



Shell Tonna S3 M

Premium machine tool slideway oil

A high-performance oil for extra machining accuracy

Precision slideways lubricated with Shell Tonna S3 M demonstrated improved performance in tests for key operating challenges:



Resistance to washout and compatibility with water-soluble coolants



Enhanced **corrosion protection** and oxidative stability for **long-lasting performance**



Strong adhesion to slideway surfaces



Effective **friction reduction** and **wear protection** under slow speeds and heavy loads

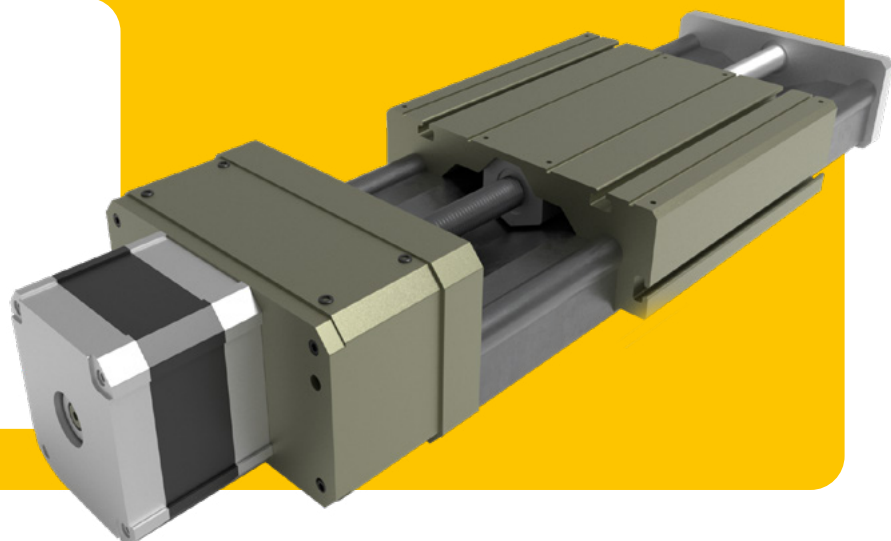


Versatility to lubricate guide materials, gearboxes and hydraulic pumps.

Shell Tonna S3 M provides:¹

- enhanced water and aqueous coolant separability
- strong washout resistance
- extra machining accuracy
- extra wear and corrosion resistance.

¹ Benchmarking tests conducted in Shell's internal labs compared performance with Shell Tonna S2 M and competitor products.



Extra machining accuracy

Challenge

The stick-slip movement of machine tool slides and tables degrades the machining accuracy and the surface quality of the product.

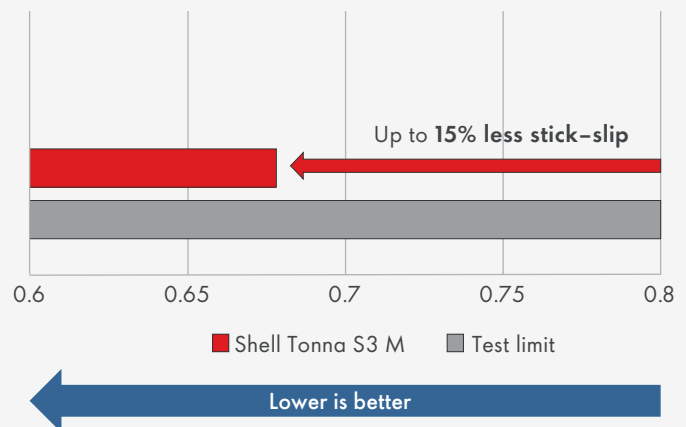
Solution

Shell Tonna S3 M is specially designed to achieve or exceed the operational efficiency of machine tools under demanding working conditions, thus enhancing their production effectiveness.

Compared with industry minimum requirements, the anti-vibration and anti-crawling performance of **Shell Tonna S3 M** is **15% better**, allowing the machine tool to **operate more smoothly** and achieve **greater positioning accuracy**.²

²The Cincinnati mechanical stick-slip test measures a lubricant's ability to minimise stick-slip motion under load, thereby ensuring smooth and precise slideway operation.

Ratio of static friction to dynamic friction (Cincinnati mechanical test)



[Click here to read the expanded image description in the appendix.](#)

Enhanced load-carrying capacity

Challenge

Excessive loads can result in surface contact that causes excessive wear and eventual component breakdown.

Solution

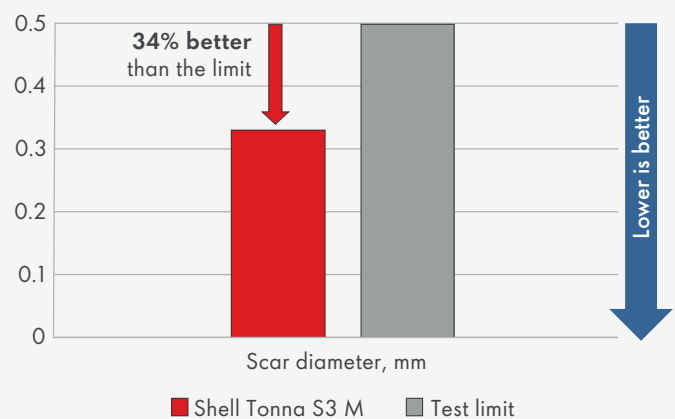
High-performance oils lubricate well under high loads, reduce wear and maintain the precision of the slideway.

As confirmed by industry standard tests,³ **Shell Tonna S3 M** demonstrated **extra wear protection**. **Shell Tonna S3 M** also passes FZG⁴ **load stage 12**.



Four-ball wear test

Four-ball wear test (ASTM D4172)



[Click here to read the expanded image description in the appendix.](#)

³The ASTM D4172 four-ball wear test evaluates a lubricant's ability to minimise wear by measuring the scar diameter on metal balls under standardised load, speed and temperature conditions.

⁴The FZG load test assesses a lubricant's ability to protect gears from wear and scuffing by evaluating its performance under increasing load conditions in a standardised gear-testing rig.

Improved wear and corrosion protection

Challenge

Water and humidity trigger rust and corrosion on metal surfaces.

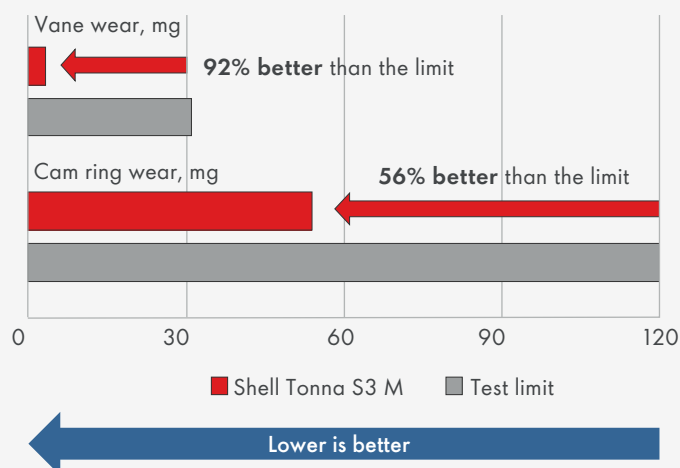
Solution

Shell Tonna S3 M benefits from oil formulation and additives that can ensure a consistent film, providing effective protection against water contamination. Rust-inhibiting additives can also prevent rust formation.

In the Vickers vane pump wear test,⁵ **Shell Tonna S3 M demonstrated impressive anti-wear performance and reduced wear by 92%**, compared with the maximum allowable wear in the test.

⁵ The Vickers vane pump wear test evaluates a lubricant's ability to protect against wear and maintain performance in hydraulic systems under high-pressure conditions.

Vickers vane pump wear test results



[Click here to read the expanded image description in the appendix.](#)

Enhanced water and aqueous coolant separability

Challenge

Contaminated slideway oil loses effectiveness and has a shorter lifespan. Residue from coolant mixing poses health, safety and environmental risks.

Solution

High-performance oils exhibit enhanced water and coolant separability and strong washout resistance.

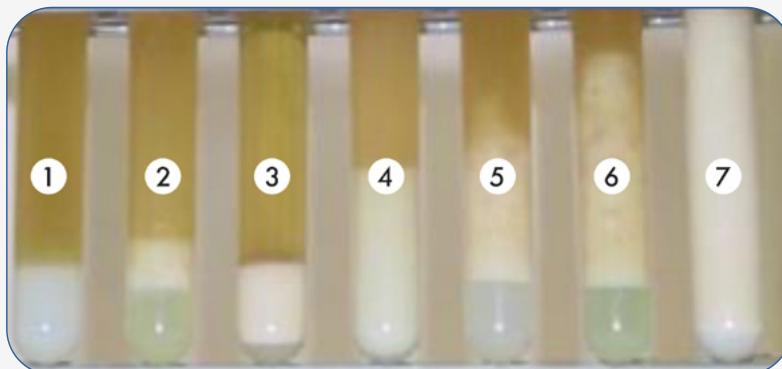
Shell Tonna S3 M demonstrated better separation from a wide range of cutting fluids, thus minimising fluid deterioration, extending coolant life, improving cutting performance and reducing health and safety risks.⁶

SKC separability test results (numerical rating)

Test item	Emulsion-type cutting fluid Sitala D 3403 (10%) 20 ml + slideway oil 80 ml		Semi-synthetic-type cutting fluid Adrana D 408 (5%) 20 ml + slideway oil 80 ml		Synthetic extreme-pressure-type cutting fluid Adrana D 601.01 (10%) 20 ml + slideway oil 80 ml	
	Competitor	Shell Tonna S3 M	Competitor	Shell Tonna S3 M	Competitor	Shell Tonna S3 M
Slideway oil						
1 h after mixing	5	5	6	6	6	6
24 h after mixing	2-3	1	2-3	1	2-3	1
168 h after mixing	1-2	1	2	1	2	1

A numerical rating of the separation, based on visual appearance (see the figure opposite), is made after one hour, one day and one week.

⁶ The SKC coolant separability test evaluates a lubricant's ability to resist emulsification when mixed with water-soluble metalworking coolants. A mixture of 8 ml of slideway oil and 2 ml of coolant is agitated at 1,500 rpm for one minute, and the test is conducted with 12 reference coolants. The separation quality is visually assessed after one hour, one day and one week, with a numerical rating assigned based on the clarity of the oil and coolant layers (1 and 2 – pass; 5 and 6 – fail). This test helps determine the lubricant's effectiveness in maintaining performance and resisting contamination in coolant-exposed environments.



Improved positioning accuracy results

Challenge

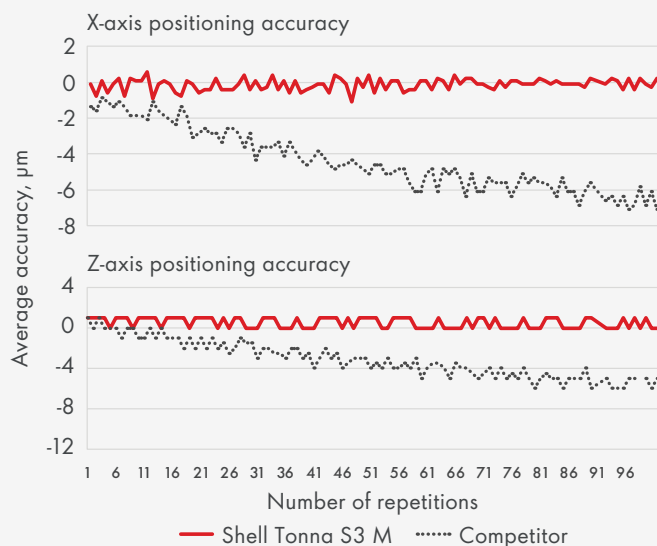
Inconsistencies in positioning and movement, stick-slip issues and inadequate lubrication can lead to reduced precision, poor surface quality and increased scrap rates.

Solution

A high-performance lubricant can minimise stick-slip and provide superior lubrication of the slideway.

Shell Tonna S3 M demonstrated superior positioning performance compared with a competitor product – **65% and 86% better positioning accuracy along the X- and Z-axis**, respectively.⁷

⁷ Positioning accuracy test on OKUMA-BYJC hard rail machine tool. The position accuracy test assesses a lubricant's ability to ensure the precise, consistent movement of machine components, which is critical for achieving high machining accuracy.



[Click here to read the expanded image description in the appendix.](#)

Shell Tonna slideway oil portfolio⁸

Shell Lubricants is the market leader in lubricants,^{9,10} with a long history of innovation. We provide a wide range of oils for industrial applications.

Increasingly efficient performance

Mainstream		Premium	Advanced
			
Shell Tonna S2 M	Shell Tonna S2 MX	Shell Tonna S3 M	Shell Tonna S4 M
• Good water and aqueous coolant separability • Resistance to washout • Good machining accuracy • Good wear and corrosion protection.	• Good water and aqueous coolant separability • Strong resistance to washout • Good machining accuracy • Good wear and corrosion protection • Extra tackifier added.	• Enhanced water and aqueous coolant separability • Strong resistance to washout • Extra machining accuracy • Extra wear and corrosion protection.	• Enhanced water and aqueous coolant separability • Strong resistance to washout • Extra machining accuracy • Extra wear and corrosion protection.

⁸ Claims in this table are based on Shell Tonna laboratory results, compared with industrial standards, by test methods including the Cincinnati mechanical stick-slip test, ASTM D4172 four-ball wear test and SKC coolant separability test.

⁹ "Shell Lubricants" refers to the various Shell companies engaged in the lubricants business.

¹⁰ Refer to Kline & Company 2024, 22nd edition Global Lubricants: Market Analysis and Assessment 2023. Shell is named #1 global lubricants supplier for the 18th year in a row.



Contact us

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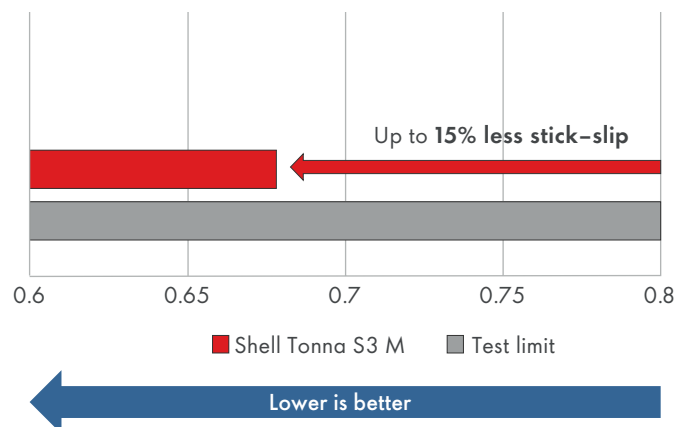
Appendix

The image displays a bar graph titled "Ratio of static friction to dynamic friction (Cincinnati mechanical test)". The horizontal axis represents values ranging from 0.6 to 0.8, corresponding to the friction ratio. An arrow pointing to the left, labelled "Lower is better," indicates that lower values signify better performance. The vertical axis compares the performance of Shell Tonna S3 M against the test limit.

The bar for Shell Tonna S3 M is shorter, indicating a friction ratio of approximately 0.68, which is lower than the test limit of 0.8. A text annotation reads "Up to 15% less stick-slip," accompanied by a yellow arrow pointing left to emphasise the difference between Shell Tonna S3 M and the test limit.

The figure highlights that Shell Tonna S3 M reduces the stick-slip phenomenon, characterised by jerky motion due to friction variations, by 15% compared to the benchmark. This makes Shell Tonna S3 M a more reliable choice for applications where smooth motion is critical.

Ratio of static friction to dynamic friction
(Cincinnati mechanical test)

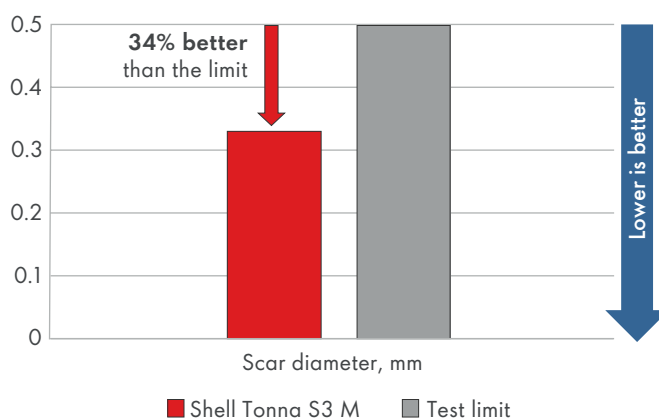


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The image represents a bar graph titled "Four-ball wear test (ASTM D4172)," which evaluates the oil wear performance. The vertical axis represents the scar diameter in millimetres (mm), labelled from 0 to 0.5; a blue arrow pointing down labelled "Lower is better" indicates that lower values represent better oil performance. The horizontal axis compares the performance of Shell Tonna S3 M (red bar) against the test limit (grey bar).

The bar for "Shell Tonna S3 M" is significantly shorter (approximately 0.32 mm) than the bar for the test limit (0.5 mm). A text annotation, accompanied by a yellow arrow pointing down, states "34% better than the limit", highlighting the improved wear resistance of Shell Tonna S3 M.

Four-ball wear test (ASTM D4172)



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Appendix

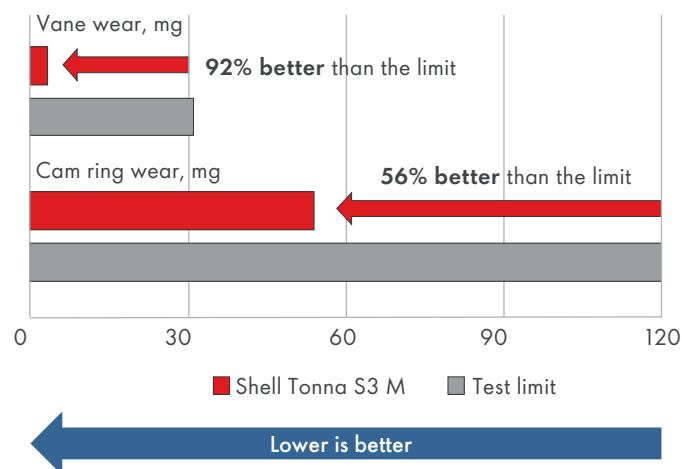
The image features a pair of bar charts titled "Vickers vane pump wear test results," which compare the wear performance of Shell Tonna S3 M against established test limits. The horizontal axis measures wear in milligrams (mg), ranging from 0 to 120 mg. An arrow pointing to the left, labeled "Lower is better," indicates that reduced wear signifies better performance.

The bar representing the vane wear of Shell Tonna S3 M is significantly shorter than the test limit, and it is accompanied by the annotation "92% better than the limit." This indicates that the product reduces vane wear by 92% compared to the benchmark.

Similarly, the bar for the cam ring wear of Shell Tonna S3 M is also shorter than the test limit, with a note stating "56% better than the limit." This illustrates a 56% improvement in reducing cam ring wear.

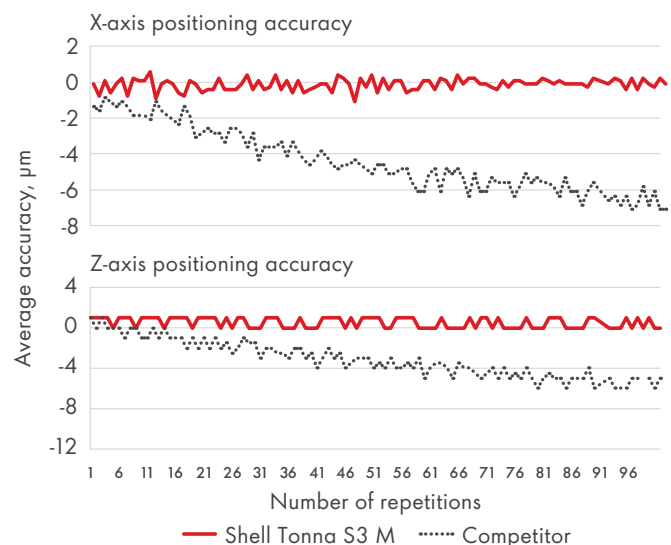
Overall, the graph demonstrates that Shell Tonna S3 M outperforms industry standards in minimizing wear for both vanes and cam rings, which are critical components in hydraulic pumps.

Vickers vane pump wear test results



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The figure consists of two line graphs titled "X-axis positioning accuracy" and "Z-axis positioning accuracy," which compare the positioning accuracy of Shell Tonna S3 M to that of a competitor oil. The vertical axis of the graphs measures the average accuracy in micrometres, while the horizontal axis represents the number of test repetitions (ranging from 0 to 100). The data in both graphs indicate that when using Shell Tonna S3 M, the positioning accuracy remains consistent, even after 100 repetitions. In contrast, the positioning accuracy with the competitor oil degrades by more than 6 micrometres after the same number of repetitions.



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