



**TRIBOLOGY INVESTIGATION INTO EXCESSIVE EXHAUST GAS EMISSIONS ON A DYNAPAC
TWIN DRUM VIBRATING ROLLER TYPE CC142 (REG SL 398 SERIAL No 834803**

CONDUCT A TEST USING CHORNCO 2082 DIESEL FUEL CONDITIONER

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INTRODUCTION

The Dynapack Roller was reported as producing excessive fumes and exhaust gas emissions and smoke. The emissions were such that the staff refused to use the machine resulting in Works Infrastructure having to hire an alternative machine.

This particular situation provided an opportunity to test the 2082 product manufactured by Chornco and their claims that it could reduce the exhaust emissions and avoid expensive maintenance on the machine.

TEST PROTOCOL

For practical reasons the exhaust system was modified in order to ensure that exhaust fumes were not blow directly at the driver. Once this had been completed base line reading were taken of the following:

1. CO emissions using an exhaust gas analyser. The Carbon Monoxide levels would indicate the level of the overall exhaust gases
2. Vibration levels at various points using an ultrasonic tester would indicate whether or not the Chornco 2082 Diesel Fuel Treatment was providing lubrication to the upper cylinder, fuel pump and injectors.

The fuel was treated with Chornco 2082 at the recommended treatment ration of 1:640 for the first 3 tanks of fuel and 1:1280 thereafter. From this the above tests were repeated and the results tabulated as detailed.

CONCLUSIONS

Clearly the use of Chornco 2082 Diesel Fuel Treatment has reduced the exhaust gas emissions from excessive to almost non-existent. By identifying that the product had not been used prior to the second test and the re-application of the 2082 product, it was evident that the benefits, initially lost could be restored very quickly. Had the product been used continuously the ultrasonic reading would, without doubt, been more significant.

Nevertheless a reduction in ultrasonic noise levels indicates less asperity contact and as shown in the tribos testing, the wear levels are significantly reduced when using the Chornco 2082 product. This will result in extended fuel pump and injector life, which would reflect in a significant reduction in maintenance and costs.



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**TEST 1 – EXHAUST EMISSIONS
VISUAL & CARBON MONOXIDE MEASUREMENT**

Machine: Dynapac Twin Drum Vibrating Roller
Type: CC 142 (Reg SL 398)
Serial No. 834803
Engine Hours 1286.9
Air filter Z75

Ambient Temperature 16.3°C

TEST READINGS

RPM	CARBON MONOXIDE IN PPM - BASELINE	CARBON MONOXIDE IN PPM - CHORNCO TREATMENT	REDUCTION %
IDLE	383	11	97%
2800	1285	208	84%

Notes:

Prior to treatment by the Chornco 2082 Diesel Fuel Treatment there was noticeable and excessive black smoke visible from the exhaust pipe at idle and a high concentration at 2800 RPM.

After treatment there was no visible signs of smoke at idle or at 2800 RPM.

CONCLUSION

In noting the considerable reductions in CO ppm it is concluded that, in identifying the manner in which the Chornco 2082 product works and given that the machine had not been recently overhauled, there were two significant factors to consider.

1. The product had cleaned the upper engine components, thus restoring lost efficiencies.
2. The product had reacted with the diesel fuel to provide a more efficient combustion.

A reduction in exhaust gas emissions means that less oxygen is being used, therefore there has to be less fuel required to produce the same power.

**TEST 2 – ULTRASONIC NOISE TEST
VIBRATION AND MAINTENANCE**

Ultrasonic test results (Db Levels)

1. **62** First reading at Idle
2. **67** Second reading at 2800 RPM

TEST A

					ROCKER COVER
70		71		INJECTORS	68
<u>71</u>		<u>68</u>			<u>69</u>
71	*	70	*		66
<u>69</u>		<u>70</u>			<u>71</u>
62		71			52
<u>67</u>		<u>73</u>		TOP OF BLOCK CASING	<u>76</u>
58					65
					TOP OF CASING

TEST B

					ROCKER COVER
70		61		INJECTORS	63
<u>76</u>		<u>68</u>			<u>70</u>
74	*	68	*		69
<u>73</u>		<u>72</u>			<u>72</u>
62		69			63
<u>76</u>		<u>72</u>		TOP OF BLOCK	<u>69</u>
56					64
<u>63</u>					<u>69</u>
					TOP OF CASING

Note:

On No.1 cylinder there was a general increase in noise level indicated and was attributed to an increase in valve clearance or cylinder noise. This was therefore indicating a mechanical defect.

On No.2 cylinder there was a general reduction in noise level after the application of the Chornco 2082 product.

On No.3 cylinder there was a general reduction in noise level after the application of the Chornco 2082 product.

When Test B was conducted it must be noted that for several weeks the clients operatives had failed to treat the fuel with Chornco's 2082 product. The product was re-introduced and after running the machine for approximately 30 minutes prior to these test results being taken it was evident from the smoke emissions that the benefits quickly returned. Having said that, had the product been used continuously the readings would have shown greater and more significant reductions in noise levels