



PANOLIN[®] BIOFLUID ZFH

A GOLDEN AGE FOR TECHNOLOGY AND THE ENVIRONMENT

Envirolin 
Canada **ECO-FRIENDLY**
LUBRICANT
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PANOLIN[®] 
Swiss High-Quality Oil

MISSION IMPOSSIBLE

UTTO (Universal Tractor Transmission Oil) lubricants are amazingly versatile. They lubricate, cool and protect axles and gearboxes from wear, transmit hydraulic forces, prevent wetbrake rattling, and inhibit corrosion throughout the machine. UTTO lubricants have to meet contradictory requirements – quite a challenge

for mineral oil based products, and at first sight impossible for synthetic ester based lubricants that are «too good» for wetbrakes.

But consumers today are not interested in such technical problems: they simply want a biodegradable UTTO lubricant. Biodegradable

hydraulic fluids, gearbox and engine oils are readily available today. So it was high time to meet the needs of the construction and forestry industries – and above all of the agricultural industry that is directly in contact with the food chain – with a non-toxic biodegradable UTTO lubricant.

IF YOU CAN DREAM IT, YOU CAN DO IT



Inspired by the Silicon Valley motto, ZF and PANOLIN decided to realize this dream of a biodegradable UTTO lubricant meeting such challenging demands. The joint development project 9829 launched by ZF Friedrichshafen AG

and PANOLIN AG Madetswil had to meet all the eco-economy criteria of the PANOLIN bio-lubricants tradition: environment-friendly and cost-effective at the same time.



TECHNICAL CRITERIA

- Fully synthetic
- Excellent anti-wear properties
- Outstanding resistance to oxidation
- No deposits even at the highest temperatures
- Very low pourpoint
- Suitable for use over a very wide temperature range



ECOLOGICAL CRITERIA

- Non-toxic
- Rapidly biodegradable
- Resource-conserving



ECONOMIC CRITERIA

- Long operating life; greater machine productivity
- Significant savings through fewer oil changes
- Lower disposal costs

TO MEET THESE CRITERIA, THE ZF ENGINEERS ESTABLISHED THE FOLLOWING REQUIREMENTS FOR PROJECT 9829:

Synchronization test	✓ Fulfilled
WG 200 3-stage friction coefficient test	✓ Fulfilled
ZF main wetbrake friction coefficient test	✓ Fulfilled
ZF sub-wetbrake Eccom friction coefficient test	✓ Fulfilled
ZFN 13022/TE-ML 06, 07, 07C	✓ Approved

ENVIRONMENT-RELATED TESTS ON THE PROJECT 9829 OIL AND ITS COMPONENTS:

OECD 201 algae test	✓ Fulfilled
OECD 202 daphnia test	✓ Fulfilled
OECD 203 fish hazard	✓ Fulfilled
OECD 301 B 28-day biodegradability: 71 – 78%	✓ Fulfilled
VAMIL regulations	✓ Fulfilled
Blue Angel RAL UZ 79	✓ Fulfilled



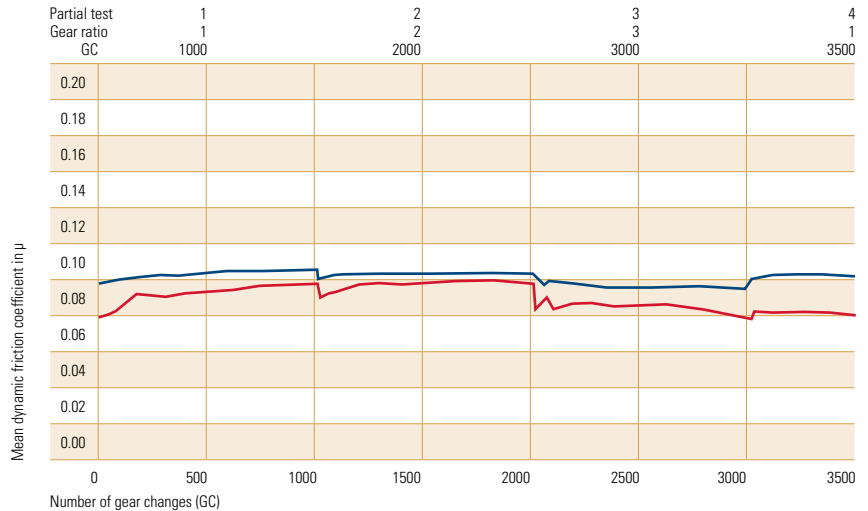
BLOOD, SWEAT AND TEARS

Not quite, but seven months of hard work combined with invaluable bio-lubricants know-how, professionalism and relentless determination. The result of development project 9829 was successful: PANOLIN BIOFLUID ZFH biodegradable high-performance UTTO lubricant.

PANOLIN BIOFLUID ZFH SETS A NEW MILESTONE IN BIO-LUBRICANTS DEVELOPMENT

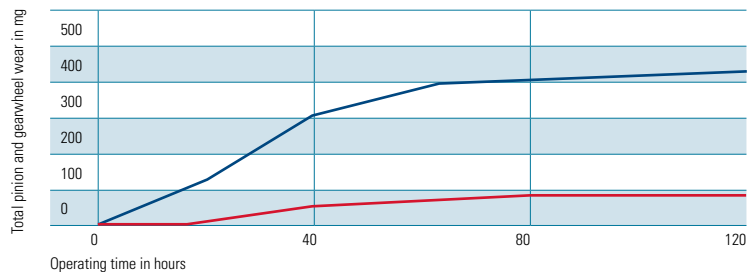
«Mission impossible» was solved by imparting synthetic ester with the necessary dynamic and static friction properties (oil film rupture coefficient) – thanks of course to long-standing know-how in selecting and combining the right components.

Comparative synchronisation and friction coefficient test results on sintered, molybdenum and paper surfaces were practically identical with those of the ZF reference oil.



WG 200 3-STAGE FRICTION COEFFICIENT TEST ON SINTERED SURFACE (MEAN DYNAMIC FRICTION COEFFICIENTS)

- ZF reference oil
- PANOLIN BIOFLUID ZFH



THE FRUITS OF LABOUR

The expected superiority of PANOLIN BIOFLUID ZFH over mineral oil based UTTO lubricants was fully confirmed by various tests:

ZF STANDARD WEAR TEST (DGMK SLOW-RUNNING WEAR TEST)

These test results proved that PANOLIN BIOFLUID ZFH (88 mg) reduces wear by about five times compared with the reference oil (438 mg).

PANOLIN BIOFLUID ZFH ONCE AGAIN MAKES PANOLIN AG THE LEADER IN BIODEGRADABLE LUBRICANTS DEVELOPMENT.



Lamella comparison according to WG 200 3-stage friction coefficient test (left: reference oil; right: PANOLIN BIOFLUID ZFH)



PANOLIN HLP SYNTH E, PANOLIN TURWADA SYNTH E, PANOLIN TURWADA S 220 LL:



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