting tool	8 & 9A	7778-0045
	9E, 10 & 11	7778-0016
Fan replacement kit	1	3470-0092
	2	3470-0095
	3	3470-0099
	4	3470-0103
Cable grommet kit	7	3470-0086
	8 - Single cable	3470-0089
	8 - Dual cable	3470-0090
	9A, 9E, 10 & 11	3470-0107
Tile mount kit	3	3470-0049
	4	3470-0060
	5	3470-0073
General kit items	Keypad blanking cover (10 pieces in pack)	3470-0058
	Frame size 3 & 4 power connector split kit	3470-0064
	I/O commissioning extender adaptor	3000-0009

Auxiliary Components	Frame Size	Part No.
Optional external EMC filters		
Unidrive M built-in EMC filter complies with EN 61800-3. External EMC filters are required for compliance with EN 61000-6-4.	3 - 230 V	4200-3230
	3 - 460 V	4200-3480
	4 - 230 V	4200-0272
	4 - 460 V	4200-0252
	5 - 230 V	4200-0312
	5 - 460 V	4200-0402
	5 - 575 V	4200-0122
	6 - 230 V	4200-2300
	6 - 460 V	4200-4800
	6 - 575 V	4200-3690
	7 - 460 V	4200-1132
	7 - 575/690 V	4200-0672
	8 - 460 V	4200-1972
	8 - 575/690 V	4200-1662
	9A - 460 V	4200-3021
	9A - 575/690 V	4200-1660
	9E & 10 - 460 V	4200-4460
	9E & 10 - 575/690 V	4200-2210
	11 - 460 V	4200-0400
	11 - 575/690 V	4200-0690

Frame 12 Kits and accessories	Description	Part No.
	Input wiring kit VX25/TS8	6772-0006
	Output wiring kit VX25/TS8	6772-0007
	Ground kit VX25/TS8	6772-0008
	Fitting kit VX25	6772-0009
	+/- DC input busbar kit	6772-0012
	Pallet truck lifting kit VX25/TS8	6500-0159
	Pallet kit ramp VX25/TS8	6500-0158
	External brake chopper	GTBU580F
	TS8 fitting kit	6772-0010

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70
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Group Turnover

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Countries

300+
Companies

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