



# TOTAL COST OF ANALYSIS IN PETROLEUM LABS

It seems contradictory, though it is the undeniable truth. While the importance of petroleum analysis increases, purchasing budgets have downsized over the last few years and lab managers have to reflect about how to purchase in a cost-effective way. This mindset goes way beyond exploring the market in search of the best prices. It is all about spreading out the cost over the next following years of usage. A well-known concept as Total Cost Of Ownership also takes multiple other parameters in account: maintenance costs, cost of downtime, energy consumption, etc. Besides that, verification of test results is immensely valuable to reduce various costs occurring in the production process.

Sustainable business is to be found in every part of a company's structure. In every department, a vision of durability and adjustments in the purchase processes may drastically reduce long-term costs. Purchasing the most affordable instrument without considering future costs that involve maintaining the continuous accessibility of the instrument or reducing downtime will only end up in a pile of needless costs and frustration. This total cost of ownership approach is an enormous step forward in cost effective buying. However, the total cost of performing a trustworthy analysis is what really matters. Reducing the total cost of your lab on a long-term vision is good; continuously improving processes to obtain the same result with even lower costs is better.

## Purchasing:

### Buying a durable solution instead of an instrument

The lab manager came in excited this morning; the budget for the development of a new testing area for jet fuel has finally been approved. Don't disturb him today, he is busy searching the internet and requesting quotations for a flash point tester, a freezing point analyser and a cloud point tester. He has already found some affordable 2nd hand equipment, which will certainly save him some money. In this situation, the real purpose of the purchase is passed by. The new laboratory activity is an investment with the aim to increase the turnover and the profit. Therefore simply buying some good looking instrumentation is only part of the solution that is actually required.

To maximise the durability on the long term, the operational lifetime of the analyser will highly affect the cost per analysis. Even a one-year difference in lifetime will be significant when dividing the cost compared to analysis turnover. An extended lifespan can only be ensured when the system is properly used and cleaned by the operator and when it is proactively maintained. Therefore, choosing an instrument that is easy to clean and has an extended availability of replacement spares is highly recommended.

## Maintenance and service:

### From necessary evil to provider of durability

European Lab Services (ELS) has over 25 years of experience in verification and service of petroleum analysers. But those are only the fundamentals. The real activity is based on an uttermost important question: 'How can proactive service support be the key to durability instead of being the necessary evil that only involve costs?'

Reducing the usage cost of an instrument starts with the most obvious part: the cleaning. Without the right cleaning of test cells, periodic calibration and verification, results will certainly start to deviate after a certain time with many discussions as a result. A different example is the cleaning of cooling vents, keeping a cooling circuit operational will drastically reduce energy costs.

A proactive service approach allows the laboratory user to avoid downtime. Strict maintenance methods are applied to make sure that the service is performed in the correct way with respect for the instrument, causing minimum time loss and the delivery of representative results. A short periodic maintenance action

optimises the accessibility of the instrument and the involvement of company engineers will be reduced to a minimum level.

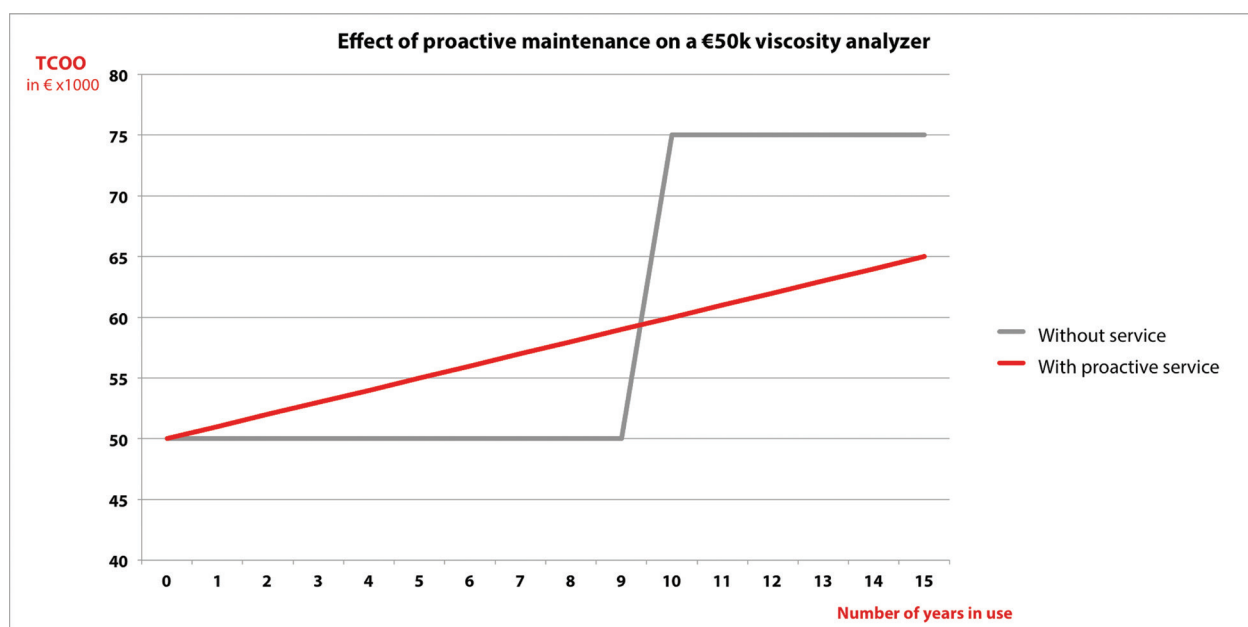
### Example case:

#### The effect of proactive maintenance

A viscosity analyser that is frequently used costs around €50k. Without any intervention the expected lifespan of this instrument will be 10 years, disregarding downtime and maintenance costs for defects. This means a total cost of €5K per year for this analysis.

When an annual maintenance is performed, the expected lifespan of the instruments is 15 years. With a yearly cost of approximately €1K, this will result in a total cost of €65k spread over 15 years. As a result you will be able to perform 15 years of analysis for €4,3K per year.

In order to reach this lifespan without any maintenance, a new analyser has to be purchased after 10 years. Half of the purchasing price has to be add up resulting in a total cost of €75k. Which means a difference in Total Cost Of Ownership of €10k spread over 15 years. See Graph 1.



Graph 1

Of course various other elements will affect the behaviour of an analyser. The challenge is to map out all spent and foreseeable costs in order to obtain a useful working tool that has the capability of telling the instrument user exactly what the analysis will cost. The company is aided in the determination of a correct pricing for the customers and valuable lessons about the cost effectiveness of the used instruments and methods are derived from this information.

For those reasons the Instrument Cost Of Ownership working tool has been developed. The lab user should be aware of the current cost of ownership status of the instruments in order to determine the right actions in case of defects or the purchase of new equipment. Therefore complete and dynamic reports on the instruments' technical history, certification, cost structure for replacement parts, service engineer working hours, and Service Level Agreements are highly necessary to visualise the health of the lab infrastructure and detect recurring breakdowns.

See Graph 2.

## System verification and certification

### Ensure precision and traceability

Two different elements that may influence the cost effectiveness of an investment for a lab analyser are the traceability and precision of the measured results. All analysers operate according to an international recognised standard (e.g. ASTM, EN, etc.), or at least they should. It's best to be sure by verifying the instruments' working method periodically with an accredited organisation. The verification of the instrument consists of the comparison to the technical specifications stated in the standard method and certification of this compliance. Reliable precision and international traceability are guaranteed with some cost-reducing effects.

Without a certificate of compliance to the standard method of a test, any other party, e.g. the customer or governmental auditor, could start a discussion about the reliability of your test results. Consequently a so-called 'witnessing' will be performed. In this case all parties will gather and rerun the doubted test, usually in cooperation with an independent testing laboratory charging at least €150 per hour for consulting. This cost is considerable for these witnessing gatherings can take half a day up to multiple days, depending on the test, disregarding the time loss due to needless discussions. A certificate of compliance to the standard method granted by an accredited organisation is sufficient to turn down all charges of doubtful results caused by the analyser and is of immense importance when facing a claim. When a small ship loaded with 5000 tons of diesel fuel has to be held because of doubtful results, a daily cost of 10.000 to 15.000 euros is paid for the delay. It is easy to imagine that evadable claims frequently exceed 1 million euros. Considering this shows that an annual verification is just a small investment compared to the consequences of the opposite.

Additionally, the accuracy of a test has a direct effect on the profitability. Working with a correctly verified analyser ensures operation within the limit of the standard specifications or allows operation that is even more accurate. Performing analysis with an increased accuracy allows a refinery to work closer to the required specification and save thousands of euros on additives and other expenses. Above that, working close to the specification allows the company to detect over-quality product that exceeds expectations and will inflict needless costs the customer won't be willing to pay for.

### Example case:

#### Reducing production cost as result of verified performance of CFPP measurement

An oil refinery handles a daily crude oil input of 320.000 barrels a day or 16 mil ton per year. The diesel fuel production is 350.000m<sup>3</sup> diesel fuel per month after blending. The ASTM D6371 or EN116 describes the standard test method for Cold Filter Plugging Point determination. In this method specification a 0,5°C accuracy on the temperature measurement is stated. Though when using a correctly verified CFPP analyser, it is reliable to work with an accuracy of 0,1°C. Higher accuracy allows higher precision in blending and saving costs. Reducing the CFPP value by 1°C in this exemple makes a difference of up to 1.2 mil euros per year. The savings of an accuracy increase helps to obtain that result. See Graph 3



## Instrument cost of ownership

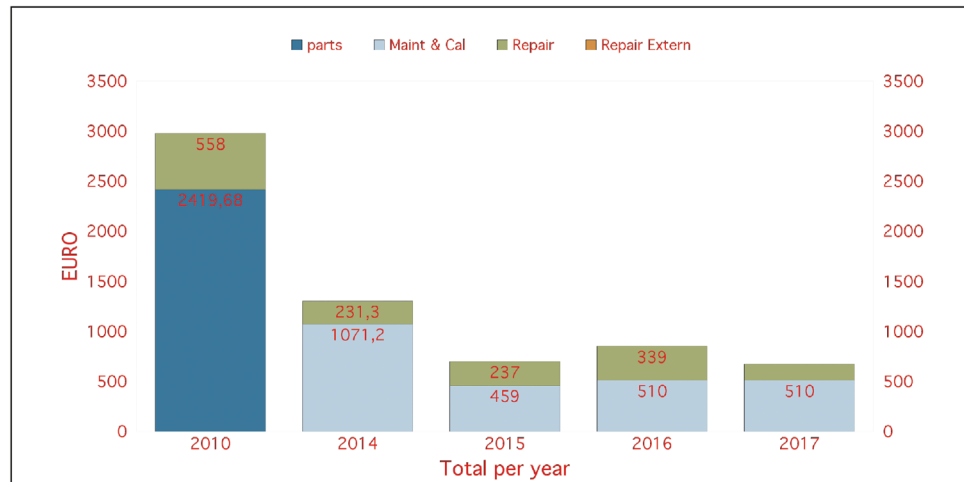
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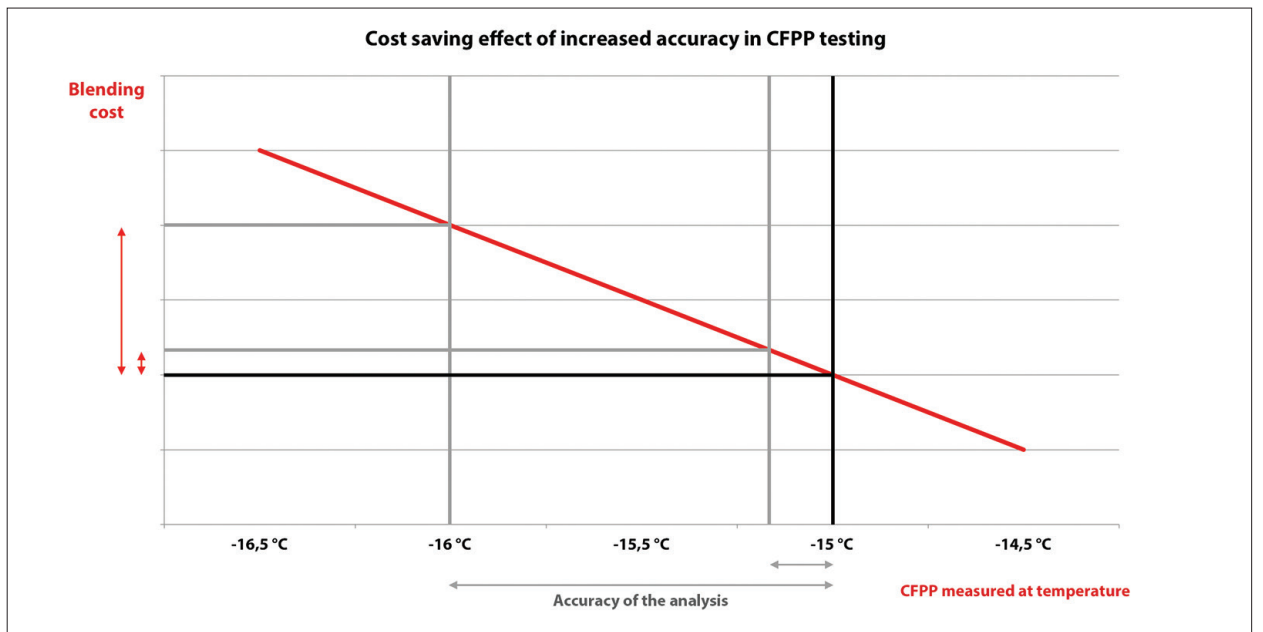
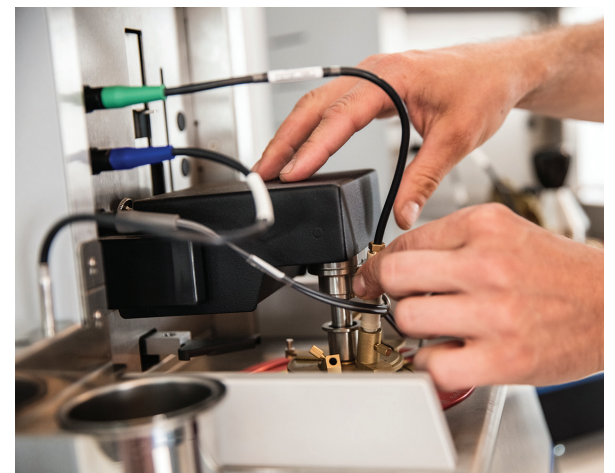
Total Cost **6.497,48**

Cost / year **206,35**

Instrument HVM472 (unit2)  
Serial n° 084720399  
Lab ID Toestel 2  
In use since 27/08/2008 Age 8,9



Graph 2



Graph 3

## Conclusion

The concepts of Total Cost of Ownership and Total Cost of Analysis go way beyond the instrument itself. Various factors such as service level and result verification directly influence the expends and profit a company gets out of its instruments.

Proactive maintenance from early in the lifespan of an analyser reduces downtime and unforeseeable costs to a minimum level and guarantees continuous accessibility to the instrument.

Verification of the instrument and its results saves a refinery thousands to millions of euros by avoiding expensive claims and needless discussions caused by doubted analysis results.

The TCOA concept won't save the company any money this year. But on the long run, every company applying this healthy mindset will see the benefit within 1 – 2 years.

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