

# Polytron

*Lubrication Technology Based on Micro-Metallurgical Process*

# Agenda

- Company Information
- Product details
  - How Does it Work
  - Characteristics
  - Benefits
  - Range of products
- Product Applications
- User References

# Background

- Manufacturing Plant is located in California, USA
- Until 1994 Polytron was primarily used by armies (Russia, Australia, Israel, Serbia) mainly in helicopters, armored tanks & submarines
- Commercially available since 1994
- Focus on Asia since since 2003 - Malaysia, Indonesia, Vietnam, Thailand, Cambodia, Myanmar & the Philippines, Australia,
- India launch in 2015

# Polytron's Mission & Goals

- Mission: To help all Industries reduce their Maintenance and Operational cost by up to 65%, and double, triple or even quadruple service life of their equipment.
- Goals: To provide significant cost savings for our clients through:
  - Extended Oil change intervals 300% - 600%
  - Average Fuel savings of up to 20%; Electrical Energy savings of up to 10%.
  - Elimination of engine/equipment wear up to 95% and major reduction in parts and equipment replacement.
  - Increasing productivity – near zero down time
  - Reducing up to 75% emission pollutants from Vehicles & Industries.
  - Considerably reducing volumes of waste oil.

## Resulting in:

Lowest Possible Production cost  
Highest possible Productivity  
Cleaner Environment

# Polytron Metal Treatment Concentrate (MTC) & Fuel Conditioner (FC)

- Polytron MTC treats the metal surfaces using Micro Metallurgical process; it does not treat the oils it is added to;
- It is engineered for all friction surfaces in all types of engines, hydraulics, gears, etc. In fact it can be used in any equipment and mechanisms that require lubrication with the same results of dramatic reduction in friction and almost complete elimination of wear & tear.
- Polytron dosages are economical:  
Polytron MTC, 5% to 15% by volume.  
Polytron FC , 0.05% to 0.1% by volume.
- Polytron MTC is compatible with all lubricants, mineral, organic and synthetic.
- Polytron FC is compatible with all fuels, gasoline, diesel, fuel oil, kerosene, HFO, etc.
- Polytron is purely petroleum based, and doesn't contain any solid particles.
- In engines it is recommended to use Polytron MTC together with Polytron FC in order to get the best possible performance off of an engine over its service life.

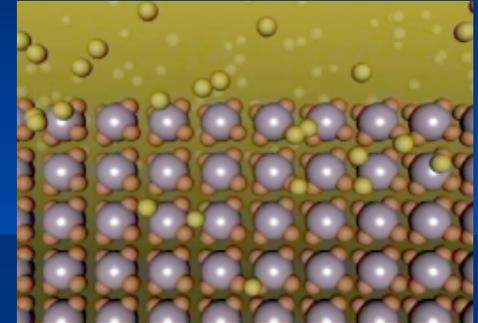
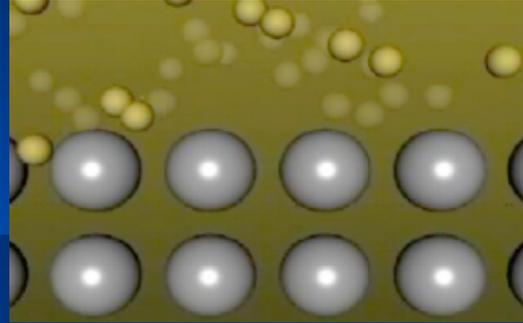
# Polytron Technology. How Does it Work ?

In the heart of this technology is a metallurgical process that allows, under heat and pressure, impregnation of some elements of Polytron, into the crystal structure of metallic friction surfaces, and convert very thin layer on these surfaces into much harder and wear resistant surfaces, resulting with much longer service life, in addition to many other very positive “side effects”.

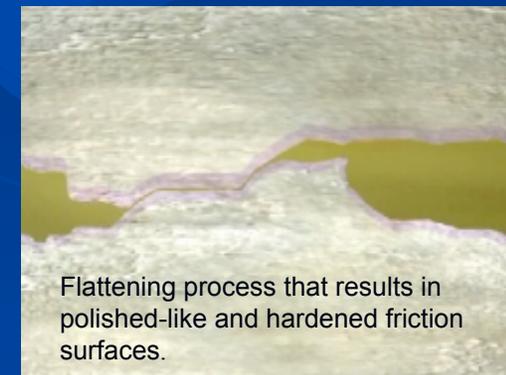
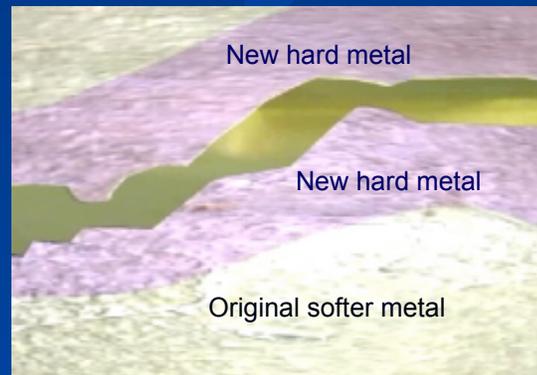


When observing mating friction surfaces under high magnification one can see that they are actually full of “mountains” and “valleys”. These “mountains” penetrate the oil-film that separates mating friction surfaces, and collide with each other. These collisions on the micro level, translate into “friction” between the mating friction surfaces on the macro-level. Some of these collisions result in metal particles breaking away from colliding “mountains”. Breaking away metal particles on the micro-level translate into a “wear” process on the macro-level.

**Conventional lubricants** are based on maintaining high strength and thickness of oil-film in order to separate the friction surfaces from touching each other. In higher pressure, generated by heavy working loads, conventional lubricants introduce an EP (Extreme Pressure) protective deposit between moving mating surfaces in order to replace the oil layer squeezed out by pressure. This way, they try to resist failure from scoring, seizure or accelerated wear. The conventional lubricants succeed in their task only partially, so a continuous wear process still takes place, contributing to deterioration in performance. This in turn, plays a significant role in the vicious cycle of deterioration in performance accelerated wear, etc.



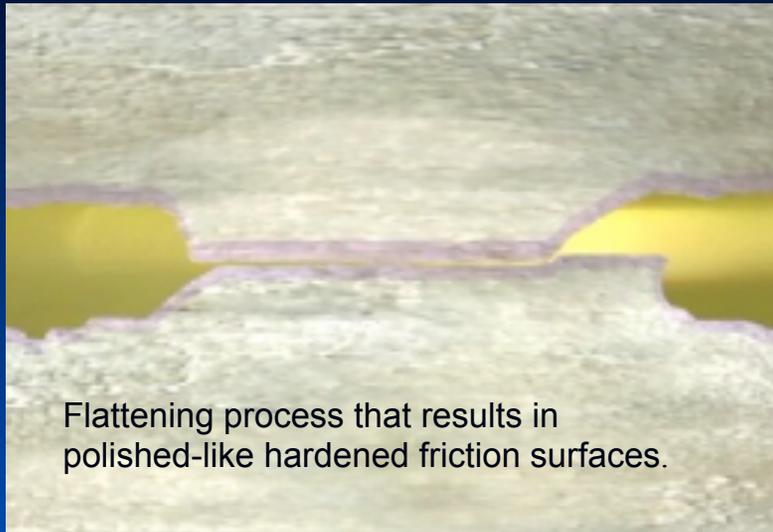
Because active elements of Polytron are polarized, when Polytron is applied, they are attracted to the metal. Under heat and pressure these polarized elements metallurgically impregnate the metal's crystal structure on its mating friction surfaces.



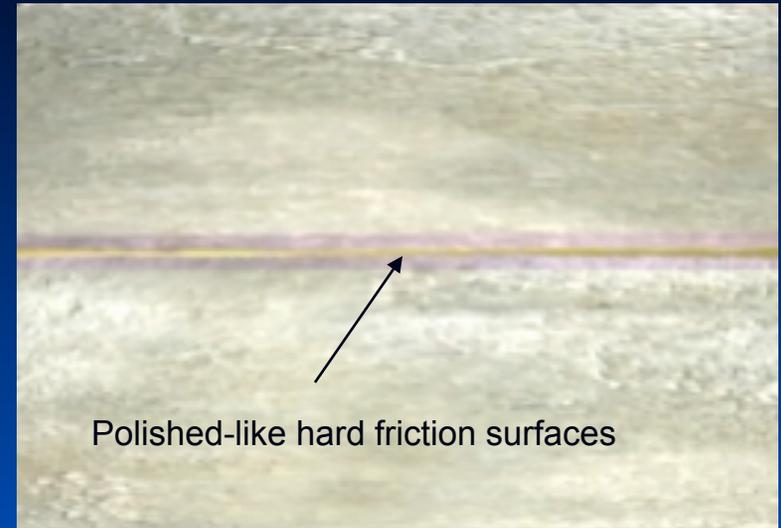
Flattening process that results in polished-like and hardened friction surfaces.

As a result of the metallurgical process, a very thin layer of original metal is converted into a new type of metal that is much harder and has a wear life that is **at least 15 times longer than the original metal**. This newly formed layer of metal protects the original “softer” metal beneath it from wear.

# MSP Technology. How Does it Work ? (continued)

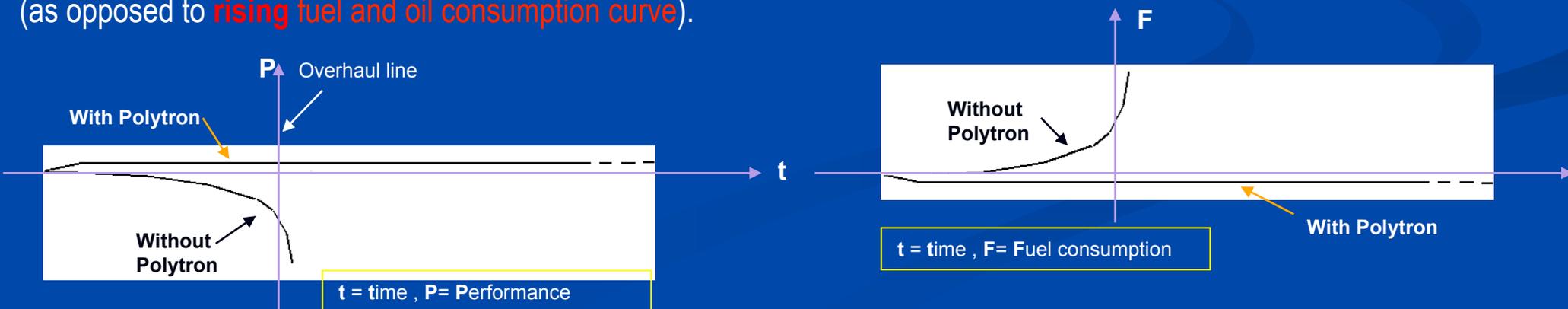


Final result



Over the first 2 years of developing this universal technology, the manufacturer added many other features to the original package by adding more chemical compounds that made it the most effective lubricant additive package on the market today, as the features listed later on will indicate.

Since there was also a strong need to develop an additive package to treat and protect and maintain upper engine and fuel system in engines, the manufacturer developed, at the same time, an additive package for fuels (based on similar technology) that made it possible to offer a complete system that allowed maintain the performance of engines at its possible best many times longer than their traditional service life, with **flat performance** curve over the years (as opposed to **declining** performance curve), and a **flat fuel and oil consumption** curve over the years (as opposed to **rising** fuel and oil consumption curve).



# User References

We treated the engine with 2.5L of Polytron MTC (10% treatment).

We could see that one day after treating the engine, it was running smoothly with considerable reduction in smoke and noise.

Loy Wei Choo ( Quarry Consultant, Singapore)

During Polytron usage, cost of production, cost of maintenance and cost of fuel usage were reduced. At the same time because more machinery was put to 24 hour usage, our productivity increased.

Huang Hong Hee ( COO- Building Material Grp  
Hong Leong Asia Ltd)

Due to strong vibration in gearbox, we brought in Polytron MTC. There was a remarkable improvement in the situation.

Eng. H. Kasper (Head of Maintenance,  
Wietersdorfer & Peggauer Zementwerke GmbH)

# Partial List of User References

## • Mining & Construction

- SAMWOH Group, Singapore – Transport & Logistics, Infrastructure, Mining, Oil & Gas, etc.
- P.T. Karimun Granite, Indonesia – Quarry
- KÄRNTNER MONTANINDUSTRIE, Austria – Mining
- Kfar Giladi Quarries, Israel
- SBI – E&M, Africa – Infrastructure and Construction

## • Transportation & Automobiles

- The Cab Company, USA
- Dragster Racing
- Australian Abalone Exports Pty. Ltd.
- Pacific Rail Road-Yukon White Pass

## • Manufacturing – Cement, Steel, etc.

- Wietersdorfer & Peggauer Zementwerke GmbH, Austria - Cement, mortar, plaster and building materials.
- Magnifin Magnesiaprodukte GmbH & Co KG, Austria - Magnesium oxide and hydroxide powders
- Fritz Egger GmbH & Co., Austria – Wood furniture
- Tridonicatco Sdn Bhd

## • Electrical Power Generation Plants

- Public Power Corporation - Greece

# Kfar Giladi Quarry / 1000 KVA Cummins Generator

1000 KVA Cummins Generator driven by 1,800 horse power engine was in service for more than 30,000 hours And was taken apart because of presence of water in oil for more than 100 work hours.



The engine was put together without replacing or machining any parts. According to our most conservative estimate, over 30,000 hours that the generator was in operation, the user saved at least \$150,000 on repairs, fuel and oil consumption. And spent only \$7,690 on Polytron products, a return of approximately \$20 on each dollar invested in Polytron

The following pictures demonstrate the outstanding performance of Polytron products (every single part of the engine was micro-measured and inspected.)



There was almost no wear on the liners and the dimensions were within the manufacturer's specs.

They looked polished and still had their cross honing pattern of the original bore



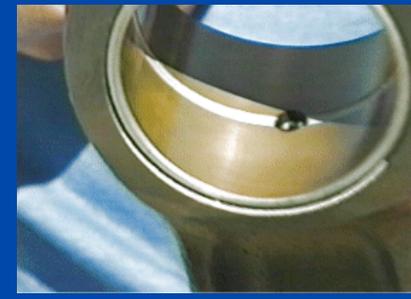
All the pistons had piston skirts and piston rings totally clean of any build-up. The rings looked like new and didn't have any wear.



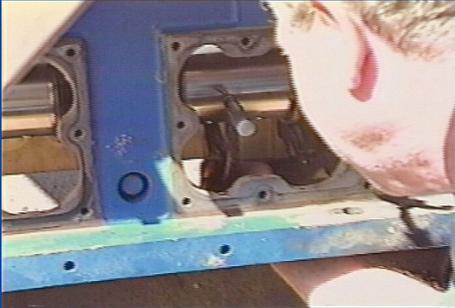
After 30,000 hours in operation and 100 hours in the presence of water, all the piston pins didn't have any traces of wear, looked polished-like and new.



After 30,000 hours in operation and 100 hours in the presence of water, all piston pin bearings didn't have any wear and looked like new.



# Kfar Giladi Quarry / 1000 KVA Cummins Generator (continued)



We micro-measured the crankshaft and found it to be in great condition. Totally round, no traces of wear. It didn't need any machining.



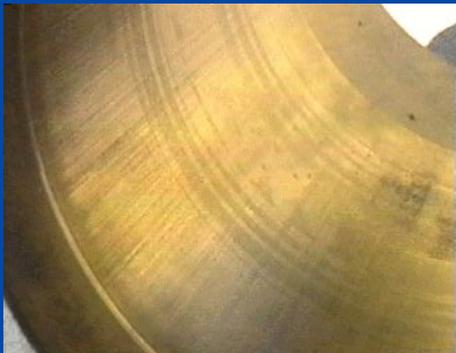
Crankshaft Main Bearings looked like new, there were no traces of wear. They maintained their original coating. Usually after 17,000 hours they are chewed up. In this engine we used **Polytron**, so there was almost no wear at all after 30,000 work-hours.



Piston-rod bearing from 16,000 hours old engine, (without **Polytron MTC**) chewed up as a result of wear.



Piston-rod bearing from our 30,000 hours old engine with **Polytron MTC** totally clean with almost no wear at all.



Piston-rod bearing from 16,000 hours old engine, (without **Polytron MTC**) chewed up as a result of wear



Cylinder liner from our 30,000 hours old engine with **Polytron MTC** totally clean with almost no wear at all.



SAMWOH

## SAMWOH Group of Companies

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### Reduction in Overhaul costs - Cummins 1000 KW Generator

The generator engine was running rough with water leakage into the engine. The engine was also emitting black smoke. The solution was to overhaul the engine, easily costing between SG\$40,000 to SG\$50,000.

**We treated the engine with 2.5 lit of Polytron MTC (10% by volume), we also treated the fuel with Polytron Fuel Conditioner (FC, 0.1% by volume).**

We could see that one day after treating the engine, it was running smoothly with reduced smoke and noise.

With such good results, we continue to treat the engine with Polytron MTC and FC.

We established that if we had to overhaul the engine and with the expected downtime of 2 weeks for the overhaul, the cost to the company would easily be in the region of SG\$60,000.

Loy Wei Choo  
Quarry Consultant  
Samwoh Resources Pte LTD  
Singapore

Samwoh Group of  
Companies / Singapore

Cummins 1000 KVA  
Generator

Saved SGD60,000 by  
preventing overhaul

### Reduction in Temperature and Extending Service Life of Bearing Vibrating Screen for Separating Stone Sizes

It is a 6ft x 12ft aggregate product screen. The screen is designed to take the load of approximately 200 tons an hour. This screen was used to screen aggregate in the range of 300 tons an hour, 50% beyond its capacity. The bearing of the screen is therefore undersized for this specific application. As a result, the bearing was overheating and showing signs of burning or seizing within 2 to 3 weeks.

**We decided to treat the bearing with Polytron EP-2 Grease.**

After applying Polytron EP-2 Grease we noticed that there was no more overheating and the bearing didn't seize even after running 4 months.

Loy Wei Choo  
Quarry Consultant  
Samwoh Resources Pte LTD  
Singapore

Samwoh Group of  
Companies /  
Singapore

Vibrating Screen for  
stone size separation

Undersized bearing that  
used to overheat and  
seize within 2 to 3 weeks  
in operation, stopped  
overheating and didn't fail  
even for 4 months after  
the company started  
using Polytron EP-2  
Grease

Hong Leong Asia LTD.

Quarry in Indonesia

Pilot project to evaluate the effect of Polytron products on the total maintenance cost per tonnage of production Involving hundreds of units heavy equipment units like Generators, Dump Trucks, and other machines.

## Results

Maintenance and operational cost reduced from USD 1.84 per ton Of production to USD 0.68, fuel consumption went down, and down time went almost to zero, resulting in much higher productivity.

**Hong Leong Asia Ltd.**

*Building Materials Group*

(Incorporated in Singapore)



Office Address:

Singapore 729061

Tel:

Fax:

12<sup>th</sup> February, 2007

President  
Polytron

#04-19

Dear

Re: Confirmation of Polytron usage and results at P.T Karimun Granite

Further to your request, I wish to confirm that Polytron HQ has supplied their complete range of products for complete Polytron treatments at our Granite Quarry plant in Karimun Island (Indonesia).

Polytron was applied to all engines and to all friction parts where Polytron can help to reduce maintenance costs; and downtime, the major ones being:

Generators, Dump Trucks, Wheel Loaders, Excavators, Bulldozers, Graders, Compressors, Drills and Drill Masters, Pumps and various other machines.

Polytron usage commenced from 2<sup>nd</sup> June, 2005 and the result of usage were documented and monitored until April, 2006. Polytron Engineers from Australia and Singapore were involved and they work together with our Engineers, maintenance, and accounts personnel at P.T. Karimun Granite.

The results were contained in the report compiled by Polytron Engineer, Mr. Robert Anwyl. This report and results are accepted and checked out with our in house reports on savings in maintenance as well as reduction of wear and tear of machinery. Since Polytron treatments, daily reports showed machines are reported to be under working conditions. Before Polytron there were at least two Engines or Hydraulics having to undergo major overhauls per month. During usage of Polytron there was zero overhaul.

Eight months into Polytron usage, we reduced our repair and maintenance cost per tonnage of production from high of USD 1.84 to USD 0.68.

During Polytron usage, cost of production, cost of maintenance, and cost of fuel usage were reduced. At the same time because more machinery were put to 24 hours usage, our productivity increased.

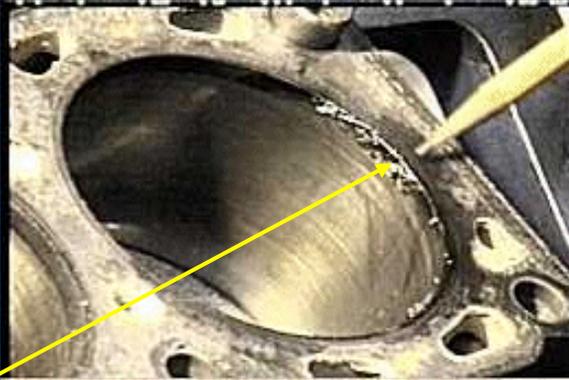
Yours truly,

  
Chief Operating Officer  
Building Material Group

HONG LEONG ASIA LTD

# The Cab Company - USA

## Not Treated



Sludge and Carbon build-up

## Treated with Polytron



Cylinder walls are always clean



Oil filters are clean



As a result of using Polytron MTC, and FC the piston-skirt (orange arrow) and rings (red arrow) are totally clean of any deposits

# Dragster racing-car engine / USA



The piston on the left was taken out from a Dragster engine after 70 runs without Polytron MTC.

The piston skirt has a severe scuffing



The piston on the right was taken out from an engine after 350 runs with Polytron MTC. The piston has no signs of wear, is totally clean, and all the friction surfaces are polished.



Before Polytron MTC was used, the engine was always taken apart for repairs after 70 runs. After Polytron MTC was applied, the engine was taken apart after 350 runs. As you can see, the engine parts have almost no wear and are totally clean. There is carbon buildup on the first piston ring (since Polytron FC is not used) but there is no carbon buildup on the other rings, and the ring surfaces are polished and clean and the cylinder skirt is totally clean. In addition there is almost no wear on the piston rings.

Wiietersdorfer and  
Peggauer  
Zementwerke / Austria  
Cement Production  
Plant

Gear Drive excessive  
vibration and excessive  
wear as a result of harsh  
environment of dust.

Polytron MTC was applied.

## Result

Reduced wear,  
production downtime was  
avoided

## Reduction in Friction with Polytron

The planet Gear Drive (Flender-Siemens) is used in the main drive of the roller mill Polycom (Polysius)

There was an appearance of strong vibrations in the gearbox in connection with hydraulic damper. This is due to the feeding of raw material and suction of environmental dust and eventual sub dimensioning of planet bearings.

Polytron MTC was added in June and July 2006.

The oil analysis after treatment showed a significant decrease in viscosity without any negative effects. The results of using Polytron MTC showed a remarkable improvement of the situation.

The was reduced amount of contaminants and less iron wear particles.

A forthcoming damage of the ant-friction bearing could be delayed and production downtime could be avoided.

Polytron products will be used at a big scale in many applications at WUP cement production sites.

Eng. H. Kasper  
Head of Maintenance  
Wiietersdorfer & Peggauer Zementwerke GmbH

Fritz Egger GmbH &  
Co. / Austria

Wood Working Plant

Bearings overheating  
causing increase in  
downtime and increase in  
repair costs.

Polytron EP-2 was  
applied.

## Result

Temperature went down  
from 110°C-120°C to 80°C.  
Downtime was avoided  
and expenses on repairs  
were dramatically reduced.

## Polytron Reduces Working Temperature

Fritz Egger GmbH & Co. in Austria produces laminates, wooden boards, fiberboards, prefabricated furniture components, lacquered boards, laminated boards, laminate flooring and faced boards.

During production of these items, some bearings showed high temperatures of up to 110-120°C. These high temperatures considerably shortened the lifetime of bearings, causing machine and products stops as well as high repair and maintenance costs.

In December 2006 Polytron EP-2 Grease was applied on the so-called problem bearings. The result was a significant decrease in the bearings temperature.

The average working temperature decreased from 100-120°C to 80°C !

Thus the downtime of machinery, additional expenses for repairs and loss of production was avoided.

The regular use of Polytron EP-2 Grease has been included in the production process.

- Fritz Egger GmbH & Co.

## Productivity Improvement after Polytron Treatment !

Date: 18th & 25th March 2005

Machine Type: Aida 60 ton metal stamping machine

Machine Usage: Ability to punch up to 2 mm thickness metal stamping machine

Material Thickness: 1.6 mm metal stamping parts

Location: Johor Bahru, Malaysia

Pre Treatment: The lubricant used was white spirit oil. The machine could only punch out up to 50 pieces per hour with manual operation (or 200 pieces per day). Finished products had serious burr. To achieve 5,000 pieces it required one full month of manual operation. That is 25 days of 4 hours production per day.

Treatment Done: Polytron Pen Lube was sprayed on the die-set and material surfaces.

Post Treatment: After punching out 50 pieces, we notices that the metal burr was reduced. After the second lot of 50 pieces, the metal burr became of an acceptable quality. The machine then put on auto operation. The output speed was also increased. Within 2.5 hours of Polytron treatment, the total production was 2,500 pieces without further treatment by Polytron. They can now achieve production of 5,000 pieces in one day's (4 hours) operation.

Article written by  
S.L. Loh  
Agile Vision Sdn Bhd

Triconicatco Sdn Bhd /  
Malaysia

Metal Working Plant /  
Stamping Machine

Could make only 200 pcs per  
day semi automatically with  
problematic burr.

Polytron Pen Lube was  
applied.

### Result

Could make 5,000 pcs a day  
with burr of acceptable quality.

Quarry / Asphalt production plant / Israel

900 KVA Cummins Electrical Generator driven by 1800 horse power engine / with Polytron MTC

## Engine head block



This engine (in which Polytron MTC was used) has been taken apart after 17,500 work-hours as a result of penetration of water into an oil system. The oil baths (blue arrow), valve springs (yellow arrow), valve stems (orange arrow) and the block surface are totally clean of any deposit build-up. According to the head mechanic of the repair shop, he has never seen anything like this before, especially with oil change intervals 4 time longer (from 250 work hours to 1000 work hours) and after many work hours with water in the oil system. All the other engine parts also were found to be in very good condition, and were put right back when the engine was re-assembled.

## Overhead Crane Lubrication-Steel Casting Facility / Polytron EP-2 Grease.

User reference from Steel Casting Facility in Indiana State, USA  
Crane Operator and a Maintenance Manager.

"I drive a **15-ton overhead crane** and my primary operation is to service the Furnace Departments Melting furnace. I service many of the functions, such as loading the 3-ton electric furnace, tapping the furnace and transferring molten metal from the furnace to the pouring floor. In all of these functions the crane is exposed to extreme temperature ranging from 2,950°F to 3,200°F. I have worked for about one year at this occupation and from the very start the crane performed very sluggishly and moved slowly making my job more difficult and less accurate in performance.

### **With *Polytron EP-2 Grease***

Since *Polytron EP-2 Grease* was injected into all the moving parts of this crane I have experienced very gratifying happenings; it moves much easier, coasts farther, is much more responsive to control and direction, which gives me more control and accuracy of operation and higher degree of safety in job performance. The findings by the supervision department indicate reduction in kilowatt hours (electrical energy consumption) used in one year per crane and the considerable reduction in maintenance and repair of the electric motors. "

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User reference from Automotive Division / ALCOA FUJIKURA LTD.  
production facility in San Antonio, Texas, USA.

Plant machinery (Orimpers 6 WB and others) / *Polytron* EP-2  
Grease and Penetrating Lubricant

"My responsibility here at Alcoa Fuji-Kura, is to primarily make sure all our equipment is operating efficiently. Our main client is Ford Motor Company and we cannot afford costly down time.

Toyojamco makes a machine called Orimper 6 WB which we use in our plants. Our maintenance personal usually change lubrication on these machines after about one week's worth of operation.

**With *Polytron* EP-2 Grease**

I used *Polytron* EP-2 Grease and the results were incredible. Lubrication was changed after 4 weeks. We were impressed that *Polytron* EP-2 Grease did not break down for such a long time, causing much less production down time. We also used *Polytron* Penetrating Lubricant spray throughout the plant with too many success stories to recount here.

Maintenance Manager,

Alcoa-Fuji-Kura

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Electric Steel  
Casting Co. / USA

PAC 250 Screw Compressor

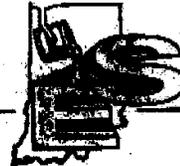
User reference from Vice President

## Problem

Compressor was overheating and shutting down automatically about every 1.5 hours, although it was serviced very often.

## After adding Polytron MTC

Compressor oil and the air temperature went down considerably. There was almost no downtime. Service frequency went down by 70%. Productivity went up considerably.



TEL. ( )

FAX ( )

## ELECTRIC STEEL CASTINGS COMPANY

*Carbon & Low Alloy Steel Castings*

1045 MAIN ST. - SPEEDWAY • P.O. BOX 24524 •

August 11, 2010

I have used Polytron for many things and to my amazement, it has performed like a champion.

The last test that we put it to, was in PAC 250 screw compressor. The compressor was running temperatures on oil of 192 °F, on air 240 °F and then shutting off. We had the compressor oil and air coolers cleaned and had serviceman give it a good bill of health. But it continued to automatically shut off about every one and a half hours. It stayed off until it cooled down about one and quarter of an hour. After several times of shutting down, we drained the oil out of the compressor.

Mixture of Polytron and a regular industrial oil was added to the compressor. The compressor holds 180 quarts of oil to the full mark. Industrial oil and Polytron MTC was mixed as follows:

|   |            |
|---|------------|
| Industrial oil - 165 Quarts x \$ 3.45 per quart = | \$569.25   |
| Polytron MTC - 15 Quarts x \$ 55 per quart =      | \$825.00   |
| Total   | \$1,394.25 |

Before Polytron we used 180 quarts of premium compressor oil at \$16.50 per quart at a total replacement cost of \$2,970. So using Polytron resulted in savings of \$1,575.75 on per one oil change only.

Additional plus side of this change was that the oil temperature was reduced from 192 °F to 160 °F and the air temperature was reduced from 240 °F to 200 °F and no more shutdowns.

Production was resumed at a reduced cost and almost no maintenance problems. Not only there was a major savings on the cost of the oil when it was replaced, but we reduced the oil change frequency by more than 70%. We also saw reduction in electrical bill. Although we see that the oil is still good when we change it, we decided not to stretch it too much, because the savings on the cost of the oil, almost full elimination of down time, lower energy consumption, and major reduction in maintenance cost, made the net savings (after deduction of the cost of Polytron) unbelievable.

We are very happy to recommend Polytron for any compressor application.

Thank you for introducing our company to Polytron products.

ELECTRIC STEEL CASTINGS COMPANY

*V. H. King*  
V. H. KING  
Vice President and CEO

Yukon Railway Company. / USA

Locomotive Diesel Engine

User reference from Master Mechanic

## Problem

Excessive fuel consumption and thick black smoke.

## After adding Polytron FC

They had 30% savings on fuel and the smoke cleared up by about 50%



WHITE PASS & YUKON ROUTE

*"Scenic Railway of the World"*

P.O. Box 436  
Skagway, Alaska 99840

(907) [REDACTED]

(907) [REDACTED]

www.whitepass[REDACTED].com

Mr. Gary Petifor:

White Pass has tested Polytron Diesel conditioner in our engine #94. We had a 30% savings in fuel and cleaned up about 50% for stack smoke emissions. It is our intention to start next season by purchasing a 55 gallon drum of Polytron Diesel conditioner and use it in all 13 of our locomotives. As long as we obtain the results we have experienced we should use approximately a 55 gallon drum per month.

Mark Schaefer

Master Mechanic



**WHITE PASS & YUKON ROUTE**  
*"Scenic Railway of the World"*

P.O. Box 435  
 Skagway, Alaska 99840

(907) [REDACTED]  
 (907) [REDACTED] Fax  
[www.whitepassrailroad.com](http://www.whitepassrailroad.com)

June 24, 1999

To Whom It May Concern:

We put Polyron hydraulic oil treatment in the railbus on June 5, 1999. Before putting it in the machine, the temperatures were hitting 180 degrees on the hill at the hardest pull on the hill.

By my records, after we put in the Polyron, the temperatures ran an average 2 days later of 12 to 15 degrees cooler. This allowed us to make the hard pull on this hill and not worry about getting too hot.

Here are the temperatures at the mile post that was the point where we heated up before:

| Mile Post | Temp Before | Temp After Polyron |
|-----------|-------------|--------------------|
| 37        | 156         | 138                |
| 36        | 170         | 150                |
| 35        | 175         | 158                |
| 34        | 180         | 167                |

As you can see, it helped our heating problem out and we are happy with the results.

Carey L. Dorn  
 Mechanic  
 White Pass & Yukon Route

Yukon Railway Company. / USA

Locomotive Diesel Engine

User reference from a Mechanic

Problem

Overheating when climbing up a hill

After adding Polytron MTC

The temperature dropped by more than 13 °F and engine was not overheating anymore.



Public Power Corporation  
Steam Electric Station Unit IV

Public Power Corporation / Greece  
User references from mechanics and  
engineers

May 13, 2009

To Whom It May Concern:

Dear Sir or Madam:

This letter confirms that the attached document about performance of Polytron products is based on facts that we witnessed personally. Based on our experience with Polytron products, we highly recommend them to be used in similar applications described in this document.

Respectfully submitted by:

Turbine Workshop

  
Peter Manikas

Lignite Workshop

  
Charilaos Krikas

Assistant Engineer

  
George Kastritseas

  
Vrionis Aristidis

  
Bill Katsaros



## Public Power Corporation / Greece

User references from mechanics and engineers

### Problem

Pump overheating, sets alarm and stops, even though air compressor used to cool it.

### After adding Polytron MTC

The temperature dropped by 4 to 5 °C and pump was not overheating anymore and the air compressor was not used for cooling anymore.



#### Condensate Pump:

- Pump Alarm Temperature : 56°C
- Pump Trip Temperature : 65°C
- Temperature prior to Polytron with compressed air cooling the pump : 55°C - 62°C
- Temperature after Polytron without compressed air cooling the pump : 52°C - 56°C
- Ambient Temperature : 35°C - 40°C

#### Comments:

Prior to using Polytron MTC, a supply of compressed air at the gearbox casing of the pump ensured its additional cooling to prevent overheating. The overheating was usually due to high ambient temperature.

By adding 10% of Polytron MTC into the gear oil of the gearbox the pump temperature dropped by 4°C-5°C and the pump functioned properly without the use of compressed air during the remainder of the summer even under very high ambient temperatures, without overheating. Use of Polytron MTC resolved the overheating problem and put a stop of the use of the air compressor.



## Public Power Corporation / Greece

### User references from mechanics and engineers

#### Problem

Because of dust and heat one of bearings supporting a shaft was overheating, losing its grease and failing resulting in expensive repairs and long downtime.

#### After applying Polytron EP-2 Grease

The temperature dropped by 7°C below the average temperature measured before, even when well known brand name greases were used. This mill operates over a year now without any overheating problems..

#### Polytron EP2 Grease

Lignite mill application, Megalopolis, Greece:

The lignite crusher-mill is located in PPC power plant unit No.3 in Megalopolis, Greece. Each crusher-mill is driven by a 2 MW (2000 KW) electric motor at up to 1500 rpm.

The shaft of the electric motor is supported by 4 bearings, 3 bearings on the front side of the crusher-mill and 1 bearing on its rear side.

The line through which the grease is pumped in (to lubricate the 3 bearings on the front), goes first to the 3rd bearing, then to the 2nd bearing, then to the 1st bearing and from there to an exit to make sure that the grease is pushed all the way through. But high temperatures, dust and heavy duty operation harden the grease around the 2nd bearing, clogging the line and preventing new grease from passing through to the 2nd and the 1st bearings during maintenance. As a result, the contaminated hardened grease loses its lubrication ability causing overheating which in turn causes the grease to breakdown, liquefy and leak out of the bearings, followed by their catastrophic failure and breakdown.

The heavy cost of this breakdown is comprised of cost of bearings, 500 to 600 Euros each, a lot of labor to replace them, down time of the system, and the most costly one is the shortage of supply of lignite to the 300 MW power unit during the time of repair.

To try and solve this specific problem, it was decided to apply Polytron EP-2 Lithium Complex Grease to all the bearings of a 2 MW electric motor used in lignite mill No. 6. As a result, the operating temperature of the bearings in this mill dropped 7°C below the average temperature observed in other mills during the hottest summer days, where they used other well known brand name greases.

This mill operates for over a year now without any overheating problems.

From:  
Grigoris Janetos  
Landscaping Co.  
Megalopolis Arkadia  
GREECE

May 12, 2010

To whom it may concern !

My name is Grigoris Janetos, an owner of Landscaping company in Megalopolis, Arkadia, Greece. My company owns and operates many grader, loader, trucks and other pieces of equipment that operate in harsh environment.

In this letter I would like to outline the extraordinary performance characteristics that I and my mechanics witnessed with Polytron products on some pieces of our equipment.

It concerns Caterpillar loader model 943, year make 86 with 15.000 work-hours.

In this loader, each time when the operator hit the gas pedal, heavy white smoke was coming out of the exhaust pipe. I was joking about the condition of this loader, because the problem was so big that we needed two operators to work on this Cat loader, one operator to operate it, and the other to add oil into the oil pan.

I was aware of this problem from the very time that I bought this loader, that's why I bought it dirty cheap.

Since the engine was in very bad shape, I planned to repair or replace it. One evening before the end of a work day I called Polytron distributor to ask him if we could try using Polytron to help with the problem, before I took it to a repair shop. The distributor suggested me to try it. When I had the conversation with the Distributor, it was the end of the day and the operator had to leave within 30 minutes, so I intended to apply Polytron the following day. To my surprise, the distributor told me that if the problem was frozen piston rings (as a result of massive carbon buildup on and around the rings), 30 minutes was enough for Polytron to take care of the problem.

When I told the operators to apply Polytron MTC to try fix the problem, they responded with humor. But 20 minutes of engine operation with Polytron MTC added, the smoke stopped. The operators couldn't believe their own eyes. Being skeptical they let the engine idle more for some time, then pushed the gas pedal down all the way to produce some visible smoke, but there was none.

The engine continued operating smoothly with no smoke. It made me very happy once again, since I avoided massive expenses on repairs and loss of revenues on down time.

The owner of Landscaping Co  
Megalopolis, Arkadia  
Greece



Grigoris Janetos

## Landscaping Company / Greece

### User references from company owner (continued)

#### Problem

Heavy white smoke coming out of  
an engine, indicating that engine  
requires overhaul.

#### After applying Polytron MTC

The white smoke dissipated,  
indication that the engine came  
back to normal operation.  
Thousand of Euros and  
downtime were saved.

## Landscaping Company / Greece

### User references from company owner (continued)

#### Problem

Manual Transmission of a truck that lost its fluid in the middle of the road and got very noisy, and was intended for repair.

#### After applying Polytron MTC

The noise stopped , and it is after 1 year now in operation and it is still going strong.

Costly repairs and downtime were avoided.

From:  
Grigoris Janetos  
Landscaping Co.  
Megalopolis Arkadia  
GREECE

May 12 , 2010

To whom it may concern !

My name is Grigoris Janetos, an owner of Landscaping company in Megalopolis, Arkadia, Greece. My company owns and operates many grader, loader, trucks and other pieces of equipment that operate in harsh environment.

In this letter I would like to outline the extraordinary performance characteristics that I and my mechanics witnessed with Polytron products on some pieces of our equipment.

It concerns Volvo truck Model F16 year make 1993 (with manual transmission).

The transmission was losing its fluid. By the time the driver became aware of the problem it was too late. The transmission was still shifting gear without any problems but the noise coming out of the gearbox was loud and alarming.

When the mechanics opened the gearbox they saw only 0.5 liter of red-brown fluid (indicating that it was burnt). They decided to take the truck to TRAKAS Repair shop located in Tripolis for repair. They told me that the repair should cost several thousands of Euros.

Before making the final decision, I called Polytron distributor that confirmed that I could use Polytron MTC to try and save the transmission..

After only 2 km of having Polytron MTC in the transmission the noise in the transmission stopped. The owner of TRAKAS repair shop went crazy when he heard the news. Anyways, after 1 year the truck is still in operation without any transmission problems.

The owner of Landscaping Co  
Megalopolis, Arkadia  
Greece



Grigoris Janetos



## KFAR GILADI QUARRIES

Kfar Giladi Quarries / Israel

User references Equipment  
Maintenance Manager.

### Problem

Company was looking for ways to reduce maintenance costs and down time. Harsh working conditions.

After applying Polytron MTC, oil change intervals were extended from 250 – 300 work hours to 1,500 work hours, savings on fuel of 10%, and considerable reduction in maintenance cost.

July 5, 2008

To Whom It May Concern !

Dear M/S:

This letter is to confirm that our company since 10 years ago uses "Polytron" products – oil additive package, fuel additive package, grease and penetrating lube.

To test the product we used oil additive package Polytron MTC in an engine of 1000 KVA Cummins electrical generator based on instructions provided by your technical support consultant, and later on all the generators and most of our heavy duty equipment was treated with Polytron oil additive and fuel additive packages.

We would like to indicate that the use of Polytron products was combined with a system of used oil analysis, based on which your consultants provided us with maintenance recommendations for each piece of equipment.

As a result of using Polytron products and your maintenance consulting service we achieved 1,500 work hours between oil changes in engines (instead of 250 –300 work-hours), and savings of about 10% in fuel consumption !

Over the course of 10 years we have been using Polytron products, it was proven without any doubt that their use has resulted in considerable reduction in maintenance cost and extended life of our equipment.

We are very pleased with the results and the professional level of your people.

Sincerely

Beni Hen

Maintenance Manager

## Solel Bone / Construction and Engineering / Israel / Africa

### User references from Equipment Maintenance Manager.

#### Problem

Company was looking for ways to reduce maintenance costs and down time. Harsh working conditions.

After applying Polytron products, oil change intervals were extended from 250 – 300 work hours to 1,000 work hours, savings on fuel of 13%, and considerable reduction in maintenance cost and downtime.



**SBI-E&M**  
(Engineering & Manpower Services) Ltd.

August 28, 2008

To whom it may concern:

Re: Summery.  
Period: Feb 2003 - June 2007

Our company, Solel Bone Engineering Services, operates more than 1000 units of heavy duty equipment and hundreds of heavy trucks, in several countries in Africa, as part of infrastructure and construction projects.

For more than 4 years now, our company is using Polytron products and is assisted by maintenance consulting services of ICT Oil Laboratories to achieve major savings in maintenance and operating costs.

Their consulting involves early detection of any developing mechanical and functional problems in the engines (and other compartments), based on analysis of used oil samples extracted from the equipment as recommended, and performing preventive targeted repairs by field mechanics. We were very impressed with their two-stage approach. At the first stage, through interpretation of used oil analysis results, recommending on preventive repairs (most of them not complicated and could be done during routine maintenance breaks), in the second stage, once used oil analysis indicated good working condition of a unit, they recommended to start using Polytron MTC and FC "to stop the clock from ticking" (the way their maintenance consulting people call it). Using Polytron MTC we could extend oil change / maintenance intervals from an average of 250 work hours to more than 1000 work hours and at the same time with dramatic reduction in wear metals (which translates to much longer engine life). Although we experimented with 1500 work-hours oil change intervals, with very good results, we decided not to stretch our luck and stopped at 1000 work-hours which is a huge savings in itself. Since we started operating under their program the equipment down time went down considerably.

As an added bonus, comparing monthly consumption of fuel on each unit before we started using Polytron and after, we got an average savings of 13%.

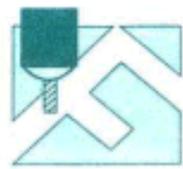
We are thankful for their professional service that characterizes so much their company.

Sincerely,

Goor Fridrik

SBI - E&M

Equipment Maintenance Manager



**INFOCUS**  
C.N.C MACHINING, INC.

Newhope Street • [REDACTED] • [REDACTED]

Tel: [REDACTED] 1253 • Fax: [REDACTED] 1256

## INFOCUS CNC Machining / USA

User references from company  
Production Manager

### Problem

Low productivity and profitability.

After applying Polytron Pen Lube

Speeds and feed went up as much as 50% and the tool life by up to 3 times, turning it to very profitable operation.

June 15 , 2009

Our company is a major producer of high precision multiple spindle drill heads for the machine tool industry. Our equipment is used by a wide variety of high production companies including, but not limited to:

- General Motors Corporation
- Ford Motor Company
- Chrysler Corporation
- General Electric
- Dana Corporation
- Whirlpool
- Navistar
- Caterpillar
- Briggs and Stratton.

In the production of our product we employ standard equipment to machine cast iron, aluminum, steel alloys and bronze. Recently we started to utilize **MSP** products in our plant both as a lubricant and as a cutting fluid. The results that we have had with the penetrating lubricant have been nothing short of amazing. We have been able to increase feeds and speeds in some cases as much as 50% and at the same time, improve surface finish and extend tool life by up to 3 times. Probably the most dramatic result we have experienced is the elimination of aluminum bonding to cutting tools even when cutting dry (i.e. no coolant).

James Brown / Production Manager

From:  
Grigoris Janetos  
Landscaping Co.  
Megalopolis Arkadia  
GREECE

May 12, 2010

To whom it may concern !

My name is Grigoris Janetos, an owner of Landscaping company in Megalopolis, Arkadia, Greece. My company owns and operates many grader, loader, trucks and other pieces of equipment that operate in harsh environment.

In this letter I would like to outline the extraordinary performance characteristics that I and my mechanics witnessed with Polytron products on some pieces of our equipment.

1) The first one concerns a Caterpillar Grader model 12K, year make 1969, that has same engine as D7, with at least 50.000 work-hours and more than 18,000 work-hours after overhaul.

It was spring time of 2009. Outside temperature got higher and the engine started having an overheating problem, not only because of the hot weather but also because the Grader radiator had clogged pipes. One spring day early in the morning we called in a mechanic to serve the cooling system. He poured in special cleaning liquid to flush the cooling system and the radiator. To do that he had to have the engine operate on idle for a long time. After some time the mechanic left without turning the engine off, while another mechanic was called in to fix the exhaust pipe. After he finished fixing it, he left without switching off the engine, so the engine was left idling that day for more than 10 hours with a defective cooling system, which caused the engine overheat. When I came to the worksite in the evening I didn't notice any visible problem with the engine. I turned the engine off and left. Next day, early morning, when I came back to the site, and the operator turned on the engine of the Grader, I was shocked to see dense white smoke coming out of the exhaust pipe, the engine misfiring and unstable in idle. The whole surroundings of the grader was filled with a smell of burning oil. I was sure that I had no choice but to overhaul the engine. Only the piston rings replacement would cost me 5.000 to 6.000 Euros.

Before I made my final decision to take the grader to a repair shop I called to consult with Polytron distributor in Greece and asked him if there was a chance that Polytron MTC could help in this kind of situation. After the distributor suggested that it was worth trying because I had nothing to lose, I added MTC to the oil tank and within one hour the smoke stopped and the engine was back to normal operation. Today May 12, 2010, about one year later, the grader is still in operation, it works perfectly without any problems, almost like new. On one hand I was very surprised and at the same time very happy. Very surprised because I have never seen anything like this before, and happy because I saved thousands of Euros on repairs and avoided loss of revenues on down time.

The owner of Landscaping Co  
Megalopolis, Arkadia  
Greece



Grigoris Janetos

## Landscaping Company / Greece

### User references from company owner

## Problem

Heavy white smoke coming out of an engine, and it is overheating, indicating that engine requires overhaul.

## After applying Polytron MTC

The temperature dropped, and the white smoke dissipated, indication that the engine came back to normal operation. Thousand of Euros and downtime were saved.

# Used oil analysis.

## **Polytron MTC Performance comparison tests**

### **based on "Used Oil Analysis"**

In recent years "Used Oil Analysis" became a part of preventive maintenance program of many commercial and industrial entities like power plants, manufacturing plants, trucking companies, cab companies, construction equipment companies, etc.

### **What is "Used Oil Analysis?"**

A sample of used oil is taken out of an engine (transmission, or other equipment) while it is warm and is put in a special analyzer that analyzes the oil for the following data.

**1. Concentration of wear metals** (in units of parts per million, ppm, by weight).

Why concentration of metals?

Different components within an engine, transmission or equipment are made of different metal alloys. For example, some engines may have bearings that are made of alloys containing copper, chromium and lead all combined. Every such component has a normal amount of wear which is accumulated over time from a statistical data of used oil analysis for that specific equipment. When used oil analysis indicates higher concentration of these metals than expected in specific make and model of the equipment under test, this may be indicative of a beginning of mechanical problem that most of the time can be fixed easily before a catastrophic failure and irreversible damage occurs, thus saving thousands of dollars on unnecessary repairs and downtime.

### **2. Viscosity:**

A parameter which indicates the condition of a fluid as a lubricant.

The lower the Viscosity and Viscosity Index compared to these parameters in new oil, the more the oil deteriorates in performance as a lubricant. This deterioration is caused by combustion gases that penetrate the oil system, metal particles that get into the oil as a result of the wear process, and shear and thermal breakdown of the oil.

### **3. TBN (Total Base Number):**

indicates the extent of motor oil oxidation. The lower the TBN the less ability it has to neutralize acidic compounds and more likely to be corrosive.

The acidic compounds are caused by combustion gases that penetrate the oil system and metal particles that get into the oil as a result of wear process.

When the TBN number is lower than 2 it is recommended to replace the oil.

**4. Other chemicals** that indicate specific engine problems (like penetration of coolant into the oil system, penetration of fuel, penetration of dust through air system, etc.)

**This tested data is compared to a data base of test results that were accumulated over the years for the specific equipment (model and make) the condition of which we want to establish.**

**How can used oil analysis help you see the difference in performance between lubricants that contain Polytron MTC additive package and those which do not?**

1) Right before the a normal oil change, take a sample of used oil from the engine under test and submit it to a laboratory for a "Used Oil Analysis" in order to get "Base Line" results (make sure that the sample is taken from midstream while the engine is still warm). together with the following information:

- a. Manufacturer name, model and year make of the equipment.
- b. Miles / hours of the oil in operation.
- c. Hours/miles of the equipment in operation (from the date of purchase to the date of submission of the used oil for analysis.

2) Together with the used oil sample also submit a sample of original clean oil to be analyzed as a reference, because there are some elements that are part of an additive package of motor oil that have to be counted out when interpreting the test results

3) Change the oil and add to the new oil 10% of Polytron MTC (or use Polytron motor oil). After 500 to 600 miles change the oil and oil filter again and add 10% MSP EF (or use MSP motor oil). The reason why we recommend to do that is as follows: Since Polytron MTC has very powerful cleaning ability, it dissolves all the build-up on the engine parts and suspends it into the oil.

### **Expected results**

- 1) 600% - 900% times lower concentration of wear metals (which means reduction in wear by at least 600% to 900%).
- 2) Viscosity and TBN are maintained at their acceptable level 300% - 600% longer, which means that the oil can serve 300% - 600% longer, extending maintenance intervals 300% to 600%.

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 Site: 803

[24- 3011 samples.doc](#)

## Used oil analysis (continued).

### Caterpillar Excavator 330B

Sample of used oil analysis interpretation based on which a maintenance consulting company recommends the users to take care of problems that are developing in this engine before Polytron MTC is applied, although it is recommended to use Polytron FC to clean upper engine parts, fuel system parts and slow down their wear process and lower soot concentration

At this stage the working condition of the engine is considered at 60%, which means it may break down in short time if the problem are not taken care of.

 3 **60% = Working Condition**

| Sample No. | Sample Date | Equipment No. | Equipment Type             | Component Type | Oil Type             | Contains PMF? | Was Oil Changed? | Total Work Hrs. | Oil Work Hrs. |
|------------|-------------|---------------|----------------------------|----------------|----------------------|---------------|------------------|-----------------|---------------|
| 1008       | 23/5/06     | 15-76-863     | Caterpillar 330B Excavator | Engine         | Total TIR 7400 15W40 | No            | Yes              | 8,727           | 265           |

| Soot Level | Fuel Content | Water Content | Acidity T AN | Alkalinity TBN | Viscosity at 40°C |
|------------|--------------|---------------|--------------|----------------|-------------------|
| 4          | ND           | ND            | --           | --             | 121.61            |

| Sample Elemental Content (ppm) |    |    |   |      |      |    |      |    |    |    |     |    |    |    |    |     |     |
|--------------------------------|----|----|---|------|------|----|------|----|----|----|-----|----|----|----|----|-----|-----|
| Mo                             | K  | Na | B | P    | Zn   | Ba | Ca   | Ag | Sn | Ni | Mg  | Pb | Si | Al | Cr | Cu  | Fe  |
| 5                              | 17 | 33 | 1 | 1074 | 1082 | 0  | 2382 | 0  | 0  | 3  | 241 | 7  | 64 | 31 | 14 | 306 | 136 |

\*

#### Comments

The sample's Viscosity is **HIGH**. Its soot content is **HIGH**. Its dust/sand content is **VERY HIGH**. No water was found in the sample, however its Sodium and Potassium contents are **HIGH** indicating a possible slow leak of coolant into engine oil. The sample's Iron, Copper and Chromium contents are **VERY HIGH** indicating engine abrasion.  
**Recommendations:** Check and service air intake system. Check and service cooling system – it may be leaking.

#### 19.06.06 (803) Dear Zvi / Michael Fadida

1. We didn't receive any reports about any maintenance that has been done on this engine since 05.07.05, but it is clear that the recommendations were performed only partially.
2. The condition of the engine deteriorated since the last "oil analysis". This engine has to be stopped and all the recommendations performed.
3. Recommendations.
  - a. Replace air filter (if not yet replaced).
  - b. Make sure that the cooling system is sealed and clean, including after cooler and oil cooler.
  - c. If the subsystems in (b) are found to be in order, make sure that the engine head gasket seals well.
  - d. If the above is found to be in order, make sure that the lobes work properly, injectors timing, valves and turbo clearances are in order.
  - e. Do not operate the engine unless all the recommendations are performed thoroughly.
  - f. After performing the above referenced recommendations, before the unit is put to work, change the oil. There is no need to analyze the used oil.
  - g. Make sure you use oil recommended by the manufacturer.
  - h. As soon as the unit becomes operational, you have to perform 2 consecutive FC\* treatments (1:1000 by volume)
  - i. After the new oil accumulates 200 work-hours it has to be changed + oil sample taken and then to perform 1 x FC\* (1:1000 by volume).
  - j. Until further notice, not to exceed 200 work-hours between oil changes.

\* **Very important** to report back whether the recommendations were performed.

\* MTC - Polytron MTC (complementary oil additive package).

\* FC - Polytron FC (complementary fuel additive package).

Sincerely,  
 Alex / Maintenance Consultant

**SBI-EM (Engineering & Manpower Services) Ltd**

Site: 803

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4

**85% = Working Condition**

| Sample No. | Sample Date | Equipment No. | Equipment Type             | Component Type | Oil Type             | Contains MTC? | Was Oil Changed? | Total Work Hrs. | Oil Work Hrs. |
|------------|-------------|---------------|----------------------------|----------------|----------------------|---------------|------------------|-----------------|---------------|
| 1553       | 5/7/06      | 15-76-863     | Caterpillar 330B Excavator | Engine         | Total TIR 7400 15W40 | No            | Yes              | 9,017           | 269           |

| Soot Level | Fuel Content | Water Content | Acidity TAN | Alkalinity TBN | Viscosity at 40°C |
|------------|--------------|---------------|-------------|----------------|-------------------|
| 3          | ND           | ND            | --          | --             | 94.39             |

| Sample Elemental Content (ppm) |   |    |   |      |      |    |      |    |    |    |     |    |    |    |    |    |    |
|--------------------------------|---|----|---|------|------|----|------|----|----|----|-----|----|----|----|----|----|----|
| Mo                             | K | Na | B | P    | Zn   | Ba | Ca   | Ag | Sn | Ni | Mg  | Pb | Si | Al | Cr | Cu | Fe |
| 1                              | 2 | 9  | 2 | 1240 | 1320 | 0  | 2896 | 0  | 0  | 1  | 321 | 2  | 11 | 4  | 2  | 13 | 23 |

| Comments  |
|---|
| The sample's Viscosity is typical. No results suggest abnormal engine wear. (Viscosity and wear metal content, which were high in the previous sample from this engine, are now typical). |

**25.07.06 (803) Dear Zvi / Michael Fadida**

1. The working condition of the engine improved a lot. Looks like you followed the recommendation and it paid off.
2. If MTC\* is not used, at this stage do not extend oil change intervals beyond 250 work-hours.
3. Make sure to use anti-freeze fluid in the cooling system.
4. Treat the fuel for this engine in 2 consecutive fuelings with FC\* (1:1000 by volume), without waiting for the next maintenance break.
5. Until further notice, not to exceed 250 work-hours between oil changes.
6. May take oil samples every other oil change (every ~ 500 work hours).
7. From the next oil change start adding MTC\* (10% by volume).
8. If MTC\* is added to new oil, you can change the oil every 1000 work-hours and take oil samples every 2000 work-hours.

\* **Very important** to report back whether the recommendations were performed.

\* MTC - Polytron MTC (complementary oil additive package).

\*FC - Polytron FC (complementary fuel additive package).

Sincerely,  
 Alex / Maintenance Consultant

## Used oil analysis, Caterpillar Excavator 330B (continued)

Based on this samples, looks like the technicians acted according to the recommendations given in the former document, and the condition of the engine improved considerably, since the concentration of Iron and Silicone and Soot went down and the viscosity is acceptable, etc. Now the consultant advises to start using Polytron MTC and if used to change the oil every 1000 work hours and take used oil sample every 2000 work hours. The working condition of the engine now is at 85% which is good for such an engine.

SBI-EM (Engineering &amp; Manpower Services) Ltd

 Re.: Analysis of Oil Samples - Results

 Site: **803** 4449-25 samples.doc

5

**90% = Working Condition**

| Sample No. | Sample Date | Equipment No. | Equipment Type             | Component Type | Oil Type                | Contains MTC? | Was Oil Changed? | Total Work Hr. | Oil Work Hr. |
|------------|-------------|---------------|----------------------------|----------------|-------------------------|---------------|------------------|----------------|--------------|
| 3918       | 3/11/06     | 15-76-863     | Caterpillar 330B Excavator | Engine         | Total TIR 7400<br>15W40 | Yes           | Yes              | 10,135         | 1,118        |

\*

\*

| Soot Level | Fuel Content | Water Content | Acidity TAN | Alkalinity TBN | Viscosity at 40°C |
|------------|--------------|---------------|-------------|----------------|-------------------|
| 3          | ND           | ND            | 1.68        | 10.45          | 99.99             |

**Sample Elemental Content (ppm)**

| Mo | K | Na | B | P    | Zn   | Ba | Ca   | Ag | Sn | Ni | Mg | Pb | Si | Al | Cr | Cu | Fe |
|----|---|----|---|------|------|----|------|----|----|----|----|----|----|----|----|----|----|
| 0  | 3 | 10 | 1 | 1135 | 1206 | 1  | 4108 | 0  | 0  | 0  | 76 | 3  | 14 | 2  | 5  | 9  | 19 |

\*

\*

\*

**Comments**

The sample's Viscosity is typical. No results suggest abnormal engine wear.

**12.12.06 (803) Dear Zvi / Michael Fadida**

1. The working condition of the engine improved since the last oil analysis dated 05.07.06.
2. If the oil contained MTC\*, then there would be a need to have oil analysis after 450 work-hours. See recommendations from the last report.
3. Replace the air filter with the next maintenance job.
4. If the oil was changed but no MTC\* added to the new oil, then keep changing the oil every 300-350 work-hours.
5. If MTC\* is used, you can change the oil every ~1,000 work-hours and take oil sample every 2,000 work-hours.

\* **Very important** to report back whether the recommendations were performed.

Sincerely,  
 Alex / Maintenance Consultant

## Used oil analysis, Caterpillar Excavator 330B (continued)

Based on this oil sample, Polytron MTC was put to use, the oil was in service for more than 1000 work ours and the TBN, and the viscosity are still within acceptable range, and the concentration of Iron (main wear metal) went down more than 4 times (or more than 80%) meaning the wear slowed down considerably. The consultant advises to to keep on using Polytron MTC and if used to change the oil every 1000 work hours and take used oil sample every 2000 work hours.

## Used oil analysis, Caterpillar Excavator 330B (continued)

Based on this oil sample, since Polytron MTC was put to use, the oil was in service for more than 1000 work ours and the, and the viscosity is still within acceptable range, and the concentration of Iron (main wear metal) went down even more than 4 times (meaning the wear slowed down even more). The consultant advises to keep on using Polytron MTC and if used to change the oil every 1000 work hours and take used oil sample every 2000 work hours.

The working condition of this engine now is considered 100%, meaning like of a new one.

SBI-EM (Engineering & Manpower Services) Ltd

### Re.: Analysis of Oil Samples - Results

Site: **803**

[4869 - 28 samples.doc](#)

6

Working Condition = 100%

| Sample No. | Sample Date | Equipment No. | Equipment Type   | Component Type | Oil Type                   | Contains MTC? | Was Oil Changed? | Total Work Hrs. | Oil Work Hrs. |
|------------|-------------|---------------|------------------|----------------|----------------------------|---------------|------------------|-----------------|---------------|
| 5305       | 11/3/07     | 15-76-863     | Caterpillar 330B | Engine         | Total TIR<br>7400<br>15W40 | Yes           | Yes              | 12,218          | 1,073         |

| Soot Level | Fuel Content | Water Content | Acidity TAN | Alkalinity TBN | Viscosity at 40°C |
|------------|--------------|---------------|-------------|----------------|-------------------|
| 3          | ND           | ND            | --          | --             | 105.35            |

| Sample Elemental Content (ppm) |   |    |   |      |      |    |      |    |    |    |     |    |    |    |    |    |    |
|--------------------------------|---|----|---|------|------|----|------|----|----|----|-----|----|----|----|----|----|----|
| Mo                             | K | Na | B | P    | Zn   | Ba | Ca   | Ag | Sn | Ni | Mg  | Pb | Si | Al | Cr | Cu | Fe |
| 1                              | 2 | 11 | 1 | 1031 | 1216 | 1  | 3686 | 0  | 0  | 1  | 147 | 0  | 9  | 2  | 3  | 2  | 17 |

\*

#### Comments

The sample's Viscosity is typical. No results suggest abnormal engine wear.

26.03.07 (336) Dear Zvi

1. The working condition of the engine is very good. This is the third time that the oil with MTC\* is changed every 1,000 work-hours.
2. Please report when was the last time that the air filter was replaced.
3. Make sure that you use anti-freeze in the cooling fluid.
4. You can keep on using MTC\* (10% by volume).

\*MTC - Polytron MTC (complementary oil additive package)

Sincerely,  
 Alex / Maintenance Consultant

# Used oil analysis (continued).

Main wear metal example : typical result

Concentration of iron wear particles

Without  
Polytron



With  
Polytron

## Polytron products summery.

There are no other products on the market today that can squeeze out of engines and any equipment the best possible performance, the longest service life, the lowest downtime and the highest productivity and cost effectiveness ever, like Polytron products can.

We invite you to take the ***Polytron*** challenge and put these miraculous products to the test.