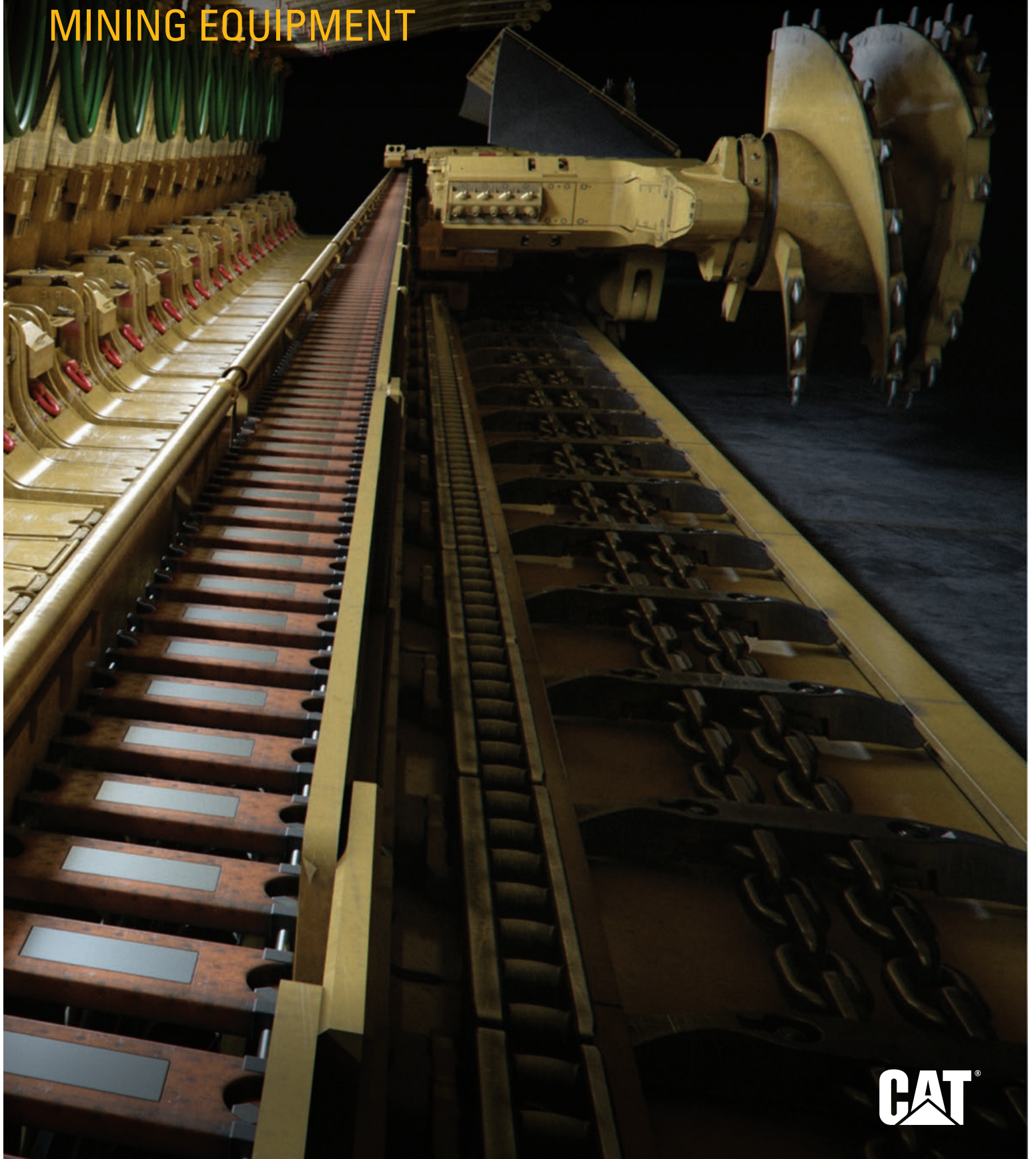


# LONGWALL

MINING EQUIPMENT



CAT<sup>®</sup>



# END-TO-END SOLUTIONS BACKED BY UNPARALLELED SUPPORT

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Longwall miners are always on the lookout for new ways to mine better — more efficiently and effectively, safely and sustainably, productively and profitably. Caterpillar is the partner that can help them succeed. But we don't do it alone.

Our quality machines and automation technologies are backed by beyond-the-iron services and support solutions that leverage the broad expertise of our Cat dealers and longwall mining experts. And every solution we provide is developed together with our customers and customized to meet the needs of their specific application.



## **BETTER LONGWALL MINING**

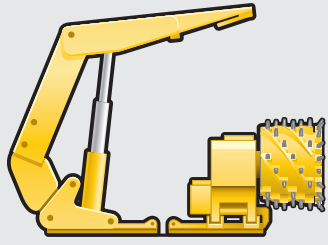
Whatever your geological conditions, seam height or production goals, there's a Cat longwall solution for you. Adapted to the mining challenges faced by our customers today, Cat customized equipment solutions for longwall mining include high-horsepower shearers, automated plow systems and armored face conveyors with intelligent drive technology—controlled and supported by advanced longwall automation. We deliver your equipment of choice—from low to high seam heights, for the longest longwalls and highest production demands.

The quality and reliability of the automation system are key to the success of a longwall mining operation. Caterpillar is the only manufacturer able to provide a complete modular family of powerful controllers that integrate fully with Cat longwall equipment. The Cat PMC® family of Programmable Mining Controls offers one-stop shopping for all the controls, sensors and components a successful longwall system needs. There are no interfacing problems and products are customized to meet your needs.



# SHEARERS

The shearer is the heart of your longwall operation, working around the clock to cut away the face and keep the whole system productive.



## SHEARER PRODUCT LINE

MODEL NO.	SEAM RANGE
EL1000	1.6–3.9 m (63–156 in)
EL2000	1.8–4.5 m (71–177 in)
EL3000	2.5–5.5 m (98–217 in)

High installed power and machine mass for the toughest cutting conditions

### **MORE UPTIME:**

Redundancy and high safety factors ensure maximum reliability

### **PROVEN RELIABILITY:**

Modular mainframe for maximum protection of gearboxes and flameproof enclosures

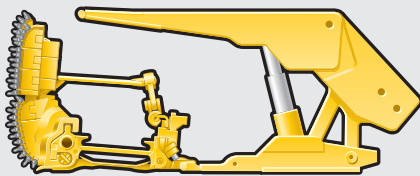
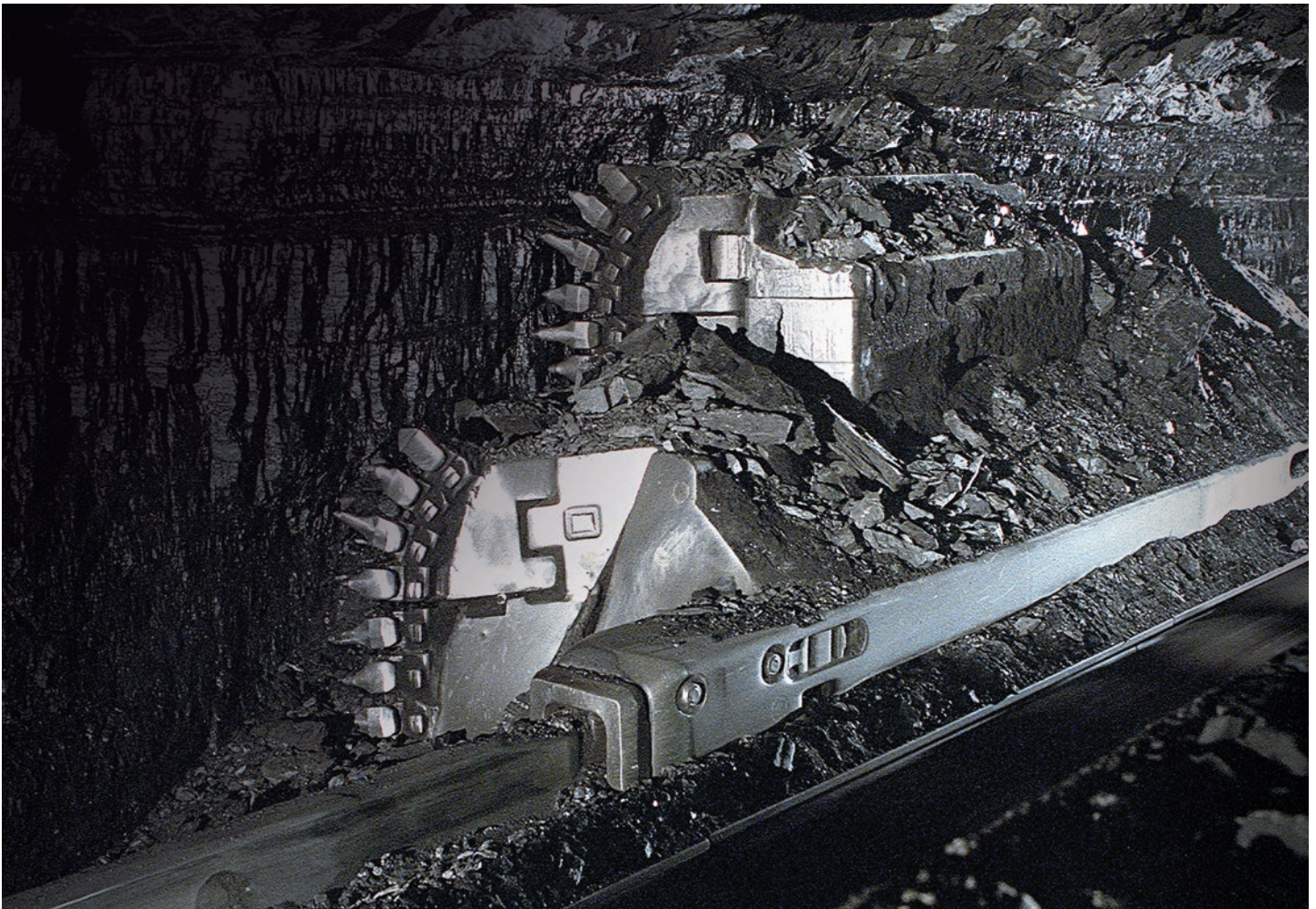
High machine weight to cope with the toughest cutting conditions



A large, heavy-duty mining plow is shown in operation, cutting through a coal seam. The plow is a massive, yellowish-brown metal structure with a series of sharp, pointed cutting edges. It is positioned in a dark, underground tunnel, with the coal seam being cut on the left side. The background shows the rough, rocky walls of the tunnel and some distant lights.

# PLOWS

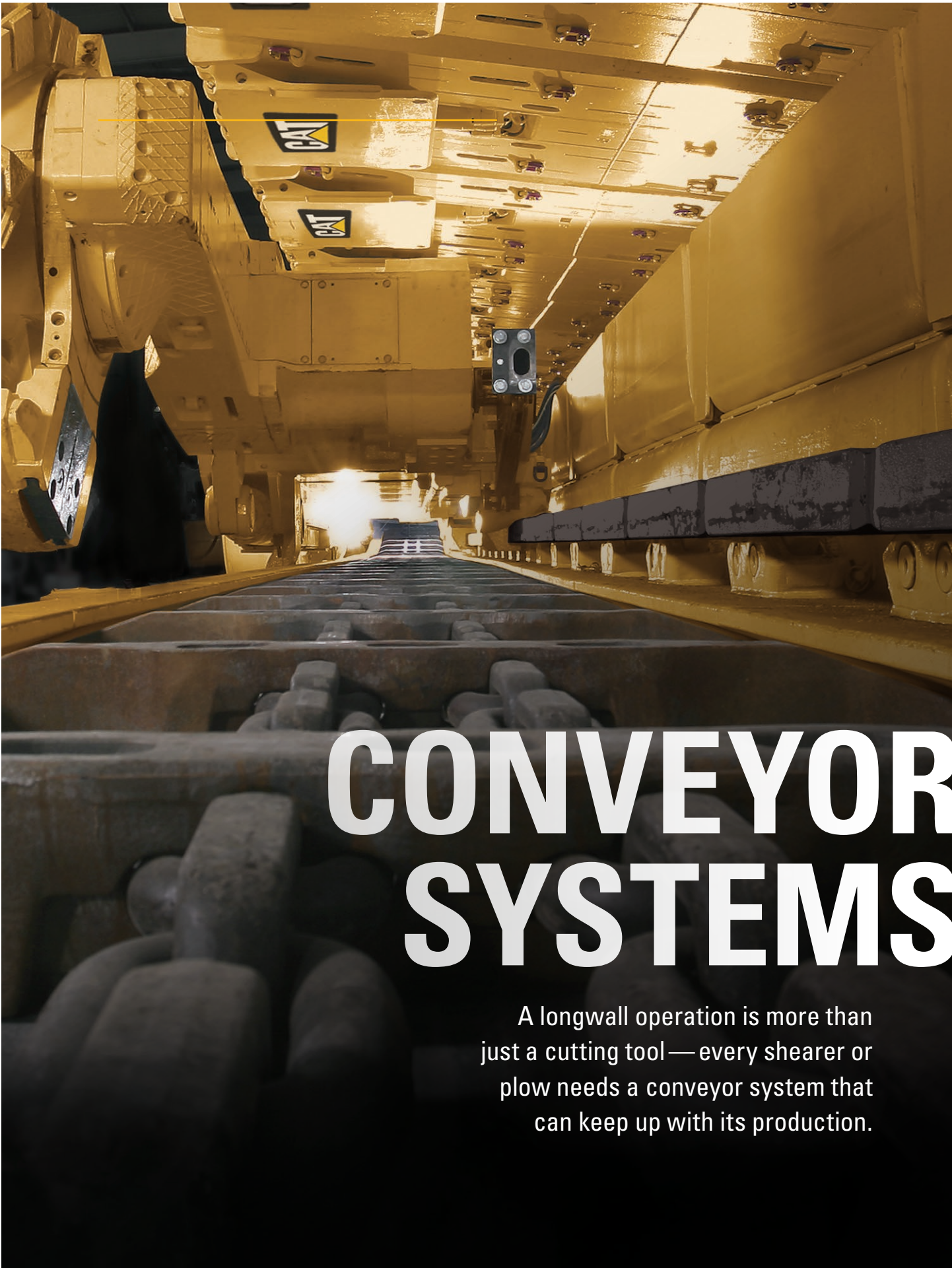
For small and medium seams, a plow system can be less expensive and more productive than a shearer.



### PLOW PRODUCT LINE

MODEL NO.	CUTTING HEIGHT
RHH800	0.6–1.6 m (23.6–63 in)
GH800B	0.75–2.0 m (29.5–79 in)
GH800	1.0–2.0 m (39.4–79 in)
GH1600	1.1–2.3 m (43–90.5 in)

Cat plows offer record-setting production in a compact, durable frame. With unmatched power and precise control systems, these cutting machines are a cost-effective alternative for many mines. In coal seam heights below 1.8 m (71 in), the plow is more productive than a shearer.

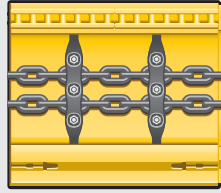


# CONVEYOR SYSTEMS

A longwall operation is more than just a cutting tool — every shearer or plow needs a conveyor system that can keep up with its production.



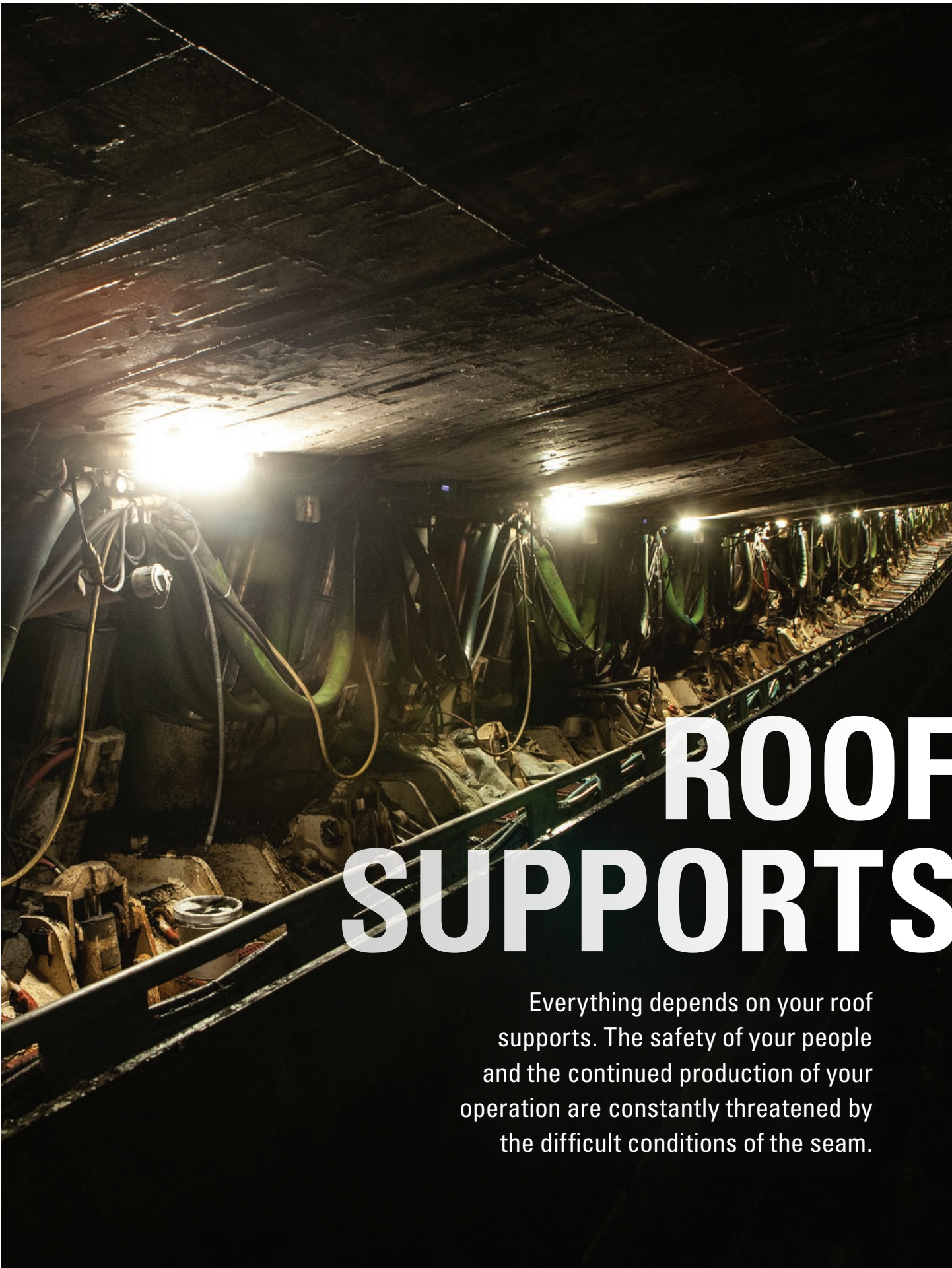
Cat Armored Face Conveyors (AFC) are built tough for a long, reliable life, and their powerful drives allow them to match the production of your operation to keep things running smoothly.



## CONVEYOR SYSTEM PRODUCT LINE

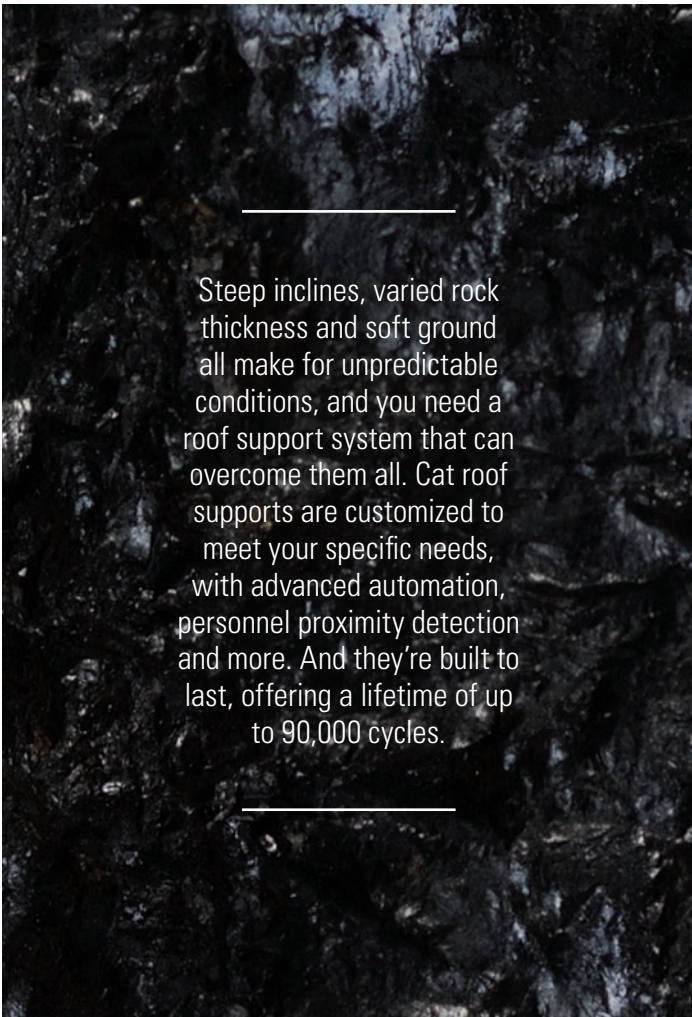
LINE PAN MODEL	PRODUCTION AVERAGE PER HOUR
PF3	1 300 tonnes / 1,433 tons
PF4	1 800 tonnes / 1,984 tons 2 500 tonnes / 2,756 tons 3 500 tonnes / 3,858 tons
PF5 & PF6	2 500 tonnes / 2,756 tons 3 500 tonnes / 3,858 tons 5 000 tonnes / 5,512 tons
PF HD	1800 tonnes (1,984 tons) 2500 tonnes (2,756 tons) 3500 tonnes (3,858 tons) 5000 tonnes (5,512 tons)
PF7	6 200 tonnes / 6,800 tons



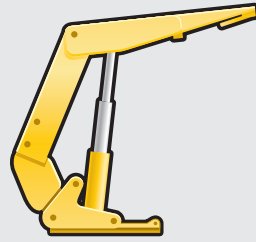


# ROOF SUPPORTS

Everything depends on your roof supports. The safety of your people and the continued production of your operation are constantly threatened by the difficult conditions of the seam.



Steep inclines, varied rock thickness and soft ground all make for unpredictable conditions, and you need a roof support system that can overcome them all. Cat roof supports are customized to meet your specific needs, with advanced automation, personnel proximity detection and more. And they're built to last, offering a lifetime of up to 90,000 cycles.



## ROOF SUPPORT PRODUCT LINE

CAT ROOF SUPPORTS SEAM RANGES FROM  
0.8–7.5 m (1.8–24.5 ft) and above

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WIDTHS FROM  
1.50 m | 1.75 m | 2.05 m / (59 in | 69 in | 81 in)

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SUPPORT CAPACITY  
1 750 tonnes / (1,929 tons)

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LIFETIME  
up to 90,000 cycles

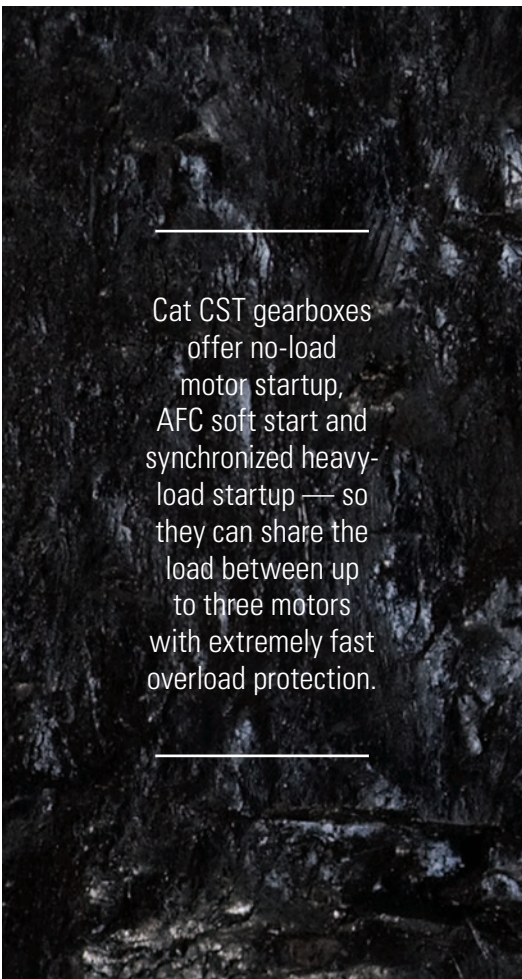
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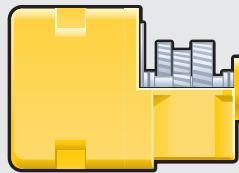
# CST GEARBOXES

A longwall conveyor system has to carry heavy loads, but coal doesn't always fall onto the conveyor in predictable, even amounts. The ability to respond quickly to overloading is critical and can protect your system from damage.





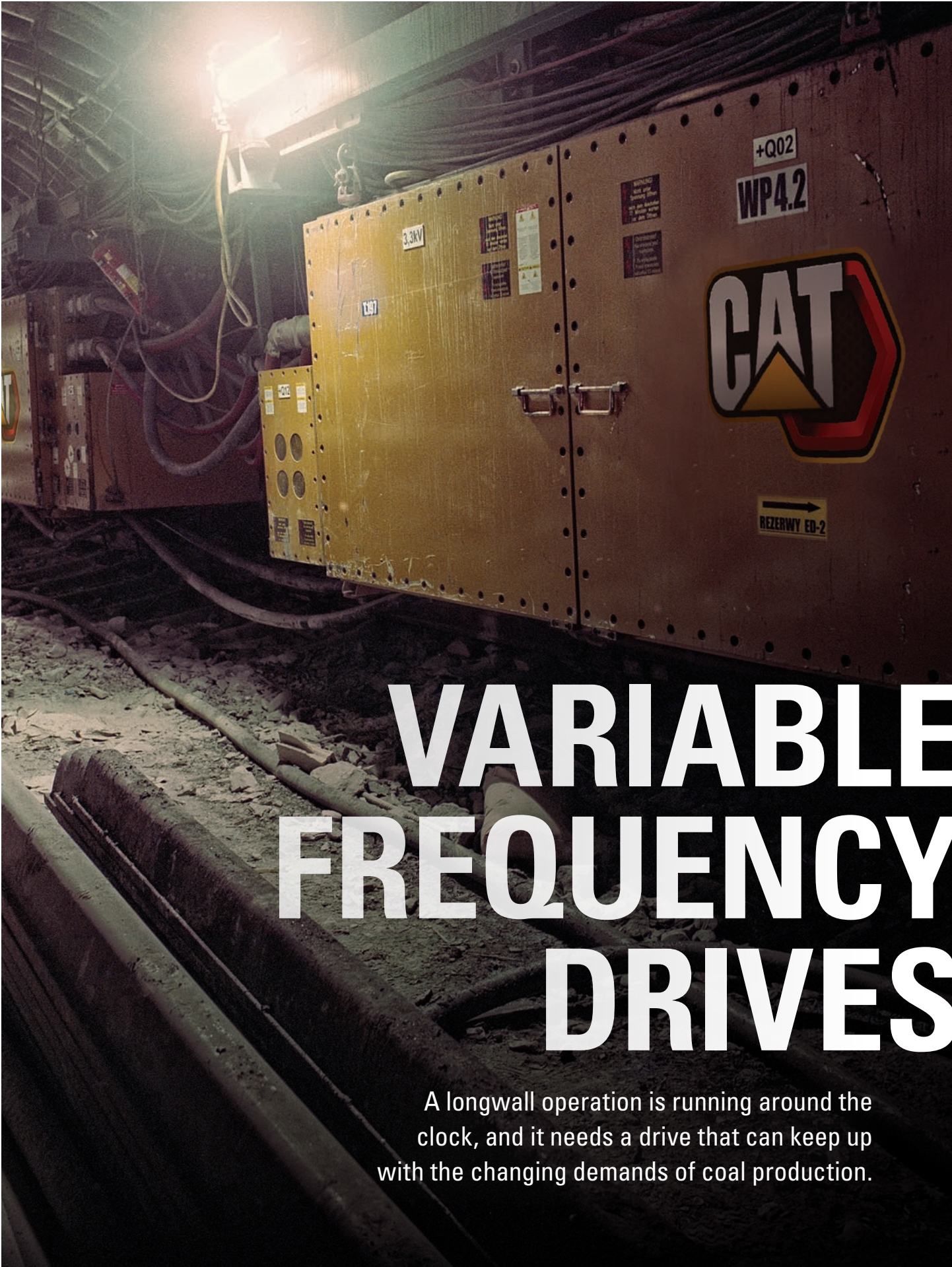
Cat CST gearboxes offer no-load motor startup, AFC soft start and synchronized heavy-load startup — so they can share the load between up to three motors with extremely fast overload protection.



### CST GEARBOX PRODUCT LINE

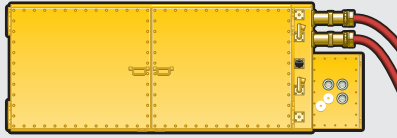
MODEL NO.	MAXIMUM INSTALLED POWER*
CST30	500 kW (671 hp)
CST45	800 kW (1073 hp)
CST45 M	800 kW (1073 hp)
CST45 V	1050 kW (1408 hp)
CST65	1200 kW (1609 hp)
CST115	1800 kW (2414 hp)

\* kW 1500 rpm @ 50 Hz (hp 1800 rpm @ 60Hz)



# VARIABLE FREQUENCY DRIVES

A longwall operation is running around the clock, and it needs a drive that can keep up with the changing demands of coal production.



## VARIABLE FREQUENCY DRIVE PRODUCT LINE

MODEL NO.	RATED POWER
VFD-A1200/W1200	800 kW (1072 hp)
VFD-A800/W800	1200 kW (1609 hp)

Cat® Variable Frequency Drives (VFDs) are designed for optimal load-sharing to stand up to difficult and unpredictable conditions. And they make efficient use of available power, allowing them to provide excellent performance even in low-power situations. By reducing wear on AFC components and making efficient use of available power, Cat VFDs also extend the life of your components and drive down maintenance costs.



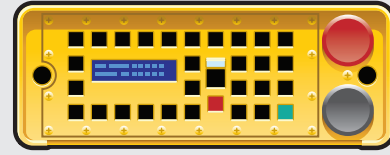
A photograph of a mining worker in a hard hat and safety vest, viewed from behind, operating machinery in a dark, industrial setting. The worker is wearing a white hard hat with a blue star logo and a grey safety vest with yellow and red reflective stripes. The background shows various pipes, cables, and mechanical components of a mining system. The lighting is focused on the worker and the machinery, creating a high-contrast scene.

# PROGRAMMABLE MINING CONTROLS

Automation is an integral part of a modern longwall mining operation, allowing the system to work safely and productively around the clock.



Ensuring that every piece of equipment is connected and communicating quickly and reliable is critical, and that's where the Cat® PMC family of Programmable Mining Controls comes in. All PMC controls are intrinsically safe, and connect to each other to form a fast, stable network of communication and control. Every PMC control allows operators to control the function of its corresponding machine, as well as handling automation and data collection.



## PROGRAMMABLE MINING CONTROLS

MODEL NO.	FUNCTION
MCU2	Main Control Unit (Underground PC)
PMC-D/PMC-D20	Drive Control Unit
PMC-R	Roof Support Control Unit
PMC-R 2.0	Roof Support Control Unit
PMC-V	Human Machine Interface for PMC-D Drive Control Systems





## IMPROVING OPERATIONAL EFFICIENCY AND SAFETY WITH ENHANCED TRAINING IN VIRTUAL REALITY

Longwall mining requires a great deal of in-depth, upfront training for operators and service personnel. Longwall mining systems are complex, and in order to operate them safely and productively, operators need hands-on experience.

However, the full system is not always available or operational when operators need to be trained. And once the system is installed and operational, it can be difficult to find time and access to adequately train new personnel without dramatically affecting production. This can be mitigated by video or instructor-led training, but these methods just aren't as effective as hands-on, in-the-iron education.

Caterpillar offers realistic, interactive 3D simulations that can help your operators gain necessary knowledge and experience safely and efficiently.

### TAKE YOUR TRAINING TO THE NEXT LEVEL

Virtual Reality allows effective and safe training without disrupting production. Trainees can practice and perfect their use of Cat longwall shearers in a highly realistic, immersive environment. The intuitive structure allows trainees to practice all aspects of operation and maintenance, with regular performance reviews. It is affordable, the entire solution ships in a box, and it can be set up easily with step-by-step instructions.

## THE BENEFITS OF VIRTUAL REALITY

SAFE TRAINING FOR HIGH-RISK SCENARIOS

COMPREHENSIVE LEARNING EXPERIENCE — ANY TIME, ANYWHERE

HIGH LEVEL OF PRACTICAL KNOWLEDGE WITH NO IMPACT ON PRODUCTION

FASTER, MORE ACCURATE AND BETTER INFORMED OPERATOR DECISIONS

REDUCED DOWNTIME WITH EARLY DETECTION OF PROBLEMS

HIGH TRAINEE ENGAGEMENT AND BETTER RETENTION COMPARED TO TRADITIONAL TRAINING METHODS



### INCREASE TRAINING EFFICIENCY

Increase productivity, lower costs and make work safer.

### TRAIN ANYWHERE

Bring longwall training to your people — instead of bringing the people underground.

### START OPERATIONS FASTER

Start your longwall training before the system is even installed.



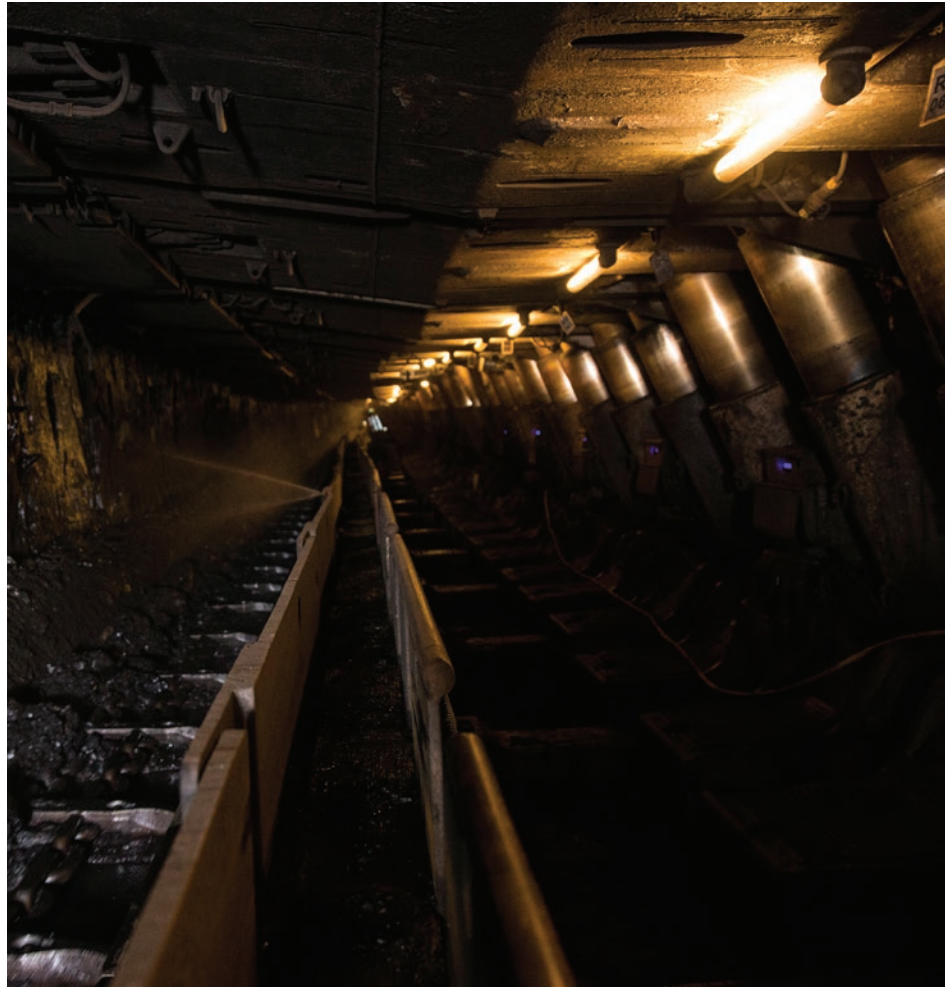
# MINING BETTER TOGETHER

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Success in the longwall mining industry takes more than the best equipment and automation solutions. It takes a partner who will work alongside you to help you address your toughest challenges and take advantage of your biggest opportunities. We are committed to helping you to improve performance across your operation, leveraging every machine, tool and technology to help you improve efficiency and productivity.

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We're also continuing to seek new ways to deliver improvements in areas such as machine availability and equipment management. Retrofits, upgrades and rebuilds help you get more from the products you already own, and increased maintenance intervals make it possible for your system to spend more time on the job. Every product we offer is integrated with technologies to boost productivity, performance and safety and supported by the Cat dealer network around the world.



## **TOTAL SITE SOLUTIONS**

We also provide a number of support products, services, knowledge and solutions that allow us to be a true one-stop shop for mining companies. We deliver total site solutions, like flexible financing options and rental and used products to help you get the equipment you need. Generator sets to power your operations. Rail products and services to transport materials around the world. And complete customized solutions that combine site assessments, products, technologies and services to address a specific challenge— from managing equipment to maximizing performance to increasing safety.



# MINING SMARTER

Modern longwall systems are heavily automated, spending as much as 98% of their production time in automated operation. That means enhanced safety, improved productivity and more efficient performance. Cat longwall automation delivers increased production, horizon control, extraction control and face alignment for consistent production and reduced wear. And with the integration of Cat<sup>®</sup> MineStar<sup>™</sup> solutions, you gain the ability to better manage your equipment, monitor machine health and improve site safety with cutting-edge technology.





 **HEALTH**  
FOR LONGWALL



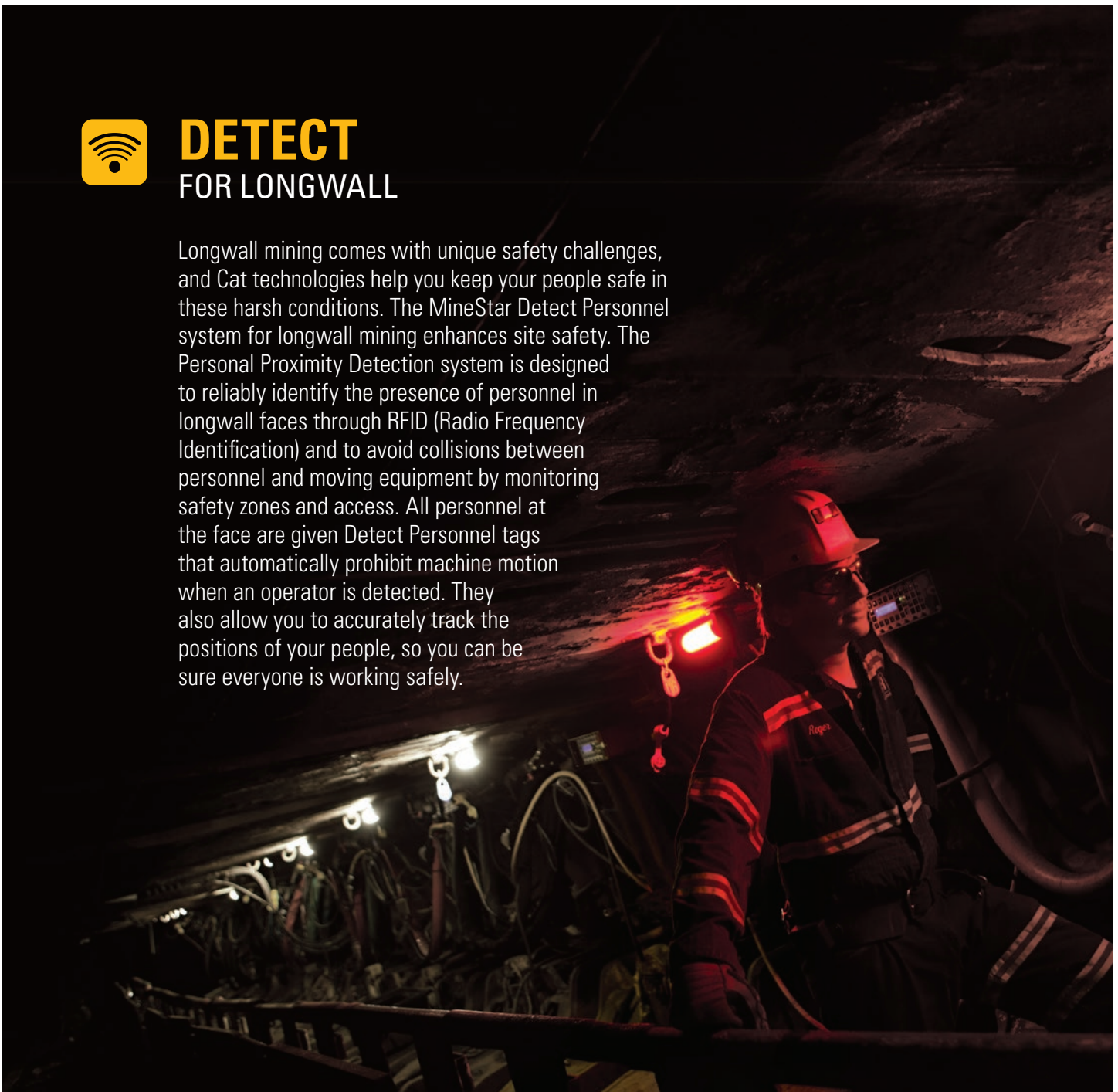
Cat MineStar Health for longwall comprises our proprietary VSoftware suite of technologies, an industry-leading collection of data gathering and analytics programs. These programs can be used to monitor the function and status of every piece of your longwall operation, filtering a massive amount of data down to concise, actionable reports that help you put the right data in the right hands at the right time.

- + Identify equipment and site conditions
- + Prevent major component failures
- + Reduce unscheduled downtime and overall maintenance time
- + Reduce maintenance costs by detecting problems early
- + Streamline service scheduling



## DETECT FOR LONGWALL

Longwall mining comes with unique safety challenges, and Cat technologies help you keep your people safe in these harsh conditions. The MineStar Detect Personnel system for longwall mining enhances site safety. The Personal Proximity Detection system is designed to reliably identify the presence of personnel in longwall faces through RFID (Radio Frequency Identification) and to avoid collisions between personnel and moving equipment by monitoring safety zones and access. All personnel at the face are given Detect Personnel tags that automatically prohibit machine motion when an operator is detected. They also allow you to accurately track the positions of your people, so you can be sure everyone is working safely.



### ROOF SUPPORT CONTROLS

The new PMC-R 2.0 has several new safety functions that were given an SIL 2 safety rating by an external certification authority.

- + Local lock out
- + Local emergency stop
- + Face-wide emergency stop





## COMMAND FOR LONGWALL

We offer three automated shearer automation packages as part of Cat MineStar Command for Longwall.

### STANDARD MACHINE CONTROL

- + Radio remote system and basic monitoring and visualization of main components and functions

### BASIC AUTOMATION

- + Includes gate-end communication and basic state tables
- + Offers zone-based automation, with parameters set for specific areas of the face

### ADVANCED AUTOMATION

- + Features state-based automation, face alignment and horizon control
- + Efficient tool for defining complex automation cycles
- + Allows the shearer to operate precisely to your defined production process, including direction, speed, arm height and ranging arm control mode
- + Up to 200 states with actions and conditions to be met before the next state is entered

A dark, industrial mining tunnel. In the foreground, a large, dark, textured rock wall is visible. In the background, a worker wearing a hard hat and safety gear is standing near some equipment. A sign that says "PHONE LOCKOUT" is visible on the ceiling. The lighting is dim, with some yellowish lights illuminating the scene.

## MINING MORE RELIABLY

You expect us to provide a high-quality, long-lasting longwall system that runs efficiently and reliably. But it's the support we provide in partnership with Cat dealers that truly delivers the full value of Cat equipment. Together, we go beyond supporting individual products to focus on complete operations — ensuring your system is available when you need it and helping you better understand how to optimize its use and maximize its life.

## CAT DEALER NETWORK

Caterpillar and Cat dealers have created a one-of-a-kind, on-site support network that adds value to both old and new longwall mining systems. Cat dealers are longwall experts and deliver the highest quality support, including expert service, fast response times, efficient parts fulfillment, world-class remanufacturing and rebuild capabilities, retrofit solutions and more.

Dealers leverage information gained from machine health systems, preventive maintenance programs and other initiatives to predict maintenance and repair needs and anticipate the parts and components that will be required. We also offer our longwall customers remote support in the form of Caterpillar experts. Using the same data collection software you use to support your operation, our team can identify issues and either fix them or offer recommendations to you or your dealer so you can get back to work.

165  
DEALERS

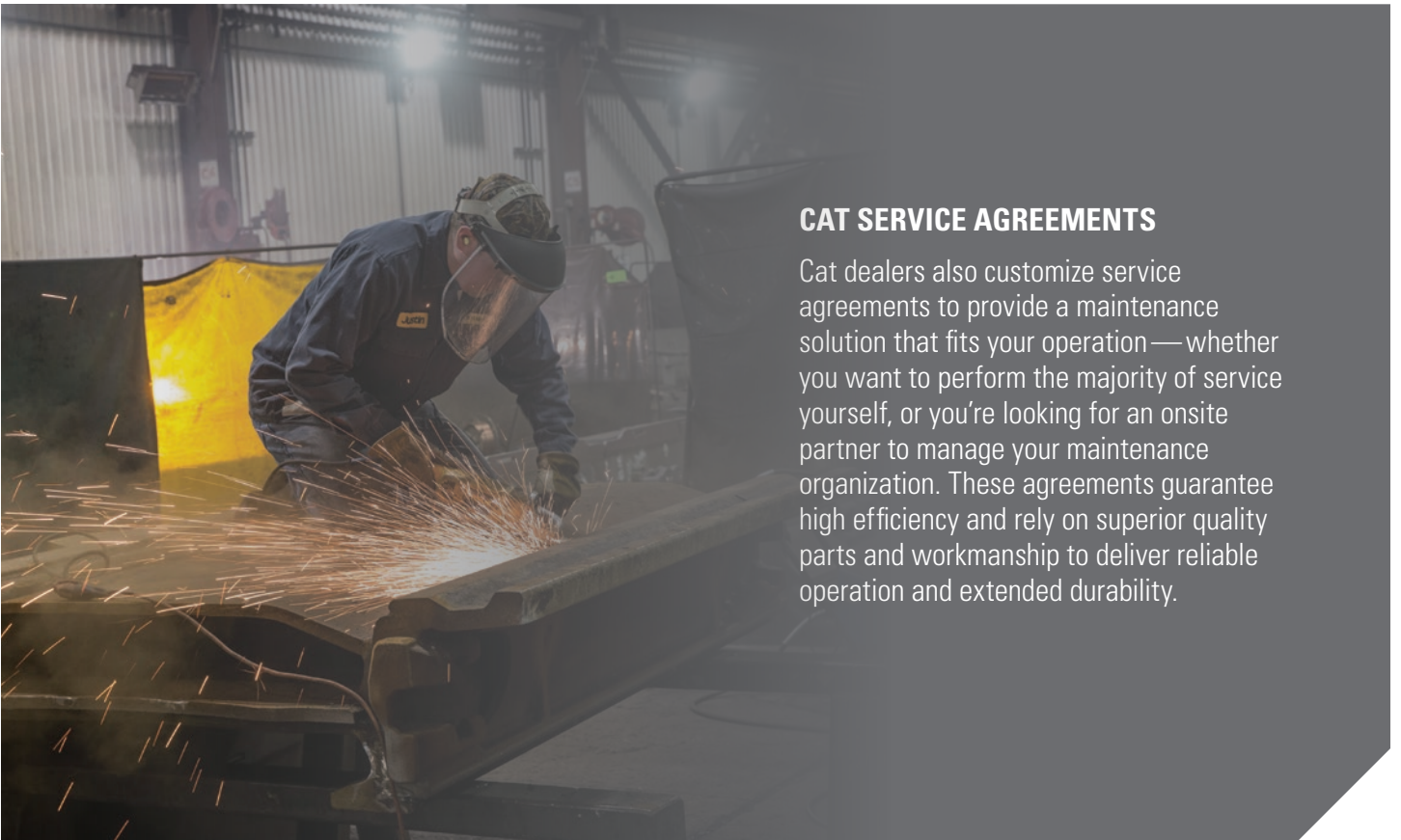
191  
COUNTRIES

2,300  
BRANCHES

MORE THAN  
169,000  
EMPLOYEES

## CAT SERVICE AGREEMENTS

Cat dealers also customize service agreements to provide a maintenance solution that fits your operation—whether you want to perform the majority of service yourself, or you're looking for an onsite partner to manage your maintenance organization. These agreements guarantee high efficiency and rely on superior quality parts and workmanship to deliver reliable operation and extended durability.

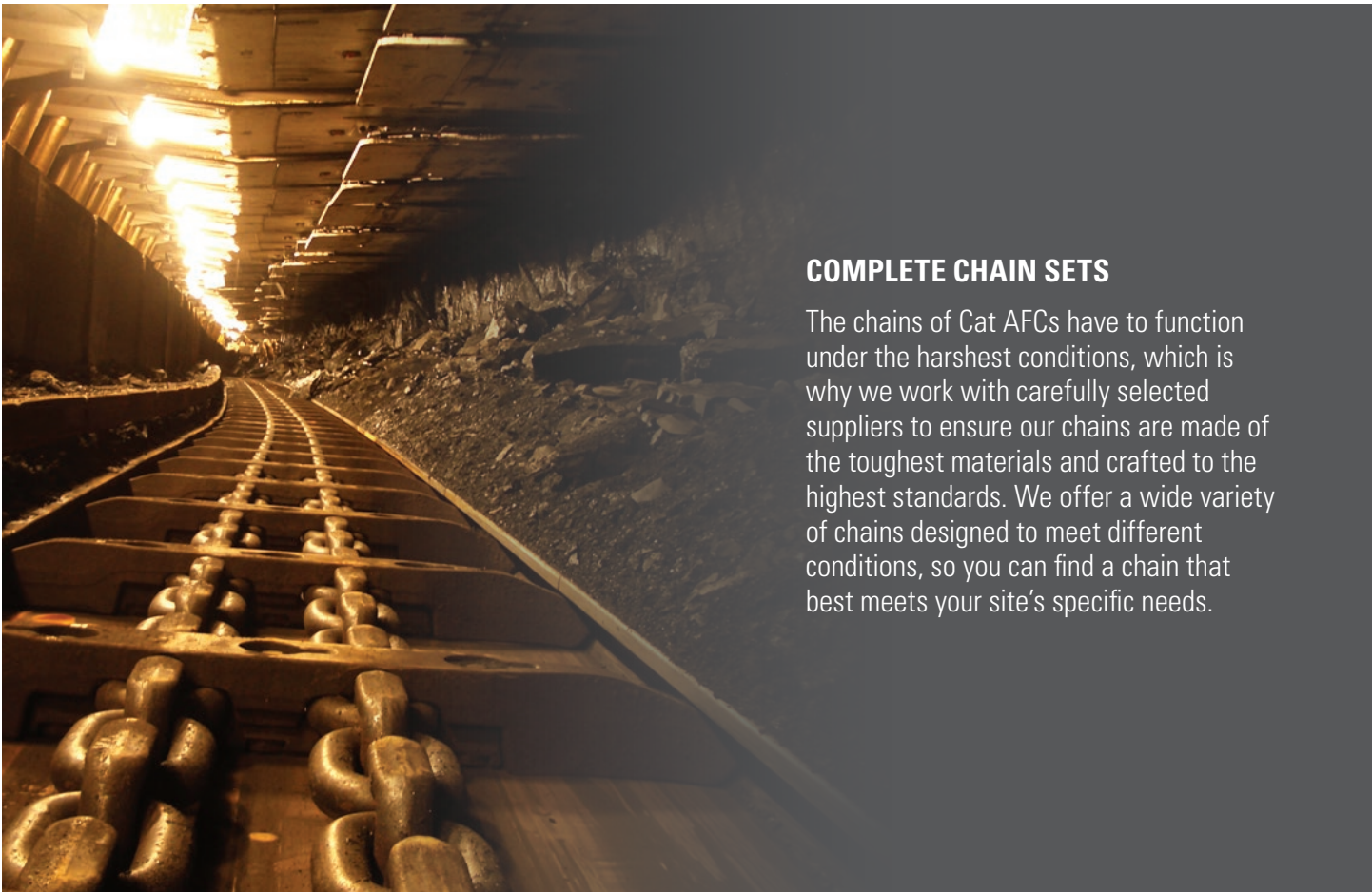


# GENUINE CAT PARTS

Most Cat dealers maintain extensive parts inventories and leverage sophisticated forecasting systems to make sure they have or can quickly obtain the parts their customers need. Whether you want a new, used, exchange or remanufactured part, Cat dealers can quickly locate and communicate a timeline for delivery in a matter of minutes.

Customers can order from more than a million items in our online parts books. Genuine Cat parts are engineered to be the best fit for Cat machines. They're designed to work and wear as a complete system, and their quality and design drive system life. They're manufactured in our own facilities and under the highest controls and standards.





### **COMPLETE CHAIN SETS**

The chains of Cat AFCs have to function under the harshest conditions, which is why we work with carefully selected suppliers to ensure our chains are made of the toughest materials and crafted to the highest standards. We offer a wide variety of chains designed to meet different conditions, so you can find a chain that best meets your site's specific needs.

### **UNDERGROUND MINING HOSES**

Cat underground mining hoses are built for endurance in the harsh conditions of your mine. We have set the standard for high-quality hose assemblies for over 50 years, earning a global reputation for superior performance and reliability.



### **HYDRAULIC SYSTEMS**

Our hydraulic legs are hard at work in mines all over the world. For more than 30 years, they have built a reputation for long life and low leakage, with long overhaul intervals and reliable performance over their entire lifetime.

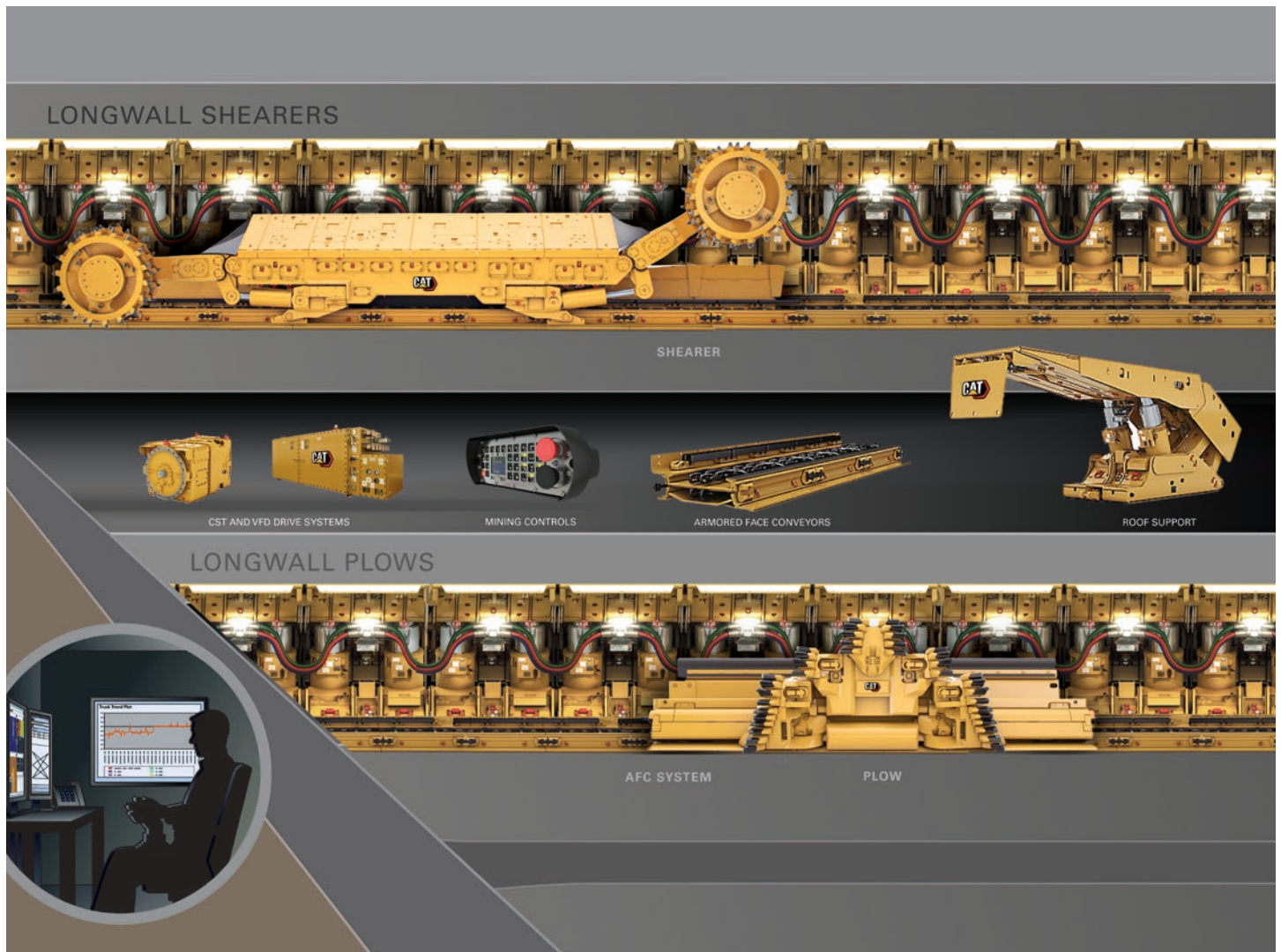
# TECHNICAL SPECIFICATIONS

See [cat.com](http://cat.com) for complete specifications.

SHEARERS	
<b>EL1000</b>	
Seam Range	1.6-3.9 m (63-156 in)
Haulage Power	2 × 100 kW @ 50 Hz (2 × 134 hp @ 60 Hz)
Cutting Power	2 × 500 kW @ 50 Hz (2 × 805 hp @ 60 Hz)
<b>EL2000</b>	
Seam Range	1.8-4.5 m (71-177 in)
Haulage Power	2 × 125 kW @ 50 Hz (2 × 168 hp @ 60 Hz)
Cutting Power	2 × 750 kW @ 50 Hz (2 × 1206 hp @ 60 Hz)
<b>EL3000</b>	
Seam Range	2.5-5.5 m (98-217 in)
Haulage Power	2 × 150 kW @ 50 Hz (2 × 200 hp @ 60 Hz)
Cutting Power	2 × 860 kW @ 50 Hz (2 × 1,380 hp @ 60 Hz)

CUSTOMIZED ROOF SUPPORT SYSTEMS	
Height – Extended	1100–6100 mm (43.3–240.2 in)
Shield Centers	1500–2050 mm (59–80.7 in)
Shield Density	up to 111 tonne/m <sup>2</sup> (12.5 ton/ft <sup>2</sup> )

PLOWS	
<b>RHH800</b>	
Coal Hardness	Soft to hard coal
Maximum Installed Power	2 × 400 kW (2 × 536 hp)
Cutting Height	0.6–1.6 m (23.6–63 in)
<b>GH800B</b>	
Coal Hardness	Soft to hard coal
Maximum Installed Power	2 × 400 kW (2 × 536 hp)
Cutting Height	0.75–2.0 m (29.5–79 in)
<b>GH800</b>	
Coal Hardness	Soft to hard coal
Maximum Installed Power	2 × 400 kW (2 × 540 hp)
Cutting Height	1.0–2.0 m (39.4–79 in)
<b>GH1600</b>	
Coal Hardness	Medium to extremely hard coal
Maximum Installed Power	2 × 800 kW (2 × 1,072 hp)
Cutting Height	1.1–2.3 m (43–90.5 in)



ARMORED FACE CONVEYORS	
<b>AFCPF3</b>	
Dogbone Breaking Force	2000 kN (224.80 tonf)
Top Plate Thickness	30 mm (1.18 in)
Bottom Plate Thickness	20 mm (0.78 in)
<b>AFCPF4</b>	
Dogbone Breaking Force	3600 kN (404.65 tonf)
Top Plate Thickness	40 mm (1.57 in)
Bottom Plate Thickness	25 mm (0.98 in)
<b>AFCPF5</b>	
Dogbone Breaking Force	4500 kN (505.82 tonf)
Top Plate Thickness	50 mm (1.96 in)
Bottom Plate Thickness	30 mm (1.18 in)
<b>AFCPF6</b>	
Dogbone Breaking Force	4500 kN (505.82 tonf)
Top Plate Thickness	30 + 25 mm (1.18 + 0.98 in)
Bottom Plate Thickness	30 mm (1.18 in)
<b>PF HD</b>	
Dogbone Breaking Force	4500 kN (505.82 tonf)
Top Plate Thickness	70 mm (2.76 in)
BOTTOM PLATE THICKNESS	40 mm (1.57 in)
<b>AFCPF7</b>	
Dogbone Breaking Force	4500 kN (505.82 tonf)
Top Plate Thickness	30 + 25 mm (1.18 + 0.98 in)
Bottom Plate Thickness	30 mm (1.18 in)

PROGRAMMABLE MINING CONTROLS	
MCU2	Main Control Unit (Underground PC)
PMC-D/PMC-D20	Drive Control Unit
PMC-R	Roof Support Control Unit
PMC-R 2.0	Roof Support Control Unit
PMC-V	Human Machine Interface for PMC-D Drive Control Systems

VARIABLE FREQUENCY DRIVES	
<b>VFD-A800/W800</b>	
Rated Power	800 kW (1,072 hp)
Input Voltage	3300V ± 10%
Maximum Operational Torque	210%
<b>VFD-A1200/W1200</b>	
Rated Power	1200 kW (1,609 hp)
Input Voltage	3300V ± 10%
Maximum Operational Torque	210%

CST GEARBOXES	
<b>CST30</b>	
Maximum Input Speed – Motor Speed	1,500 rpm @ 50 Hz (1,800 rpm @ 60 Hz)
Maximum Output Torque for a Short Duration (3 sec.)	300 000 Nm (221,269 ft-lb)
Weight (without oil)	
In-Line Drive System	3 900 kg (8,600 lb)
Right/Left-Angle Drive System	5 800 kg (12,800 lb)
<b>CST45</b>	
Maximum Input Speed – Motor Speed	1,500 rpm @ 50 Hz (1,800 rpm @ 60 Hz)
Maximum Output Torque for a Short Duration (3 sec.)	450 000 Nm (331,858 ft-lb)
Weight (without oil)	
In-Line Drive System	5 900 kg / 13,000 lb
Right/Left-Angle Drive System	9 700 kg / 21,400 lb
<b>CST45 M</b>	
Maximum Input Speed – Motor Speed	1,500 rpm @ 50 Hz (1,800 rpm @ 60 Hz)
Maximum Output Torque for a Short Duration (3 sec.)	450 000 Nm (331,858 ft-lb)
Weight (without Oil)	
In-Line Drive System	7 200 kg / 15,900 lb
<b>CST45 V</b>	
Maximum Input Speed – Motor Speed	1,500 rpm @ 50 Hz (1,800 rpm @ 60 Hz)
Maximum Output Torque for a Short Duration (3 sec.)	450 000 Nm (331,858 ft-lb)
Weight (without oil)	
In-Line Drive System	5 900 kg / 13,000 lb
Right/Left-Angle Drive System	9 700 kg / 21,400 lb
<b>CST65</b>	
Maximum Input Speed – Motor Speed	1,500 rpm @ 50 Hz (1,800 rpm @ 60 Hz)
Maximum Output Torque for a Short Duration (3 sec.)	650 000 Nm (331,858 ft-lb)
Weight (without oil)	
In-Line Drive System	8 600 kg / 19,000 lb
Right/Left-Angle Drive System	10 900 kg / 24,000 lb
<b>CST115</b>	
Maximum Input Speed – Motor Speed	1,500 rpm @ 50 Hz (1,800 rpm @ 60 Hz)
Maximum Output Torque for a Short Duration (3 sec.)	1 150 000 Nm (331,858 ft-lb)
Weight (without oil)	
In-Line Drive System	16 400 kg (36,145 lb)
Right/Left-Angle Drive System	23 980 kg (52,851 lb)



# LONGWALL MINING SYSTEMS

For more complete information on Cat products, dealer services and industry solutions, visit us at [www.cat.com](http://www.cat.com)

PEDJ0583

Materials and specifications are subject to change without notice. Featured machines in photos may include additional equipment. See your Cat dealer for available options.

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