

OIL ANALYSIS REPORT

Machine Id MANNS 1100 X6 Component

Port Main Engine

SINCLAIR FULL SYNTHETIC SAE 5W40 (23 GAL)

DIAGNOSIS

Recommendation

We advise that you check the air filter, air induction system, and any areas where dirt may enter the component. The filter change at the time of sampling has been noted. We recommend an early resample to monitor this condition.

Wear

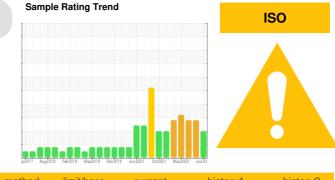
All component wear rates are normal.

Contamination

There is a moderate amount of particulates (2 to 100 microns in size) present in the oil. The system cleanliness is above the acceptable limit for the target ISO 4406 cleanliness code.

Fluid Condition

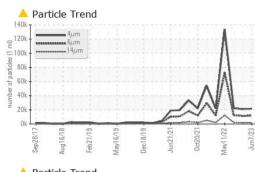
The BN result indicates that there is suitable alkalinity remaining in the oil.

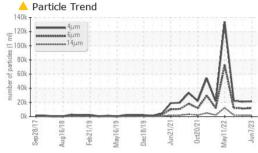


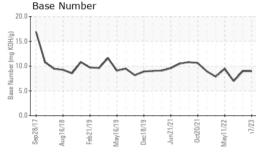
Machine Age hrs Client Info 373 13003 12574 Oil Age hrs Client Info 373 429 520 Oil Changed Client Info ABNORMAL ABNORMAL ABNORMAL ABNORMAL Sample Status Image Image ABNORMAL ABNORMAL ABNORMAL ABNORMAL CONTAMINATION method Imit/base current history1 history2 Fuel WC Method >4.0 <1.0 <1.0 <1.0 Glycol WC Method >575 18 7 6 Chromium ppm ASTM D5185m >32 0 <1 <1 Nickel ppm ASTM D5185m >32 0 <1 <1 Nickel ppm ASTM D5185m >1 1 <1 <1 Aluminum ppm ASTM D5185m >18 1 <1 <1 Lead ppm ASTM D5185m >14 <1 <1 <1	SAMPLE INFORM	ATION	method	limit/base	current	history1	history2
Machine Age hrs Client Info 373 13003 12574 Oil Age hrs Client Info 373 429 520 Oil Changed Client Info 373 429 520 Sample Status Image ABNORMAL ABNORMAL ABNORMAL CONTAMINATION method Imil/base current history1 history2 Fuel WC Method >4.0 <1.0 <1.0 <1.0 Glycol WC Method >4.0 <1.0 <1.0 NEG NEG WEAR METALS method Imil/base current history1 history2 Iron ppm ASTM D5185m >52 1 <1 <1 Nickel ppm ASTM D5185m >22 <1 <1 1 <1 Namium ppm ASTM D5185m >14 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 1 1 </th <th>Sample Number</th> <th></th> <th>Client Info</th> <th></th> <th>KLM2316481</th> <th>KL0008978</th> <th>KL0008920</th>	Sample Number		Client Info		KLM2316481	KL0008978	KL0008920
Oil AgehrsClient Info373429520Oil ChangedClient InfoChangedChangedChangedChangedSample StatusIImit/basecurrenthistory1history2FuelWC Method>4.0<1.0<1.0<1.0GlycolIWC Method>4.0<1.0<1.0<1.0GlycolIWC MethodNEGNEGNEGNEGWEAR METALSmethodImit/basecurrenthistory1history2IronppmASTM D5185m>751876ChromiumppmASTM D5185m>2<1<1<1NickelppmASTM D5185m>2000JuminumppmASTM D5185m>2000JuminumppmASTM D5185m>14<1<1<1LeadppmASTM D5185m>14<1<1<1TinppmASTM D5185m>14<1<1<1VanadiumppmASTM D5185m0000ADDITIVESmethodImit/basecurrenthistory1history2BoronppmASTM D5185m531055MagnesiumppmASTM D5185m531055MagnesiumppmASTM D5185m103710351282PhosphorusppmASTM D5185m20433Magnesiumppm	Sample Date		Client Info		07 Jun 2023	08 Jan 2023	04 Nov 2022
Oil Changed Sample StatusClient InfoChanged ABNORMAL	Machine Age	hrs	Client Info		373	13003	12574
Sample Status Imathe ABNORMAL ABNORMAL ABNORMAL ABNORMAL CONTAMINATION method limit/base current history1 history2 Fuel WC Method >4.0 <1.0	Oil Age	hrs	Client Info		373	429	520
CONTAMINATION method limit/base current history1 history2 Fuel WC Method >4.0 <1.0	Oil Changed		Client Info		Changed	Changed	Changed
Fuel WC Method >4.0 <1.0 <1.0 <1.0 <1.0 Glycol WC Method WC Method NEG NEG NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >75 18 7 6 Chromium ppm ASTM D5185m >2 <1 <1 <1 Nickel ppm ASTM D5185m >2 0 0 0 Silver ppm ASTM D5185m >15 1 1 <1 <1 Lead ppm ASTM D5185m >14 <1 3 2 Copper ppm ASTM D5185m >80 87 137 119 Tin ppm ASTM D5185m 14 <1 <1 <1 Cadmium ppm ASTM D5185m 0 0 0 0 Boron ppm ASTM D5185m 14 <1 <1	Sample Status				ABNORMAL	ABNORMAL	ABNORMAL
Glycol WC Method NEG NEG NEG NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >75 18 7 6 Chromium ppm ASTM D5185m >2 <1 <1 <1 Nickel ppm ASTM D5185m >2 <1 <1 <1 Nickel ppm ASTM D5185m >2 <0 0 0 Silver ppm ASTM D5185m >2 0 0 0 Aluminum ppm ASTM D5185m >15 1 1 <1 <1 Lead ppm ASTM D5185m >80 87 137 ▲ 119 Tin ppm ASTM D5185m >14 <1 <1 <1 Vanadium ppm ASTM D5185m 0 0 0 0 Addium ppm ASTM D5185m 53 10 55 <th colspan="2">CONTAMINATION</th> <th>method</th> <th>limit/base</th> <th>current</th> <th>history1</th> <th>history2</th>	CONTAMINATION		method	limit/base	current	history1	history2
WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m<>75 18 7 6 Chromium ppm ASTM D5185m<>8 1 <1	Fuel		WC Method	>4.0	<1.0	<1.0	<1.0
Iron ppm ASTM D5185m >75 18 7 6 Chromium ppm ASTM D5185m >8 1 <1	Glycol		WC Method		NEG	NEG	NEG
Chromium ppm ASTM D5165m >8 1 <1	WEAR METALS		method	limit/base	current	history1	history2
Chromium ppm ASTM D5185m >8 1 <1 <1 Nickel ppm ASTM D5185m >2 <1	Iron	ppm	ASTM D5185m	>75	18	7	6
Titanium ppm ASTM D5185m >3 0 <1 0 Silver ppm ASTM D5185m >2 0 0 0 Aluminum ppm ASTM D5185m >15 1 1 <1	Chromium	ppm	ASTM D5185m	>8	1	<1	<1
Silver ppm ASTM D5185m >2 0 0 0 Aluminum ppm ASTM D5185m >15 1 1 <1	Nickel	ppm	ASTM D5185m	>2	<1	<1	<1
Aluminum ppm ASTM D5185m >15 1 1 1 1 Lead ppm ASTM D5185m >18 <1	Titanium	ppm	ASTM D5185m	>3	0	<1	0
Lead ppm ASTM D5165m >18 <1 3 2 Copper ppm ASTM D5185m >80 87 137 119 Tin ppm ASTM D5185m >14 <1	Silver	ppm	ASTM D5185m	>2	0	0	0
Copper ppm ASTM D5185m >80 87 137 119 Tin ppm ASTM D5185m >14 <1	Aluminum	ppm	ASTM D5185m	>15	1	1	<1
Tin ppm ASTM D5185m >14 <1 <1 <1 Vanadium ppm ASTM D5185m >14 0 0 0 Cadmium ppm ASTM D5185m 0 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 20 40 30 Barium ppm ASTM D5185m 0 0 0 Molybdenum ppm ASTM D5185m 53 10 55 Manganese ppm ASTM D5185m 881 843 1086 Calcium ppm ASTM D5185m 827 823 960 Zinc ppm ASTM D5185m 827 823 960 Zinc ppm ASTM D5185m 20 4 3371 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m <td< td=""><th>Lead</th><td>ppm</td><td>ASTM D5185m</td><td>>18</td><th><1</th><td>3</td><td>2</td></td<>	Lead	ppm	ASTM D5185m	>18	<1	3	2
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ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 20 40 30 Barium ppm ASTM D5185m 0 0 0 Molybdenum ppm ASTM D5185m 53 10 55 Manganese ppm ASTM D5185m 53 10 55 Magnesium ppm ASTM D5185m 58 1 <1	Vanadium	ppm	ASTM D5185m		0	0	0
Boron ppm ASTM D5185m 20 40 30 Barium ppm ASTM D5185m 0 0 0 0 Molybdenum ppm ASTM D5185m 53 10 55 Manganese ppm ASTM D5185m 53 10 55 Manganese ppm ASTM D5185m 1 <1 <1 <1 <1 Magnesium ppm ASTM D5185m 881 843 1086 Calcium ppm ASTM D5185m 827 823 960 Zinc ppm ASTM D5185m 1037 1035 1282 Sulfur ppm ASTM D5185m 3184 3404 3371 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 4 3 3 Sodium ppm ASTM D5185m >20 4 3 0 INFRA-RED method	Cadmium	ppm	ASTM D5185m		0	0	0
Barium ppm ASTM D5185m 0 0 0 Molybdenum ppm ASTM D5185m 53 10 55 Manganese ppm ASTM D5185m 1 <1 <1 Magnesium ppm ASTM D5185m 881 843 1086 Calcium ppm ASTM D5185m 827 823 960 Zinc ppm ASTM D5185m 827 823 960 Zinc ppm ASTM D5185m 1037 1035 1282 Sulfur ppm ASTM D5185m 3184 3404 3371 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 4 3 3 Sodium ppm ASTM D5185m >20 4 3 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.3 <th>ADDITIVES</th> <th></th> <th>method</th> <th>limit/base</th> <th>current</th> <th>history1</th> <th>history2</th>	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum ppm ASTM D5185m 53 10 55 Manganese ppm ASTM D5185m 1 <1	Boron	ppm	ASTM D5185m		20	40	30
Manganese ppm ASTM D5185m 1 <1 <1 Magnesium ppm ASTM D5185m 881 843 1086 Calcium ppm ASTM D5185m 728 1528 946 Phosphorus ppm ASTM D5185m 827 823 960 Zinc ppm ASTM D5185m 827 823 960 Zinc ppm ASTM D5185m 1037 1035 1282 Sulfur ppm ASTM D5185m 3184 3404 3371 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 4 3 3 Sodium ppm ASTM D5185m >20 4 3 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.3 0.4 0.3 Nitration Abs/cm *ASTM D7624	Barium	ppm	ASTM D5185m		0	0	0
Magnesium ppm ASTM D5185m 881 843 1086 Calcium ppm ASTM D5185m 728 1528 946 Phosphorus ppm ASTM D5185m 827 823 960 Zinc ppm ASTM D5185m 1037 1035 1282 Sulfur ppm ASTM D5185m 3184 3404 3371 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 4 3 3 Sodium ppm ASTM D5185m >20 4 3 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.3 0.4 0.3 Nitration Abs/cm *ASTM D7624 >20 9.5 12.0 11.3	Molybdenum	ppm	ASTM D5185m		53	10	55
Calcium ppm ASTM D5185m 728 1528 946 Phosphorus ppm ASTM D5185m 827 823 960 Zinc ppm ASTM D5185m 1037 1035 1282 Sulfur ppm ASTM D5185m 3184 3404 3371 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 4 3 3 Sodium ppm ASTM D5185m >20 4 3 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.3 0.4 0.3 Nitration Abs/cm *ASTM D7624 >20 9.5 12.0 11.3	Manganese	ppm	ASTM D5185m		1	<1	<1
Phosphorus ppm ASTM D5185m 827 823 960 Zinc ppm ASTM D5185m 1037 1035 1282 Sulfur ppm ASTM D5185m 3184 3404 3371 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 4 3 3 Sodium ppm ASTM D5185m >20 4 3 3 Potassium ppm ASTM D5185m >20 4 3 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.3 0.4 0.3 Nitration Abs/cm *ASTM D7624 >20 9.5 12.0 11.3	Magnesium	ppm	ASTM D5185m		881	843	1086
Zinc ppm ASTM D5185m 1037 1035 1282 Sulfur ppm ASTM D5185m 3184 3404 3371 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 4 3 3 Sodium ppm ASTM D5185m >20 4 3 3 Potassium ppm ASTM D5185m >75 22 3 4 Potassium ppm ASTM D5185m >20 4 3 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.3 0.4 0.3 Nitration Abs/cm *ASTM D7624 >20 9.5 12.0 11.3	Calcium	ppm	ASTM D5185m		728	1528	946
Sulfur ppm ASTM D5185m 3184 3404 3371 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 4 3 3 Sodium ppm ASTM D5185m >75 22 3 4 Potassium ppm ASTM D5185m >20 4 3 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.3 0.4 0.3 Nitration Abs/cm *ASTM D7624 >20 9.5 12.0 11.3	Phosphorus	ppm	ASTM D5185m		827	823	960
CONTAMINANTSmethodlimit/basecurrenthistory1history2SiliconppmASTM D5185m>20433SodiumppmASTM D5185m>752234PotassiumppmASTM D5185m>20430INFRA-REDmethodlimit/basecurrenthistory1history2Soot %%*ASTM D78440.30.40.3NitrationAbs/cm*ASTM D7624>209.512.011.3	Zinc	ppm	ASTM D5185m		1037	1035	1282
Silicon ppm ASTM D5185m >20 4 3 3 Sodium ppm ASTM D5185m >75 22 3 4 Potassium ppm ASTM D5185m >20 4 3 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.3 0.4 0.3 Nitration Abs/cm *ASTM D7624 >20 9.5 12.0 11.3	Sulfur	ppm	ASTM D5185m		3184	3404	3371
Sodium ppm ASTM D5185m >75 22 3 4 Potassium ppm ASTM D5185m >20 4 3 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.3 0.4 0.3 Nitration Abs/cm *ASTM D7624 >20 9.5 12.0 11.3	CONTAMINANTS		method	limit/base	current	history1	history2
Potassium ppm ASTM D5185m >20 4 3 0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.3 0.4 0.3 Nitration Abs/cm *ASTM D7624 >20 9.5 12.0 11.3	Silicon	ppm	ASTM D5185m	>20	4	3	3
INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.3 0.4 0.3 Nitration Abs/cm *ASTM D7624 >20 9.5 12.0 11.3	Sodium	ppm	ASTM D5185m	>75	22	3	4
Soot % % *ASTM D7844 0.3 0.4 0.3 Nitration Abs/cm *ASTM D7624 >20 9.5 12.0 11.3	Potassium	ppm	ASTM D5185m	>20	4	3	0
Nitration Abs/cm *ASTM D7624 >20 9.5 12.0 11.3	INFRA-RED		method	limit/base	current	history1	history2
	Soot %	%	*ASTM D7844		0.3	0.4	0.3
Sulfation Abs/.1mm *ASTM D7415 >30 20.9 23.9 25.4	Nitration	Abs/cm	*ASTM D7624	>20	9.5	12.0	11.3
	Sulfation	Abs/.1mm	*ASTM D7415	>30	20.9	23.9	25.4

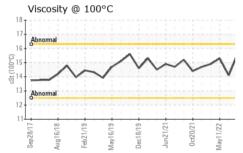


OIL ANALYSIS REPORT



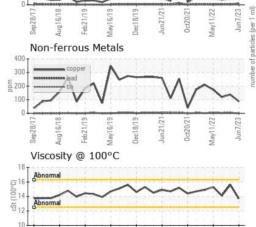






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FLUID CLEANLIN	IESS	method	limit/base	current	history1	history2
Particles >4µm		ASTM D7647		21445	20966	22349
Particles >6µm		ASTM D7647	>5000	<u> </u>	1 1421	12175
Particles >14µm		ASTM D7647	>640	<u> </u>	1 944	<u> </u>
Particles >21µm		ASTM D7647	>160	<u> 6</u> 70	▲ 655	<u> </u>
Particles >38µm		ASTM D7647	>40	<u> </u>	1 01	<u> </u>
Particles >71µm		ASTM D7647		11	10	11
Oil Cleanliness		ISO 4406 (c)	>19/16	A 21/18	1 /18	<u> </u>
FLUID DEGRADA	ATION	method	limit/base	current	history1	history2
Oxidation	Abs/.1mm	*ASTM D7414	>25	18.0	20.7	23.2
Base Number (BN)	mg KOH/g	ASTM D2896		8.98	8.96	6.98
VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE	NONE
Appearance	scalar	*Visual	NORML	NORML	NORML	NORML
Odor	scalar	*Visual	NORML	NORML	NORML	NORML
Emulsified Water	scalar	*Visual	>0.1	NEG	NEG	NEG
Free Water	scalar	*Visual		NEG	NEG	NEG
FLUID PROPERT	TIES	method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D445		13.7	15.6	14.1
GRAPHS						
Ferrous Alloys				Particle Cou	nt	
iron i		٨	491,52			1 ²⁶
0 - chromium		1	122,88	0-		-24
)-		11	30,72	0		-22

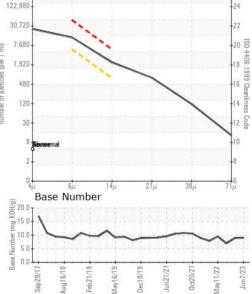


May16/19 Dec18/19

Feb21/19

Aug16/18.

Sep28/17



EXPEDITIONS Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513 Sample No. : KLM2316481 Received : 17 Jul 2023 658 FRONT ST, SUITE 127 Lab Number Diagnosed : 05900777 : 19 Jul 2023 LAHAINA, HI Unique Number : 10562133 : Wes Davis US 96761 Diagnostician Test Package : MOB 2 (Additional Tests: PrtCount) Contact: BILL CALDWELL Certificate L2367 To discuss this sample report, contact Customer Service at 1-800-237-1369. bill@go-lanai.com * - Denotes test methods that are outside of the ISO 17025 scope of accreditation. T: (800)695-2624 F: (808)661-0544 Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)

Jun21/21-

Jun7/23 -

May11/22

Report Id: EXPLAH [WUSCAR] 05900777 (Generated: 07/19/2023 11:52:37) Rev: 1

Submitted By: TECHNICIAN ACCOUNT X-6