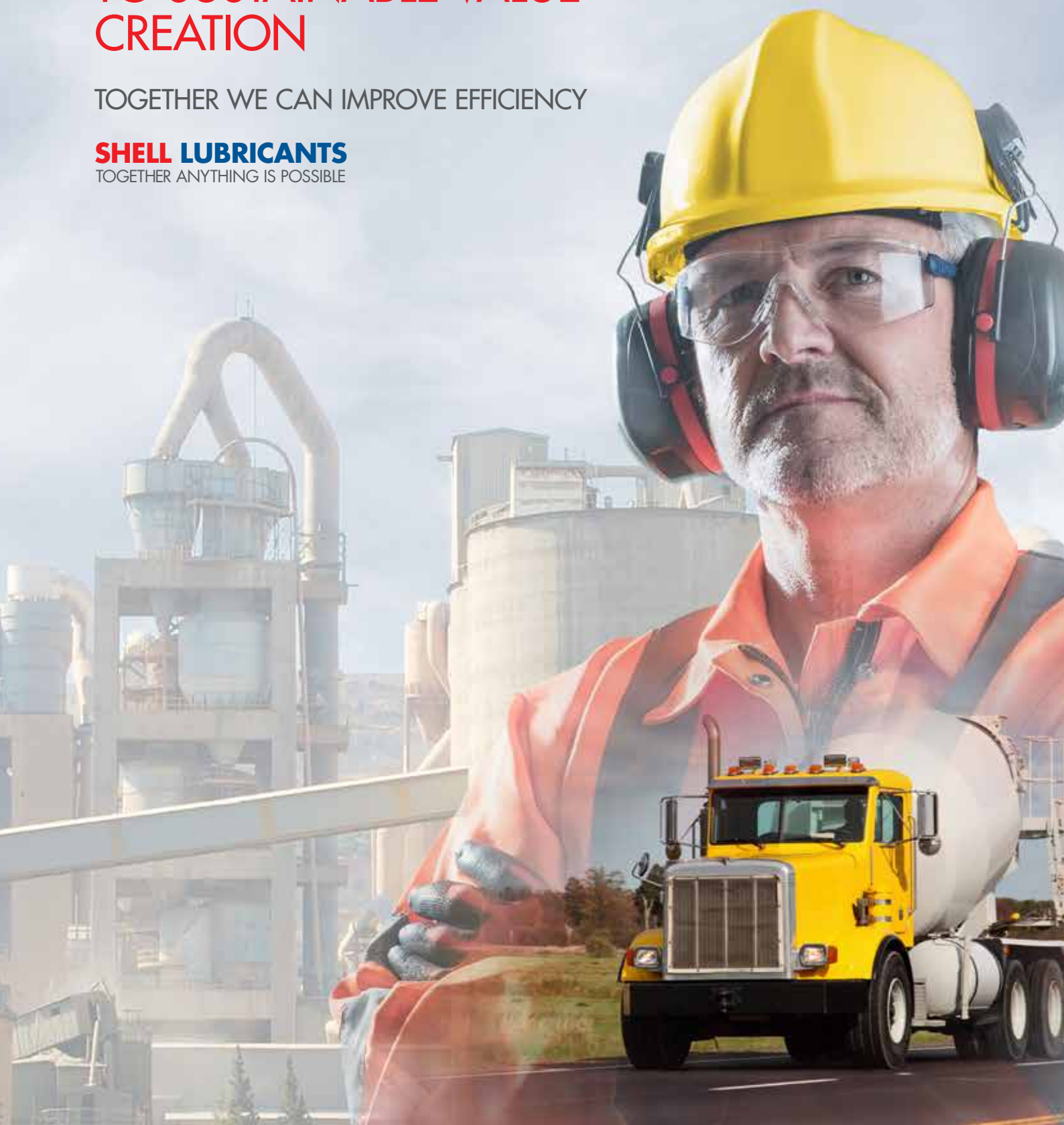


FROM INCREASING CEMENT PLANT RELIABILITY TO SUSTAINABLE VALUE CREATION

TOGETHER WE CAN IMPROVE EFFICIENCY

SHELL LUBRICANTS
TOGETHER ANYTHING IS POSSIBLE



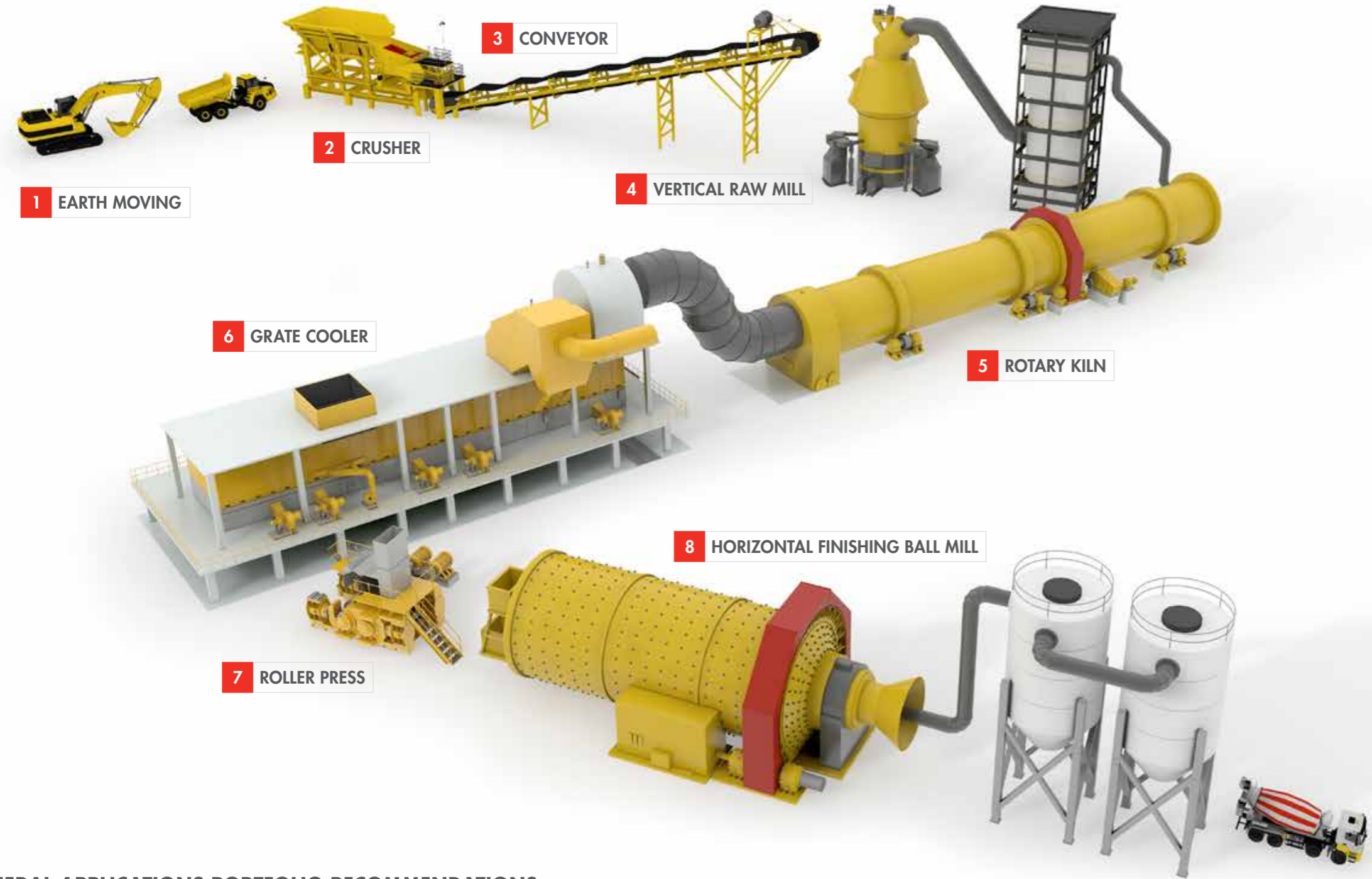
UNINTERRUPTED PRODUCTION

Although the reshaping of the cement industry and the emergence of regional champions has created value for some companies, others urgently seek improved profitability. Long-term equipment reliability can make a considerable difference.

At Shell, we focus on working collaboratively with you to help grow your business. We understand that your success depends on continuous production: on creating sustainable value by keeping your crushers, mills, kilns and conveyors working effectively. That means long-term reliability and improved efficiency for your equipment and giving your people

the knowledge to make the decisions necessary to gain a competitive advantage.

Our lubrication solution for the cement industry, underpinned by the Shell LubeAdvantage programme, is the key to unlocking that added value.



INTEGRATED CEMENT PLANT MANUFACTURING PROCESS

GENERAL APPLICATIONS PORTFOLIO RECOMMENDATIONS

KEY

- ✓✓✓ performance
- ✓✓ performance
- ✓ performance

Shell Rimula	Shell Tellus	Shell Omala	Shell Corena	Shell Gadus
Heavy-duty diesel engine	Hydraulics (mobile)	Hydraulics (stationary)	Industrial gearbox	Rotary screw compressors
■ Shell Rimula R5 LE 10W-30	■ Shell Tellus S4 VX	■ Shell Tellus S4 ME	■ Shell Omala S4 GX	■ Shell Corena S4 R
■ Shell Rimula R4 L 15W-40	■ Shell Tellus S3 V	■ Shell Tellus S3 M	■ Shell Omala S3 GP	■ Shell Corena S3 R
■ Shell Rimula R4 X 15W-40	■ Shell Tellus S2 VX	■ Shell Tellus S2 MX	■ Shell Omala S2 G	■ Shell Corena S2 R
				■ Shell Corena S2 P
				■ Shell Gadus S5 V100
				■ Shell Gadus S3 V100
				■ Shell Gadus S2 V100
				■ Shell Gadus S3 High Speed Coupling
				■ Shell Gadus S2 High Speed Coupling

Note:

- * If oil lubricated, refer to Shell Omala gearbox oils
- ** Could also be shaft rather than open-gear driven

KEY CHALLENGES:

SPECIALIST APPLICATIONS:

GENERAL APPLICATIONS:

1. EARTH MOVING

High loads
Shock loading
Ingress of contamination

Transmission:
■ Shell Spirax
Plain bearings, pin and bushes:
■ Shell Gadus S3 V460D 2
■ Shell Gadus S2 V460D 2
■ Shell Gadus S2 V220AD 2

Hydraulics (mobile)

2. CRUSHER

High loads
Heavy shock loads

Roller bearings:
■ Shell Gadus S5 V460
■ Shell Gadus S3 V460D
■ Shell Gadus S2 V460A

Motors
Gearbox
Hydraulics
High-speed coupling

3. CONVEYOR

Continuous operation
Dusty

Roller bearings – manual lubrication:
■ Shell Gadus S3 V220C
■ Shell Gadus S2 V220
■ Shell Gadus S1 V160
■ Shell Gadus S1 V220
Roller bearings – auto-lubrication:
■ Shell Tactic EMV Gadus S5 T460
■ Shell Tactic EMV Gadus S3 V220C
Gearbox:
■ Shell Morlina S4 B

Motors
Gearbox

KEY CHALLENGES:

SPECIALIST APPLICATIONS:

GENERAL APPLICATIONS:

4. VERTICAL RAW MILL

High loads
Shock loading

Roller bearings:
■ Shell Gadus S5 V 460*
■ Shell Gadus S3 V460 D
■ Shell Gadus S3 V460
Separator bearings:
■ Shell Gadus S5 T460
■ Shell Gadus S3 V460
■ Shell Gadus S5 V100
■ Shell Gadus S3 V220
Rocker arm bearings:
■ Shell Gadus S4 V2600 AD
■ Shell Gadus S3 V460 D
■ Shell Gadus S2 V460

Motors
Gearbox
Hydraulics

5. ROTARY KILN

High loads
Very high temperatures
Ingress of contamination

Pinion bearings:
If greased:
■ Shell Gadus S3 T460*
■ Shell Gadus S3 V460
Open gears, Running in:
■ Shell Gadus S3 Repair
Spray:
■ Shell Gadus S4 OGH 160
■ Shell Gadus S4 OG 20000 Clear
■ Shell Gadus S2 OGH 00
Bath:
■ Shell Gadus S4 OGT
■ Shell Gadus S4 OG Clear Oil 20000

Motors
Gearbox
Hydraulics
High-speed coupling

6. GRATE COOLER

Very high temperatures
High speeds

Roller bearings:
■ Shell Gadus S5 V460
■ Shell Gadus S3 V220C
■ Shell Gadus S3 V460
■ Shell Gadus S5 V100

Motors

7. ROLLER PRESS

High loads
Shock loading

Roller bearings:
■ Shell Gadus S2 V1000AD 1.5
■ Shell Gadus S4 V2600AD 1.5*

Motors
Gearbox
Hydraulics

8. HORIZONTAL FINISHING BALL MILL**

High loads
High temperatures
Ingress of contamination

Pinion bearings:
If greased:
■ Shell Gadus S3 V460*
■ Shell Gadus S2 V460A
Open gears: Running in:
■ Shell Gadus S3 Repair

Motors
Gearbox
High-speed coupling

Spray:
■ Shell Gadus S4 OGH 160
■ Shell Gadus S4 OGMS
■ Shell Gadus S4 OG 20000 Clear
■ Shell Gadus S2 OGH 00
Bath:
■ Shell Gadus S4 OGT
■ Shell Gadus S4 OG Clear Oil 20000

GENERAL APPLICATIONS:

1. EARTH MOVING

KEY CHALLENGES:

High loads
Shock loading
Ingress of contamination

SPECIALIST APPLICATIONS:

Transmission:
■ **Shell Spirax**
Plain bearings, pin and bushes:
■ **Shell Gadus S3 V460D 2**
■ Shell Gadus S2 V460D 2
■ Shell Gadus S2 V220AD 2

GENERAL APPLICATIONS:

Hydraulics (mobile)

2. CRUSHER

High loads
Heavy shock loads

Roller bearings:
■ **Shell Gadus S5 V460**
■ Shell Gadus S3 V460D
■ Shell Gadus S2 V460A

Motors
Gearbox
Hydraulics
High-speed coupling

3. CONVEYOR

Continuous operation
Dusty

Roller bearings – manual lubrication:
■ **Shell Gadus S3 V220C**
■ Shell Gadus S2 V220
■ Shell Gadus S1 V160
■ Shell Gadus S1 V220
Roller bearings – auto-lubrication:
■ **Shell Tactic EMV Gadus S5 T460**
■ Shell Tactic EMV Gadus S3 V220C
Gearbox:
■ Shell Morlina S4 B

Motors
Gearbox

4. VERTICAL RAW MILL

KEY CHALLENGES:

High loads
Shock loading

SPECIALIST APPLICATIONS:

Roller bearings:
■ **Shell Gadus S5 V 460***
■ Shell Gadus S3 V460 D
■ Shell Gadus S3 V460
Separator bearings:
■ **Shell Gadus S5 T460**
■ Shell Gadus S3 V460
■ Shell Gadus S5 V100
■ Shell Gadus S3 V220
Rocker arm bearings:
■ **Shell Gadus S4 V2600 AD**
■ Shell Gadus S3 V460 D
■ Shell Gadus S2 V460

GENERAL APPLICATIONS:

Motors
Gearbox
Hydraulics

5. ROTARY KILN

High loads
Very high temperatures
Ingress of contamination

Pinion bearings:
If greased:
■ **Shell Gadus S3 T460***
■ Shell Gadus S3 V460
Open gears, Running in:
■ Shell Gadus S3 Repair
Spray:
■ **Shell Gadus S4 OGH 160**
■ **Shell Gadus S4 OG 20000 Clear**
■ Shell Gadus S2 OGH 00
Bath:
■ **Shell Gadus S4 OGT**
■ **Shell Gadus S4 OG Clear Oil 20000**

Motors
Gearbox
Hydraulics
High-speed coupling

6. GRATE COOLER

Very high temperatures
High speeds

Roller bearings:
■ **Shell Gadus S5 V460**
■ Shell Gadus S3 V220C
■ Shell Gadus S3 V460
■ Shell Gadus S5 V100

Motors

7. ROLLER PRESS

KEY CHALLENGES:

High loads
Shock loading

SPECIALIST APPLICATIONS:

Roller bearings:
■ **Shell Gadus S2 V1000AD 1.5**
■ **Shell Gadus S4 V2600AD 1.5***

GENERAL APPLICATIONS:

Motors
Gearbox
Hydraulics

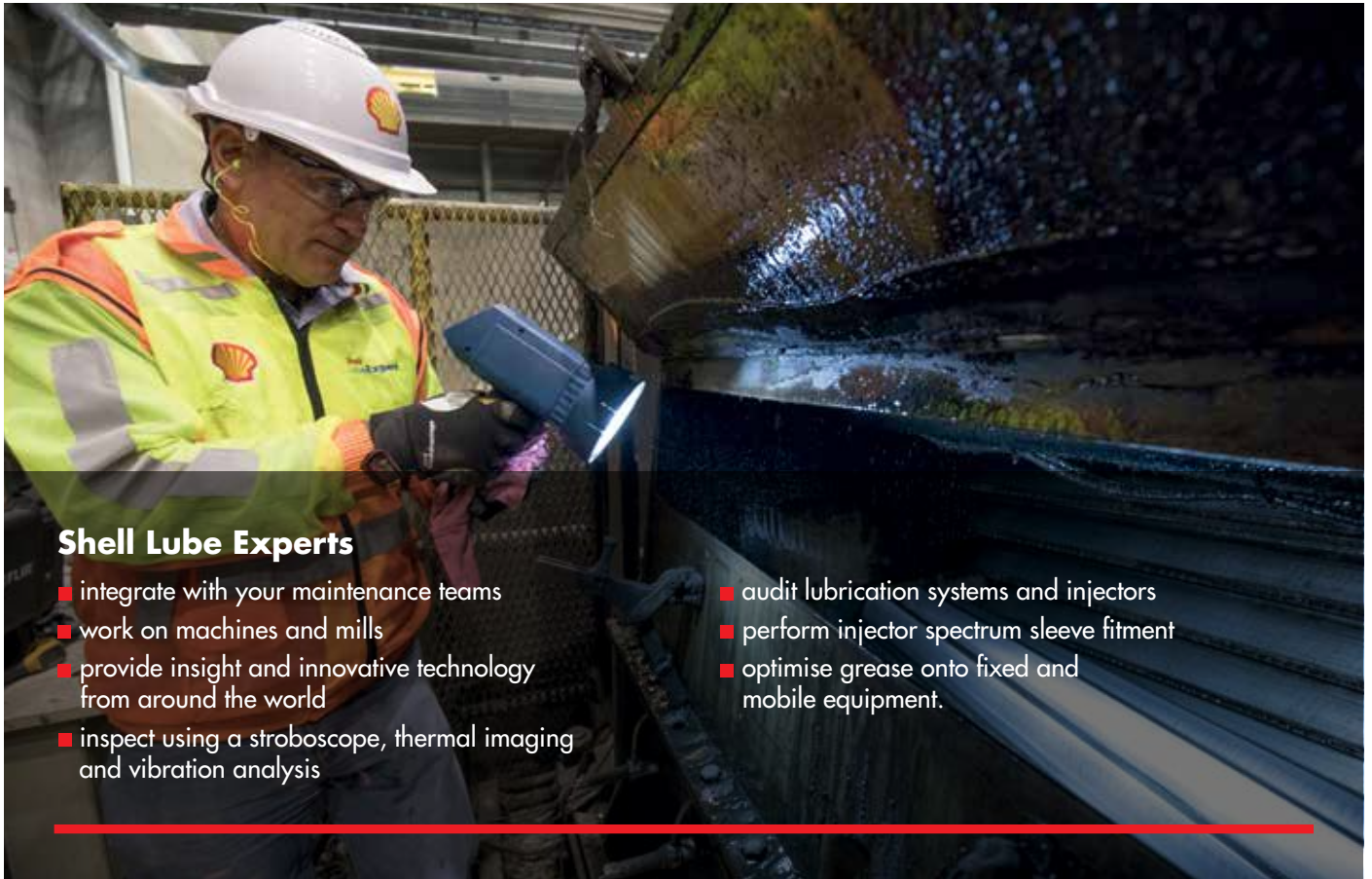
8. HORIZONTAL FINISHING BALL MILL**

High loads
High temperatures
Ingress of contamination

Pinion bearings:
If greased:
■ **Shell Gadus S3 V460***
■ Shell Gadus S2 V460A
Open gears: Running in:
■ **Shell Gadus S3 Repair**

Motors
Gearbox
High-speed coupling

Spray:
■ **Shell Gadus S4 OGH 160**
■ **Shell Gadus S4 OGMS**
■ **Shell Gadus S4 OG 20000 Clear**
■ Shell Gadus S2 OGH 00
Bath:
■ **Shell Gadus S4 OGT**
■ **Shell Gadus S4 OG Clear Oil 20000**



Shell Lube Experts

- integrate with your maintenance teams
- work on machines and mills
- provide insight and innovative technology from around the world
- inspect using a stroboscope, thermal imaging and vibration analysis
- audit lubrication systems and injectors
- perform injector spectrum sleeve fitment
- optimise grease onto fixed and mobile equipment.

CUTTING MILL DOWNTIME

Indonesian cement producer Semen Tonasa reported a **US\$2.7 million annual saving¹** associated with switching to **Shell Omala S4 GX 680** through avoiding lost production. With its former lubricant, the company was losing up to four hours' mill production each day because the slide-shoe lubricant temperatures were exceeding the safe limits and causing system trips.

DOUBLING FLEET OIL-DRAIN INTERVALS

A cement company in Egypt reported a **US\$309,078 annual saving¹** associated with switching to **Shell Rimula R4 X 15W-40** through a 54% reduction in oil consumption and filter use, and greater equipment reliability. With the new oil and the Shell LubeAnalyst condition monitoring service, the company has extended the oil-drain interval of its equipment without compromising reliability: from 250 to 600 hours for its trucks and from 250 to 500 hours for its pumps, loaders and generators.

IMPROVING OPEN-GEAR PROTECTION






Yaobai Cement, one of the largest cement groups in western China, reported a **US\$9,836 annual saving¹** associated with switching to **Shell Gadus S4 OGT**. Through a collaboration with Shell, the company was also able to simplify lubricant management across its 17 production lines, especially for open gears, where the cost of grease was high and operating efficiency was low.

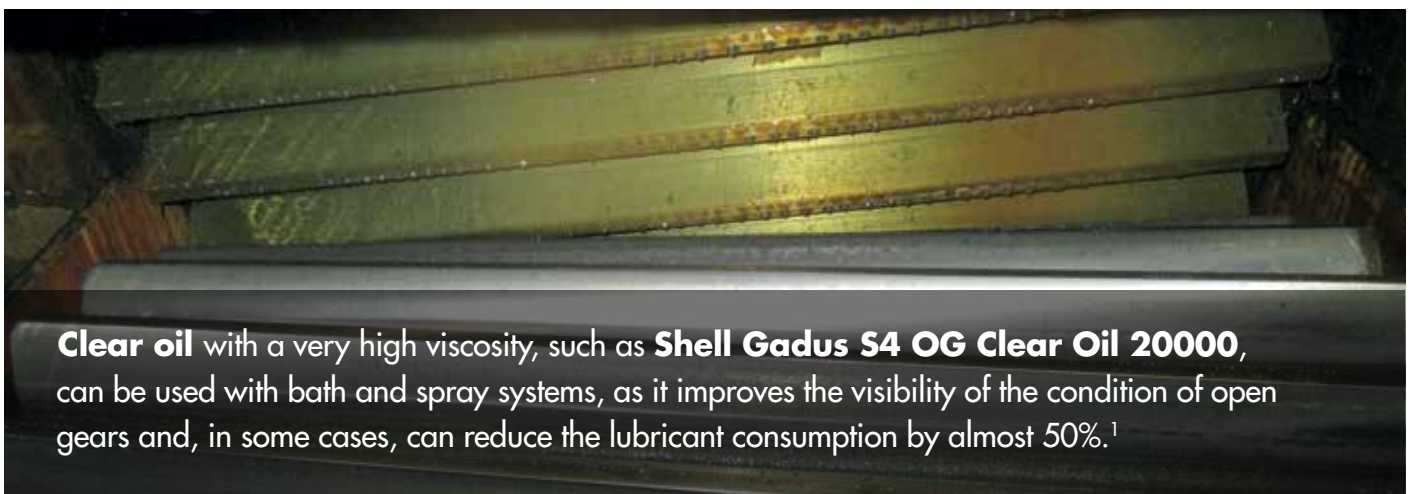
Shell Lubricants' quality and performance are recognised by key cement equipment manufacturers, including FLSmidth in Europe and CITIC in Asia, and by component equipment manufacturers, including Flender and Ferry Captain.

¹The savings indicated are specific to the calculation date and mentioned site. These calculations may vary from site to site and from time to time, depending on, for example, the application, the operating conditions, the current products being used, the condition of the equipment and the maintenance practices.

UNLOCKING POTENTIAL

To help overcome today's cement-industry challenges, Shell provides an integrated lubricants solution that combines a complete range of value-adding products with customised services that help to unlock your full potential.

BECAUSE YOU NEED...	WE PROVIDE...
Reliable equipment 	Shell LubeExpert Dedicated, highly trained lubricants service experts work with you to inspect critical machinery such as open gears, mills and kilns and help to identify practical preventive maintenance, which can save of millions of dollars by helping to avoid major breakdowns.
Lower costs 	Shell LubeAdvisor Our specialists conduct site surveys to identify areas for improvement, including in lubricant product selection, distribution, delivery, storage and application, and used-lubricant disposal. Changes are implemented and measured through value improvement projects.
Data-driven decisions 	Shell LubeAnalyst This global oil and equipment monitoring service helps you to assess lubricant condition, identify potential problems and benchmark equipment performance. It is available in 95 countries and 28 languages. The service enables you to monitor equipment without interrupting operations and provides guidance on interpreting the results.
Efficient operations 	Shell LubePlanner This service can save time and avoid reactive maintenance by helping you to develop and run a comprehensive lubrication maintenance programme. The service uses software to create a lubrication schedule that includes product recommendations, inventory management and maintenance schedules.
Motivated and competent staff 	Shell LubeCoach This customised training programme led by Shell technical experts with wide in-field experience offers practical lubricant-management coaching for your staff to help them keep your equipment running reliably.



Clear oil with a very high viscosity, such as **Shell Gadus S4 OG Clear Oil 20000**, can be used with bath and spray systems, as it improves the visibility of the condition of open gears and, in some cases, can reduce the lubricant consumption by almost 50%.¹



To find out how we can help to create sustained value for your cement operations, contact your Shell representative or visit

<http://www.shell.com/lubricants>

¹Using Shell Gadus S4 OG Clear Oil 20000 helped a customer in India to reduce the open gear grease consumption by 46%.