

Shell Marine Products



SHELL ARGINA

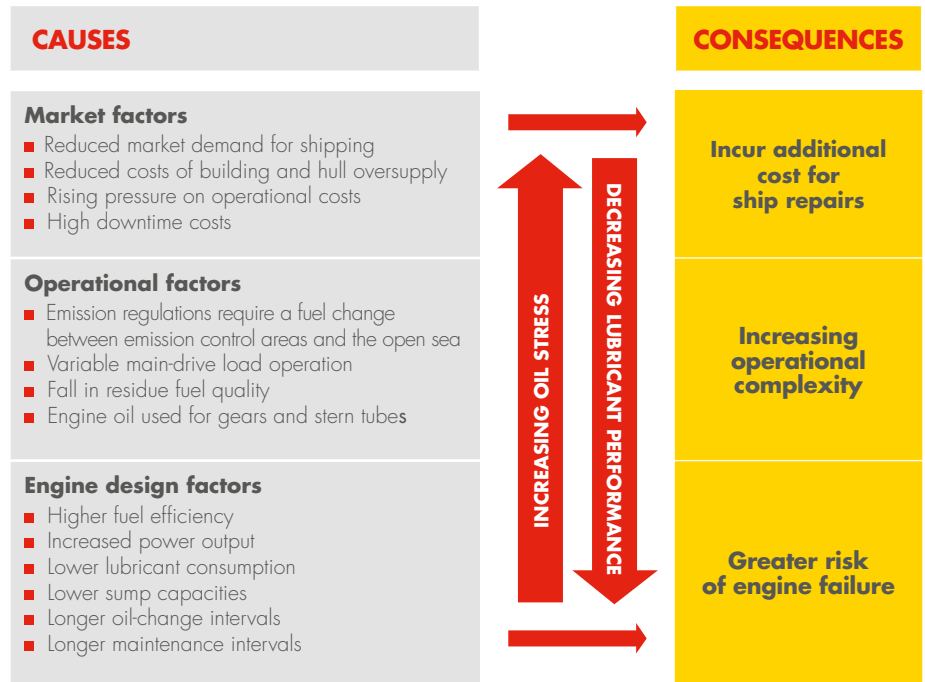
**PROVEN TO PROVIDE ADVANCED
OIL-STRESS MANAGEMENT**



THE STRESSES AND CHALLENGES FACING MARINE ENGINE OPERATORS

Market and operational changes, and new engine designs are adding to the demands made on engine oils. Using engine oil that fails to perform under today's increased oil-stress levels can lead to increased maintenance costs, poor reliability, and needless anxiety.

We understand your desire to reduce costs and attain the peace of mind that comes with engine reliability. That is why we created Shell Argina, which is proven to resist differing types of oil stress for reduced maintenance costs and increased engine reliability.



SHELL'S SOLUTION FOR MANAGING OIL STRESS

In medium-speed diesel engines, the oil is subjected to acid, thermal and asphaltene stresses. These oil-stress factors can shorten oil and engine component life, and lead to reduced reliability (Table 1).

		BN depletion	Ring liner and valve wear	Piston undercrown deposits	Ring groove deposits	Viscosity increase	Crankcase fouling	Fuel pump sticking
OIL STRESS	ACID	■	■					
	THERMAL			■	■	■		
	ASPHALTENE			■	■	■	■	■
Effect on your operation		Shortens oil life	Reduces reliability; shortens life of components	Shortens life of piston crowns	Reduces reliability; shortens life of rings and liners	Shortens oil life	Shortens filter life	Reduces reliability

Table 1: The effects of oil stress.

Our deep oil-stress understanding, which is based on 20 years of research, and the development of oil-stress management technology have resulted in Shell Argina products. Years of use have demonstrated that Shell Argina is effective in managing different types of oil stress, which can help you to:

- **reduce your running costs** through better oil durability and increased engine component life
- **improve your engine reliability**, with improved engine cleanliness
- **enjoy peace of mind** through reduced downtime and increasing productivity.

REDUCING YOUR OPERATIONAL COSTS

Shell Argina oils have set the benchmark in managing oil stress for decades. The latest generation has significantly improved low- and high-temperature deposit resistance, high base number (BN) retention and resistance to viscosity increase.

CONTROLLING COSTS BY MAXIMISING OIL DURABILITY AND ENGINE COMPONENT LIFE

Rising viscosity due to asphaltene stress or depleting BN due to acid stress can require partial or complete oil replacement. This can be costly and inconvenient.

Shell Argina oils' excellent viscosity control (figures 1 and 2) and BN retention (Figure 3) can help to reduce the amount of oil you use by up to 20% compared with competitors' products, thereby controlling your oil costs.

In addition, a more-durable, longer-lasting oil will protect engine components better, thereby helping to reduce maintenance costs.

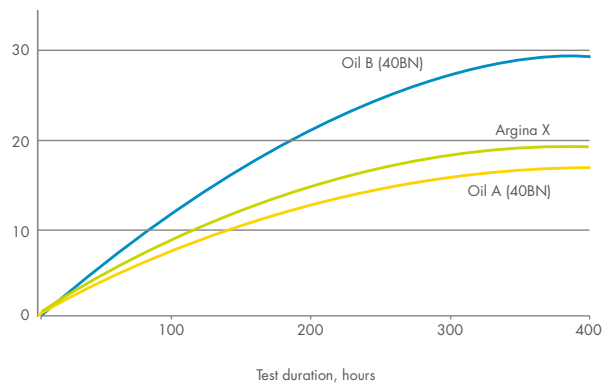


Figure 1. The ability of Shell Argina X to handle asphaltene stress is seen in the slow viscosity rise during accelerated engine tests. After 400 hours, Shell Argina X and competitor's oil A showed a viscosity increase of less than 20%, but more deposits were produced with oil A. Competitor's oil B suffered a 29% viscosity increase.

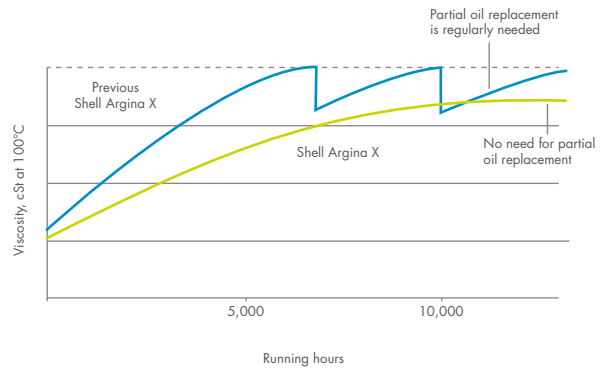


Figure 2. In a field trial, Shell Argina X removed the need for regular partial oil replacement in a MAN B&W engine operating under severe asphaltene stress conditions.

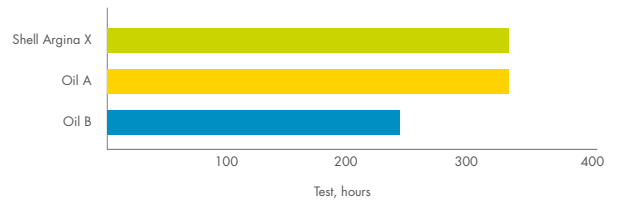


Figure 3. Under accelerated engine test conditions, Shell Argina X and oil A took more than 300 hours to deplete from BN40 to BN20. Oil B fell to BN20 in only 232 hours. An oil's BN depletes as harmful acids are neutralised. However, this depletion can be caused by secondary processes such as oxidation, which leaves the oil unable to protect against corrosion. Shell Argina X's excellent BN retention helps to extend oil life, thereby reducing the need for partial oil replacement, and increase component life through longer corrosion protection.



SHELL ARGINA HAS SET A HIGHER BENCHMARK FOR A CLEANER ENGINE AND LONGER OIL LIFE

DELIVERING RELIABILITY

Over 20 years of research and testing have helped us to understand oil stress. Shell Argina oils are designed to manage differing effects of oil stress to reduce downtime, keep your engine cleaner and give longer oil and component life, thereby improving engine reliability. This delivers greater vessel reliability and helps to maximise commercial performance.

- **Greater power to clean and protect.** Clean engines are efficient engines. With their increased resistance to fuel oil contamination and physical thickening, Shell Argina oils form fewer deposits as a result of the thermal and asphaltene stresses in heavy-fuel engines.
- **Better general engine cleanliness.** Fewer crankcase and valve-deck deposits help to prolong filter life and reduce cleaning maintenance. A clean crankcase also indicates that the less visible engine parts are in good condition. Field trials have demonstrated the improved general engine cleanliness with Shell Argina oils, thanks to its increased resistance to oil stress, which results in fewer deposits (Figure 4).
- **Improved piston cleanliness.** In field trials, Shell Argina oils demonstrated visible improvements in ring belt cleanliness, which can help to prevent ring sticking, blow-by and liner damage. Significant reductions in piston undercrown deposits were also seen (Figure 5). Keeping the undercrown clean helps to maintain crown cooling, which prevents burning and prolongs piston life.

SHELL ARGINA X AND XL: ENGINE CLEANLINESS FIELD TRIALS, POWER STATION, WEST AFRICA



Figure 4 (left). Engine inspections during field trials reveal a clean camshaft in a Pielstick engine after 5,000 hours of operation under severe conditions with Shell Argina X (left). No deposits were observed on the valve deck of a Wärtsilä 64 engine after 5,000 hours of operation with Shell Argina XL (right).

Figure 5 (right). In accelerated engine tests, Shell Argina X and Shell Argina XL gave almost no undercrown deposits after 400 hours of testing. Oil B gave similar results but demonstrated poor durability. Oil A gave 5–100 μm of deposits.



CHOOSE SHELL ARGINA TO ENJOY PEACE OF MIND

In many cases, pressure to reduce operating costs is coinciding with increasing demands on engine oils. You need your oil to perform under tougher conditions and to help reduce costs. Shell Argina oils are designed to cope with differing aspects of oil stress and have proven performance that can help to cut costs, increase reliability and, ultimately, along with our technical services and our port network give you greater peace of mind.

FOR EFFECTIVE OVERALL OIL STRESS MANAGEMENT

Some oils perform well under certain oil stresses, but deal poorly with others. Of the products we tested, only Shell Argina oils offered top performance against all oil stresses.

Oil-stress indicator	Oil A (BN 40)	Oil B (BN 40)	Shell Argina X (BN 40)
Piston cleanliness	✓	✓✓	✓✓✓
General engine cleanliness	✓✓	✓✓	✓✓✓
Control of oil thickening	✓✓	✓	✓✓✓
Excellent BN retention	✓✓	✓	✓✓✓

A RANGE OF OILS TO SUIT ALL LEVELS OF OIL STRESS

	<ul style="list-style-type: none"> Fuel sulphur ≤2.0% High lubricant oil consumption 	<ul style="list-style-type: none"> Fuel sulphur >2.0% Lubricant oil consumption >1.0 g/kWh 	<ul style="list-style-type: none"> Fuel sulphur >2.5% Poor quality fuels Low lubricant oil consumption (0.6–1.0 g/kWh) Low specific sump capacity 	<ul style="list-style-type: none"> Fuel sulphur >>2.5% Poor quality fuels Very low lubricant oil consumption (<0.5 g/kWh) Very low specific sump capacity Engines running at high load factors (>90%)
Shell Argina XL				
Shell Argina X				
Shell Argina T				
Shell Argina S				

APPROVED BY ENGINE MANUFACTURERS

Shell Argina oils are approved by major engine manufacturers, including **Caterpillar (MaK)**, **MAN B&W** and **Wärtsilä**.

OPTIMISE YOUR OPERATIONS WITH TECHNICAL SERVICES

Help your business to save money, drive up reliability and availability, and minimise expenditure on lubricants and spares with our technical services.

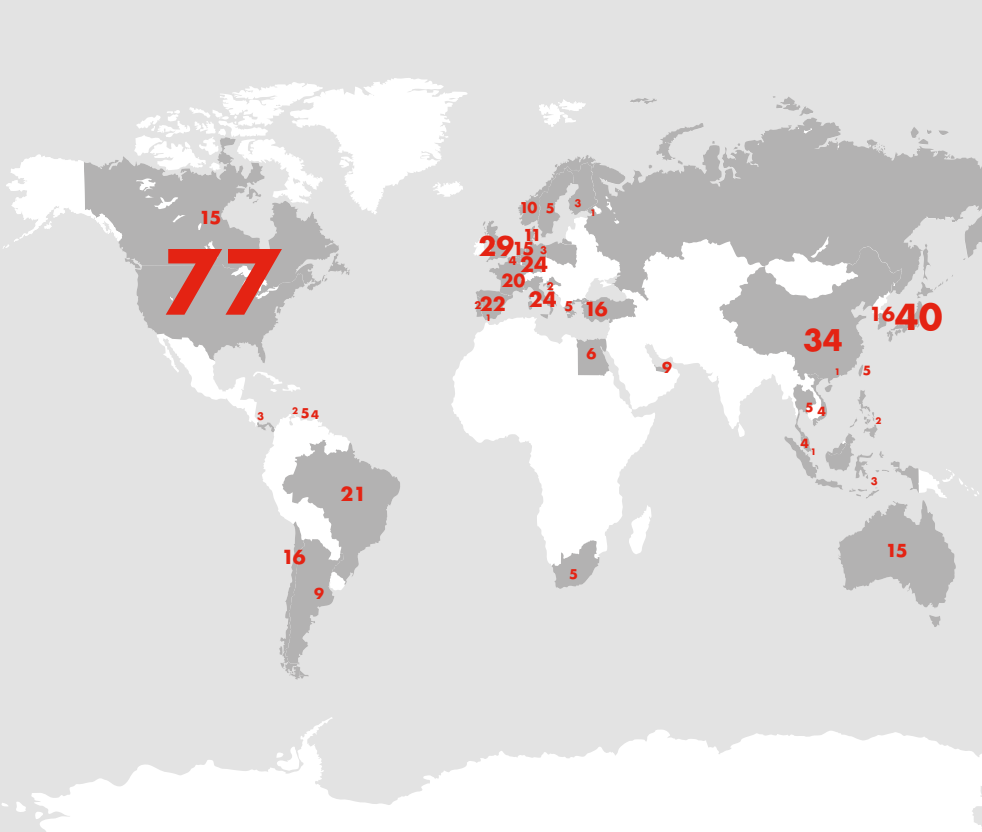
Lubricant advice can help you to select the right lubricant grade to deal with the specific level of oil stress in your engine.

Shell Rapid Lubricants Analysis is an oil condition monitoring service that helps your vessels to run smoothly by identifying potential oil or equipment failures before they become critical.

Shell's Oil Life Extension Tool offers more customised specific advice for optimising expenditure on trunk-piston-engine lubricant.

SHELL MARINE PRODUCTS

GLOBAL REACH AND LOCAL PRESENCE



Shell Marine Products' global supply chain of more than 30 lubricant blending plants and a network of 500 port facilities means you can rely on us to provide security of supply where and when you need it. We have a commitment to ensure the availability of our top 10 marine engine oils across the entire network.

Our account managers and customer service teams across the globe are ready to understand your business needs and ensure that your requirements are met in a professional manner.

Find out more: talk to Shell or our local distributors

For more information about how Shell Argina can help you to manage the effects of oil stress on your business, please contact your local Shell Marine Representative or email to smp-marketing@shell.com.

We can also offer you specialist lubrication solutions for a wide range of applications.

Please visit www.shell.com/marine for more information.

