CATAGEN
green emissions testing

CASE STUDY

# Representative Aftertreatment Ageing

## OBJECTIVES

- Hardware needed to be aged equivalent to bespoke ageing protocol representative of real world operation to useful life.
- OEM had a product launch deadline that had to be met.
- Accurate and repeatable results were required for homologation.

A key challenge for every OEM is generating aged catalysts accurately and repeatably for calibration. Any uncertainty over aftertreatment system performance will cause delays to product launch or larger safety margins applied for emissions performance which reduce the opportunity of catalyst PGM optimisation and therefore costs.

## EXAMPLE OF OUR STANDARD AGEING CAPABILITIES

| Parameter | Value |
|---|---|
| Flow Rate | 120g/s (+) |
| Inlet Temperature | 1010°C |
| Lambda | 1-10 |
| Species Added | NO, $NH_3$, $H_2O$, $O_2$, CO, $CO_2$, $CH_1$ Natural Gas, (others on request) |
| Chemical Poisoning | At partner request e.g., sulphur, phosphors |

## APPROACH

1. Performance metrics can be obtained from a partner's reference aged aftertreatment system, if available, to understand what the performance of the system needs to be at full useful life.

2. Using our in-house kinetic model, coupled with our catalysis and testing knowledge, we can start to understand the required ageing parameters to representatively age the system to useful life.

3. The CATAGEN toolset, specifically the CATAGEN Ageing Metric, was used to quantify the bespoke customer ageing experience.

4. An equivalent CATAGEN ageing cycle was specified and executed with industry leading control and repeatability. This is shown in the process diagram.

5. As the CATAGEN Ageing Metric evaluation is embedded into the in-house OMEGA control software, the catalyst ageing experience is monitored on a second-by-second basis, allowing certainty to be placed on the extent of the catalyst ageing.

6. A representative aged aftertreatment component is produced for our partner.

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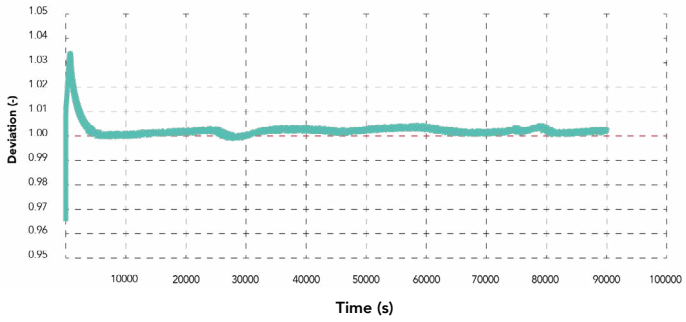
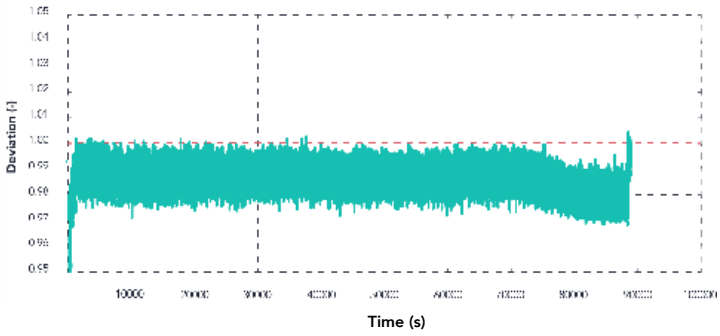
## TESTING DATA SAMPLES

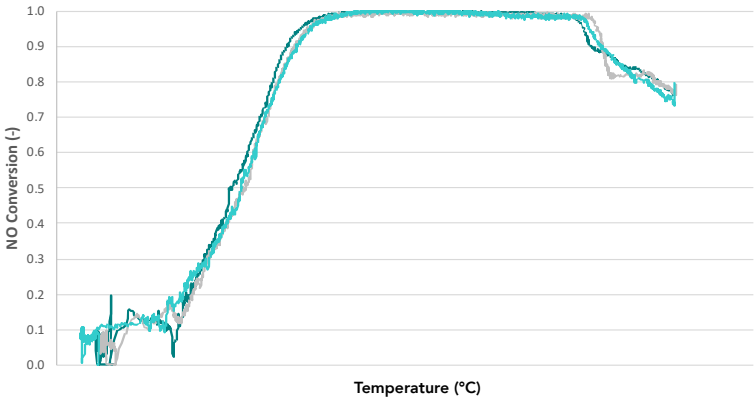
Inlet Temperature Deviation




Inlet Lambda Deviation




Lights Offs ANR 1 with $O_2$




## CONCLUSION

Accurately, and repeatably and most importantly representatively generating aged catalyst hardware is a challenging process. In this study, the CATAGEN's toolset can facilitate the development of a CATAGEN ageing cycle equivalent to a bespoke customer partner cycle. Ageing is complete with high repeatability and accuracy on the OMEGA test vehicle, with catalyst equivalency validated on the customer test bench.

- Cost Savings
- Testing Adaptability
- $CO_2$ Emissions Saving
- Pure Measurement of Performance