



Introduction:  
Hydraulic Fluid Management  
by  
Kleentek: Electrostatic Oil Cleaner  
EOC-RxxTP Series

Focus Machinery Pte Ltd, Singapore

x

Kleentek Corporation Inc., Japan

## 1. Focus Machinery Pte Ltd, Singapore - History, Heritage and Background

Focus Machinery Pte Ltd, Singapore has been working with Kleentek Corporation, Inc in Japan since 1999.

We started off supplying equipment such as dehumidifier dryers and parts and components dealing with used injection machine for the export market.

We supply and support equipment and tools of various make within the Asia Pacific Region, such as Singapore, Malaysia and Indonesia – Batam.

We've successfully supplied and delivered many units of Kleentek, Electrostatic Oil Cleaners (EOCs) previously also known as Electrostatic Liquid Cleaners (ELCs) to various industries such as plastic injection moulding industries, Injection stretch blow moulding (PET bottles production) and power generation plants in the region of Singapore, Malaysia, Thailand and Indonesia – Batam.

The logo for Kleentek, featuring a stylized red double arrow pointing left followed by the word "KLEENTEK" in a bold, red, sans-serif font.The logo for Focus, consisting of the word "FOCUS" in white, serif capital letters inside a dark blue oval.

## Application of Kleentek: Electrostatic Oil Cleaner

### Type of Lubricant/Oil

### Specific Application

Hydraulic Oil  
VG22 ~ 68

Hydraulic Press; Casting Machine; Forging Machine; Injection Molding; Steel Mill/Paper Mill; Gauge Control System (Steel, Aluminums, Paper); Governor Control (Power Plant); Machining Centers; Test Stand Simulator



Lubricant  
VG68 ~ 200

Mechanical Press Machine; Gas & Steam Turbines (Power Plants); Paper Dryer Bearing; Vacuum Pumps;



Turbine Oil

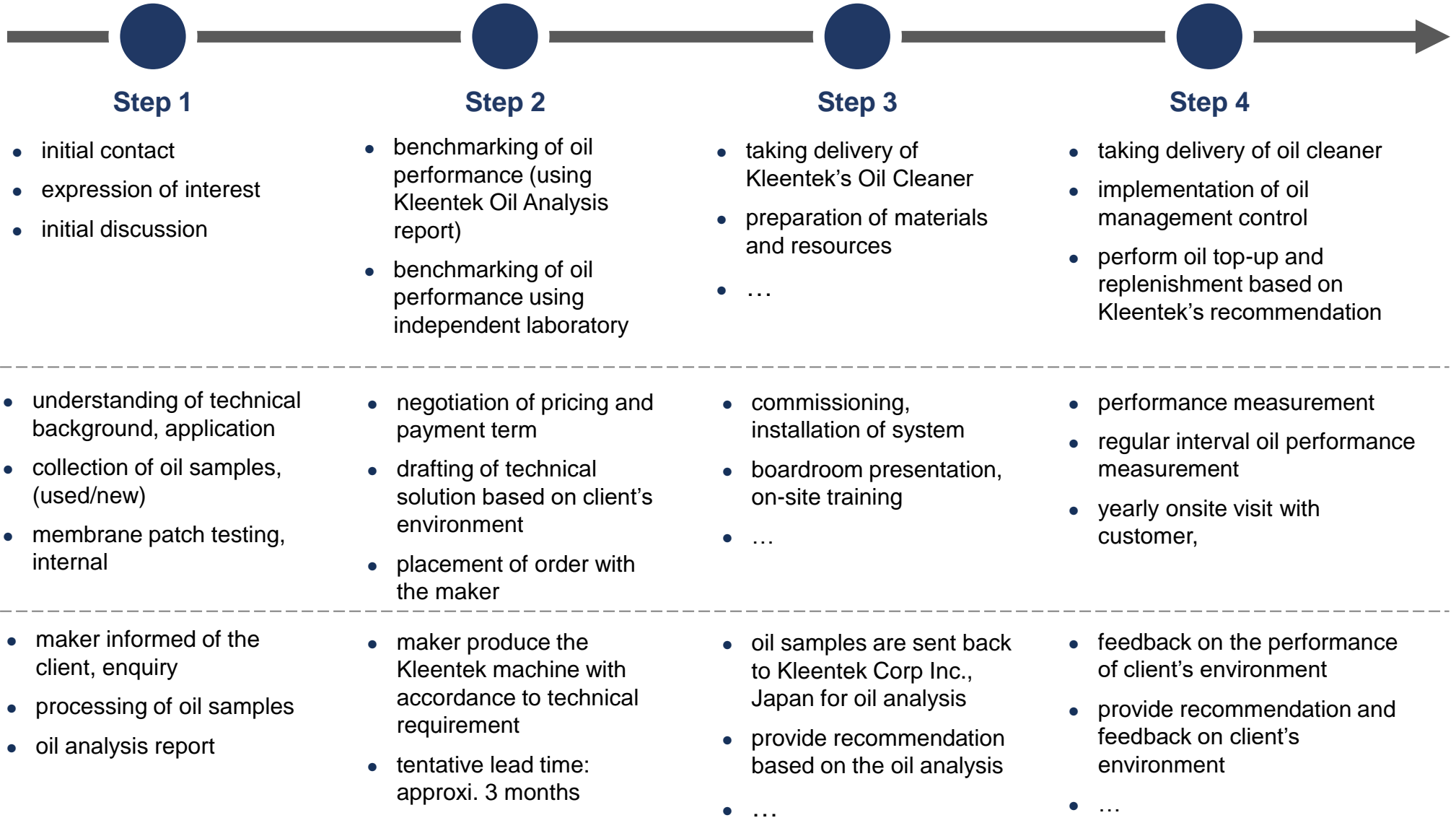
Power Plants



### Summary:

Application Oil : Mineral based oil with the exception of engine oil  
Viscosity : below 200mm<sup>2</sup>/s  
Temperature : below 60°C

### 3. Our Framework



#### 4. Value Proposition of Kleentek: Electrostatic Oil Cleaner (“EOC”)

To promote sustainable practice through  
the reduced use of non-renewable natural resource  
by refocusing the use refined mineral oil  
while ensuring maximum uptime;  
reduce cost of maintenance  
and minimizing operational impact.

## 5. Kleentek: Electrostatic Oil Cleaner (EOC) TP Series – Features

### Designed for: (Industry)

- ✓ Plastic Injection Molding Machine
- ✓ Power Generation – Utilities
- ✓ Casting Machine
- ✓ Aviation
- ✓ Compressor Oil

### Applicable for:

- ✓ Hydraulic Fluid
- ✓ Circulating/Lube Oil
- ✓ Gear Oil
- ✓ Thermal Oil
- ✓ Compressor Oil
- ✓ Mineral Oil Cutting Fluid
- ✓ Transformer Oils
- ✗ Water-based Fluids
- ✗ Engine oil, synthetics



Picture above is for illustration purposes.  
Difference models may or may not differ from the one above.

### TP Series: Product Features

- Improved Ergonomic Setup - Digital Display
- Improved Digital Control
- Remote Monitoring via USB
- 15kV potential cleaning chamber for faster cleaning performance
- Higher High-Voltage Transformer (“HVT”) Capacity
- Available in various model for different capacities
- Designed and made in Japan, Tokyo – Certificate of Origin, available upon request

**Please contact your local/regional agent more details.**

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### Benefits of EOC:

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- Eliminate Hydraulic Problems
  - Eliminate Oil Leakages
  - Eliminate Stuck Servo Valve
  - Reduce Level of Oil Contamination
  - Reduce Level of Varnish Formation
  - Reduce Level of Oil Oxidation product
  - Improve Membrane Patch Colorimetry (“MPC”) Varnish Potential
- 

**Please contact your local/regional agent more details.**

## 6. Kleentek: Electrostatic Oil Cleaner (EOC) TP Series – Optional Accessories



### Option 1: Screen Protector

Screen protector add-on accessories that helps to protect the LCD screen against both physical and accidental impact protection, as well as harsh climate, environmental condition and exposure.

Protect the LCD screen from smudges, fingerprints and other oily residue from remaining on the LCD.

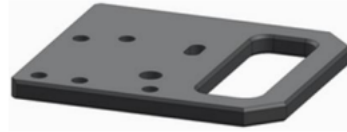


### Option 2: Ergonomic Trolley Handle

Improve the ergonomic working environment of your facility, by selecting this optional seam welded onto the chassis of your Kleentek: Electrostatic Oil Cleaner (EOC) for durability, functionality and practicality reason.

Ensuring that you will have a strong and practice handle for you or your staff to move the oil cleaner around your facility with ease.

## 6. Kleentek: Electrostatic Oil Cleaner (EOC) TP Series – Optional Accessories



### Option 3: Ergonomic Lift Handle

Optional ergonomic lifting handles provides ergonomic lifting point for operator of the machine to lift the oil cleaner in a safe, ergonomic manner.

\*Available only for R50TP and R100TP range.

## 5. Kleentek: Electrostatic Oil Cleaner (EOC) TP Series – Optional Accessories

Models TP Series:	Ergonomic Trolley Handle	Polycarbonate Screen Protector	Ergonomic Lifting Handle	Power Supply Option	Delivery Lead Time
EOC-R10TP	●	●	○	<ul style="list-style-type: none"> <li>Single Phase 220V, 50Hz,</li> <li>Three Phase 400V, 50Hz</li> </ul>	1 month
EOC-R25TP	●	●	○	<ul style="list-style-type: none"> <li>Single Phase 220V, 50Hz,</li> <li>Three Phase 400V, 50Hz</li> </ul>	1 month
EOC-R50TP	●	●	○	<ul style="list-style-type: none"> <li>Single Phase 220V, 50Hz,</li> <li>Three Phase 400V, 50Hz</li> </ul>	1 month
EOC-R100TP	●	●	●	<ul style="list-style-type: none"> <li>Single Phase 220V, 50Hz,</li> <li>Three Phase 400V, 50Hz</li> </ul>	2 months
EOC-R150TP	●	●	●	<ul style="list-style-type: none"> <li>Single Phase 220V, 50Hz,</li> <li>Three Phase 400V, 50Hz</li> </ul>	2 months
EOC-R200TP	●	●	●	<ul style="list-style-type: none"> <li>Single Phase 220V, 50Hz,</li> <li>Three Phase 400V, 50Hz</li> </ul>	3 months
EOC-R300TP	●	●	●	<ul style="list-style-type: none"> <li>Single Phase 220V, 50Hz,</li> <li>Three Phase 400V, 50Hz</li> </ul>	3 months

Remarks: ○ Not Available      ● Available

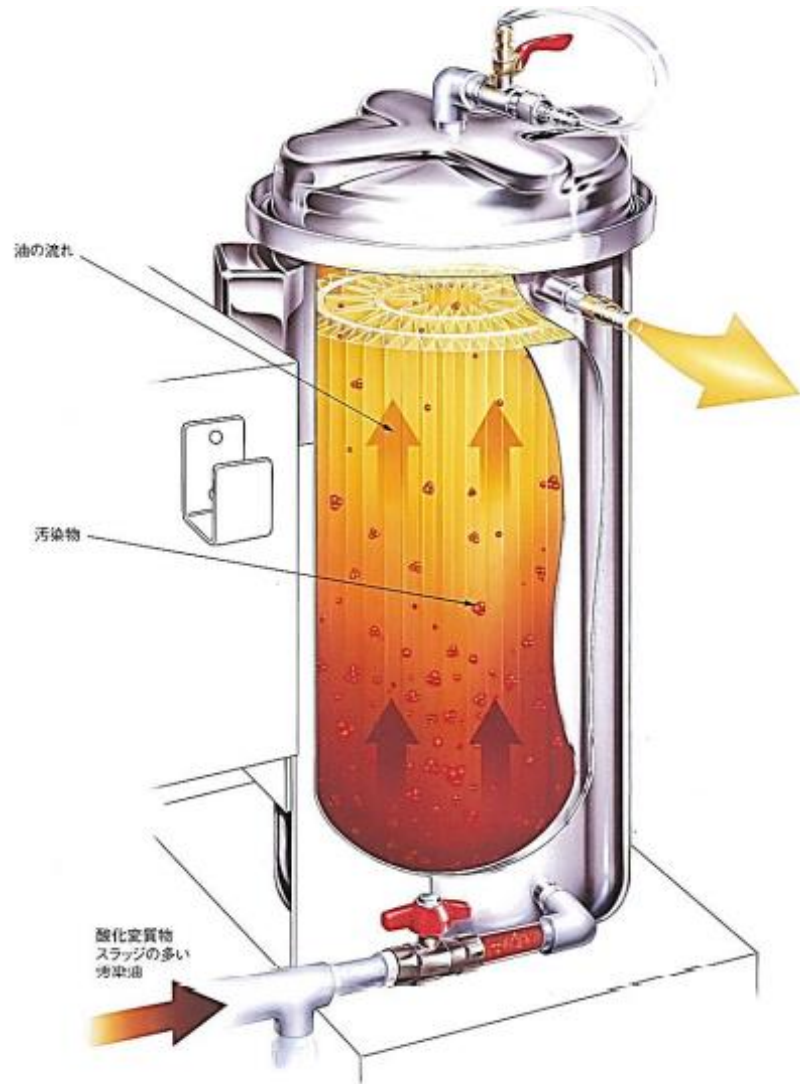
## 5. Working Principle of Electrostatic Oil Cleaner (“EOC”)



### Operating Principle of EOC

- ✓ Contaminants within the oil are charged using the electrode. The charged particles will move towards the electrode having opposite polarity.
- ✓ EOC has the ability to eliminate any kinds and sizes of contaminants including sub-micron contaminants
- ✓ Combined both the principle of electrophoresis & dielectrophoresis
- ✓ Patented designed collector materials that deform the electrical field and neutral contaminants are attracted to the strongest field region (Dielectrophoresis)
- ✓ Free-flowing of the fluid within the cleaning chamber. No pressure differences between the bottom and the top of the cleaning chamber

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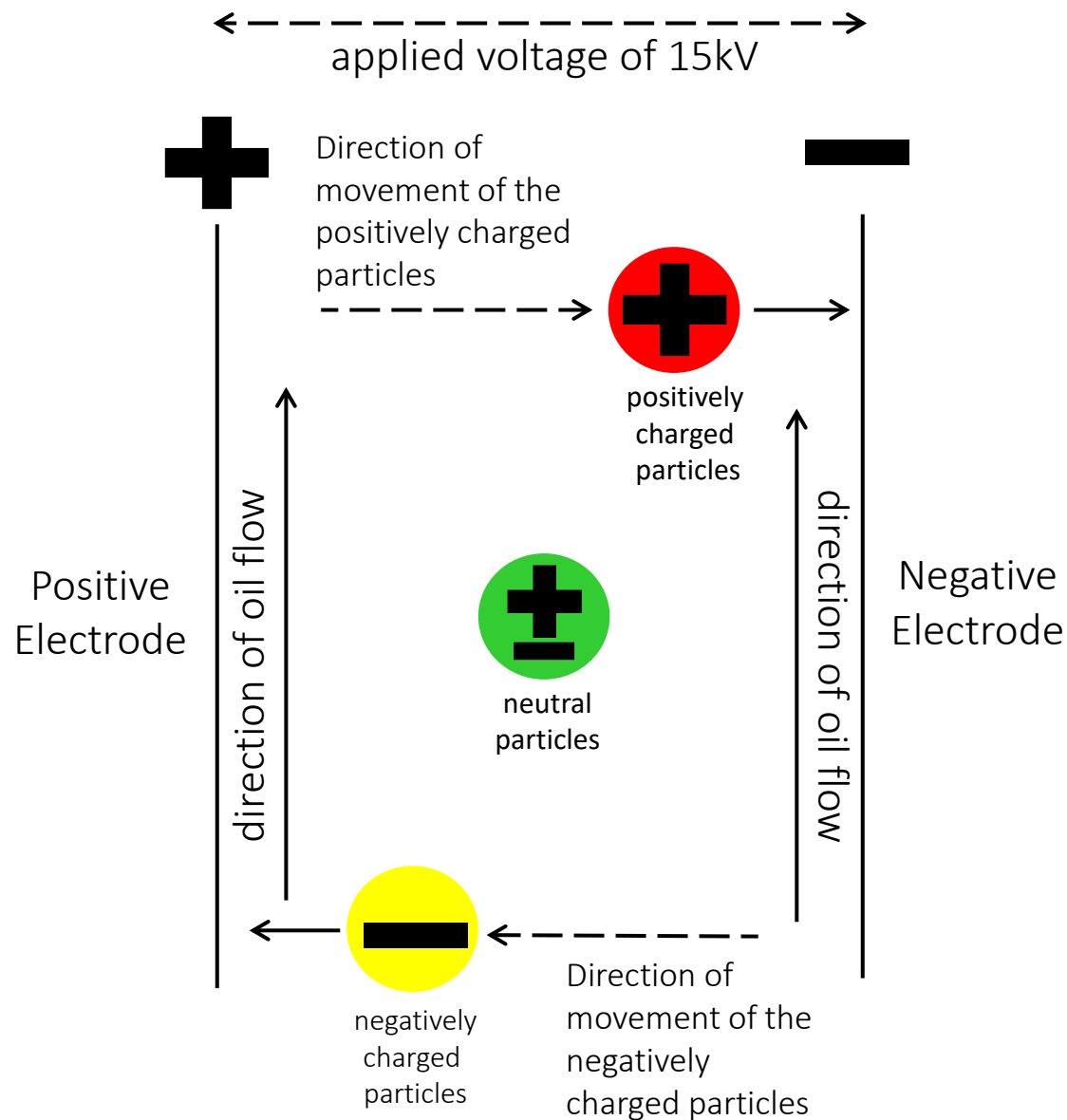
## 6. Advantages, Features and Performance



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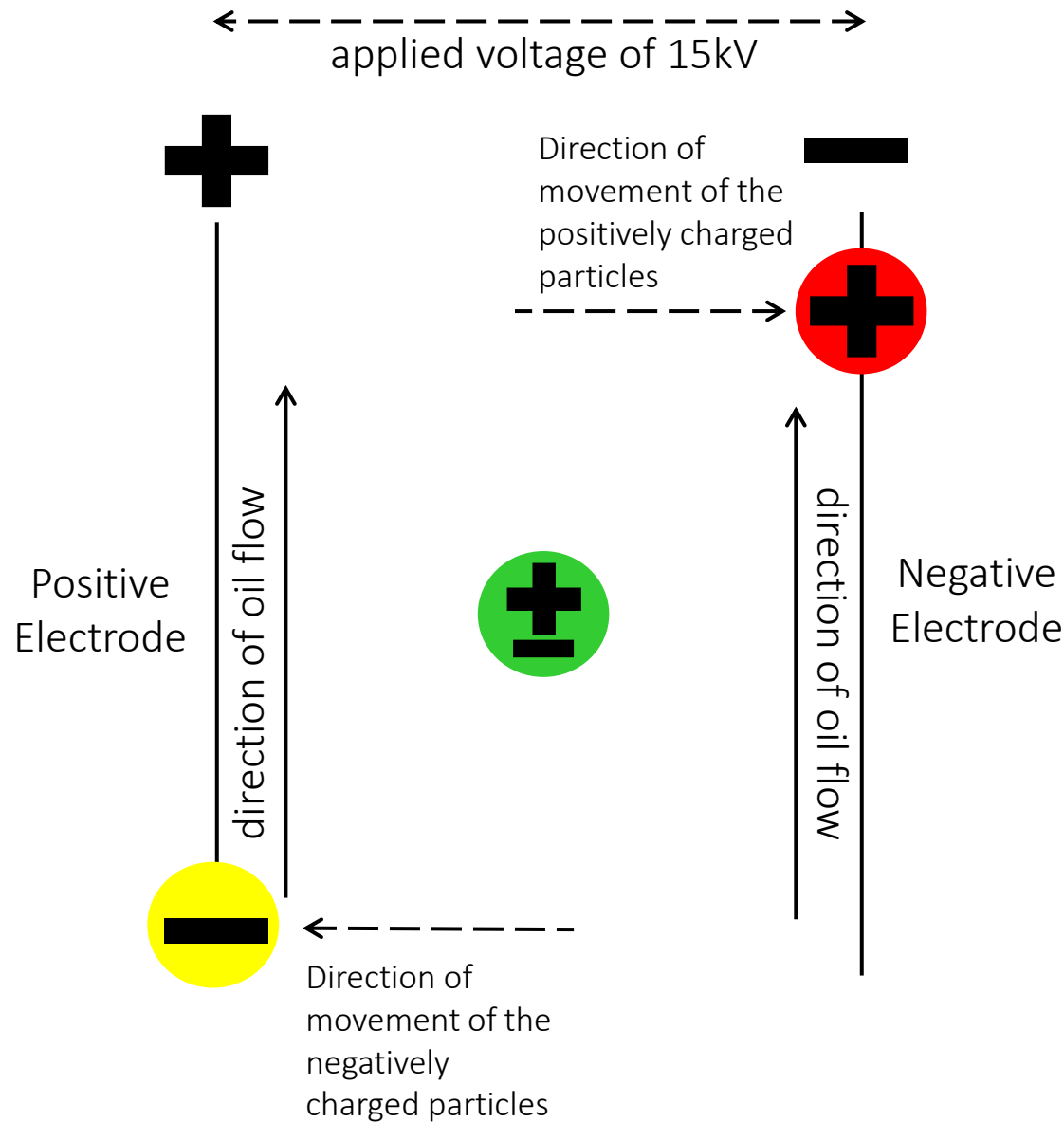
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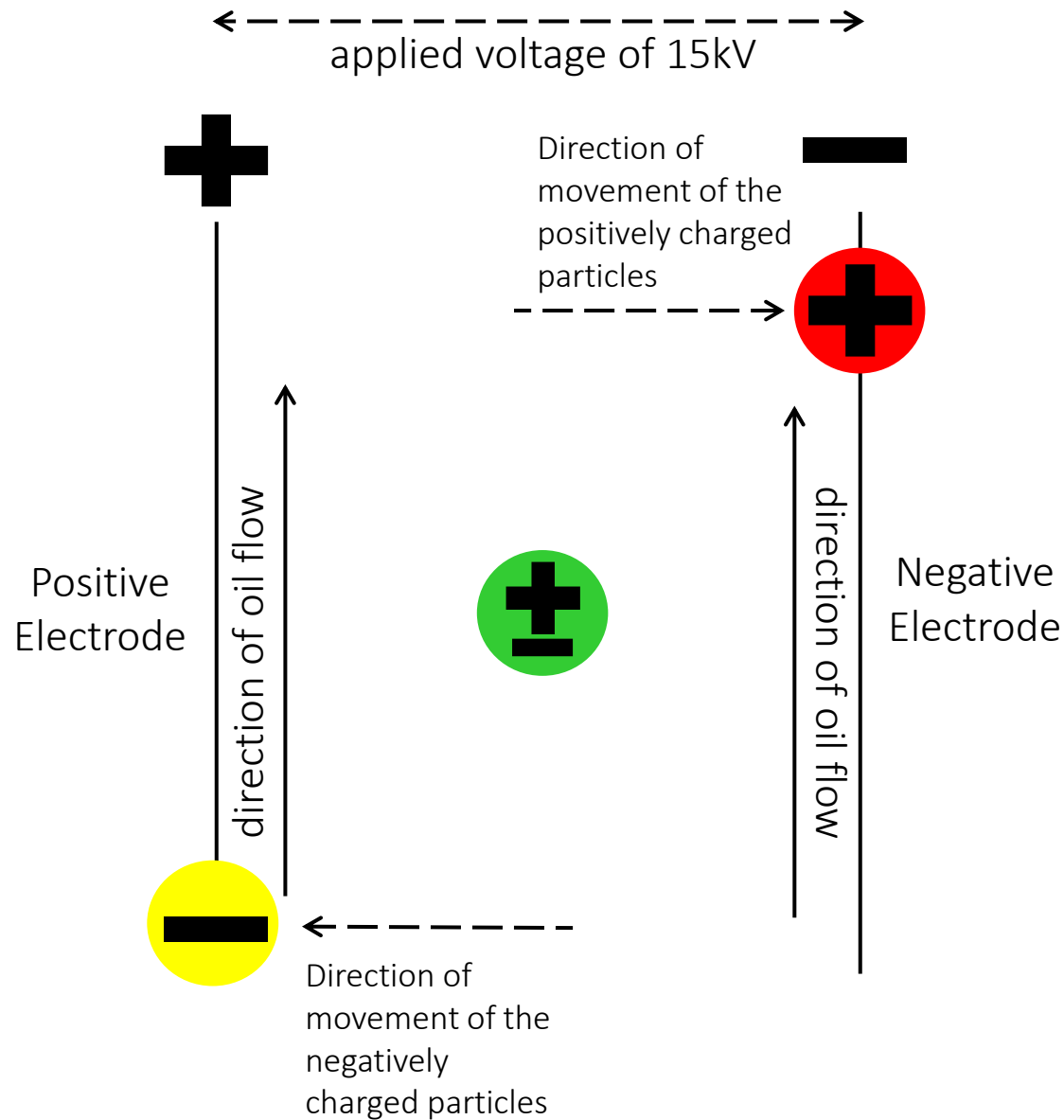
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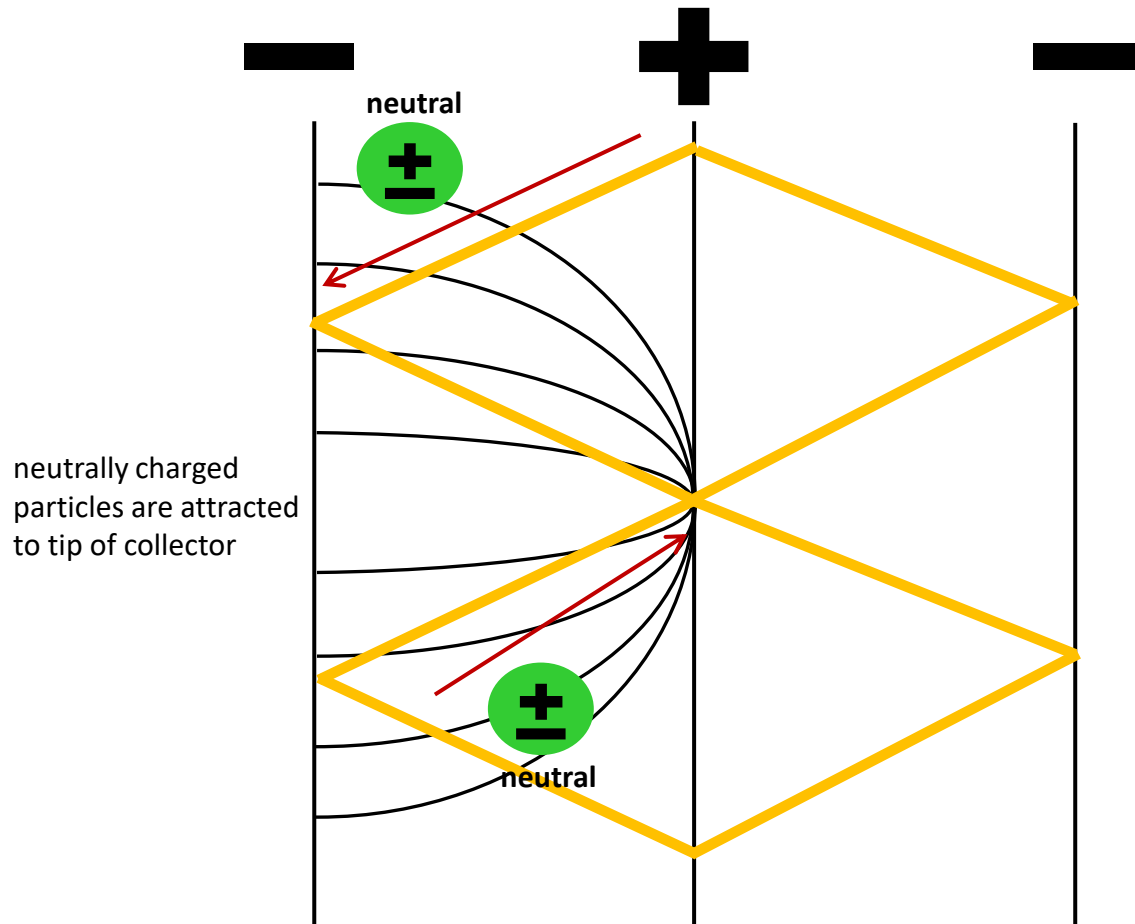


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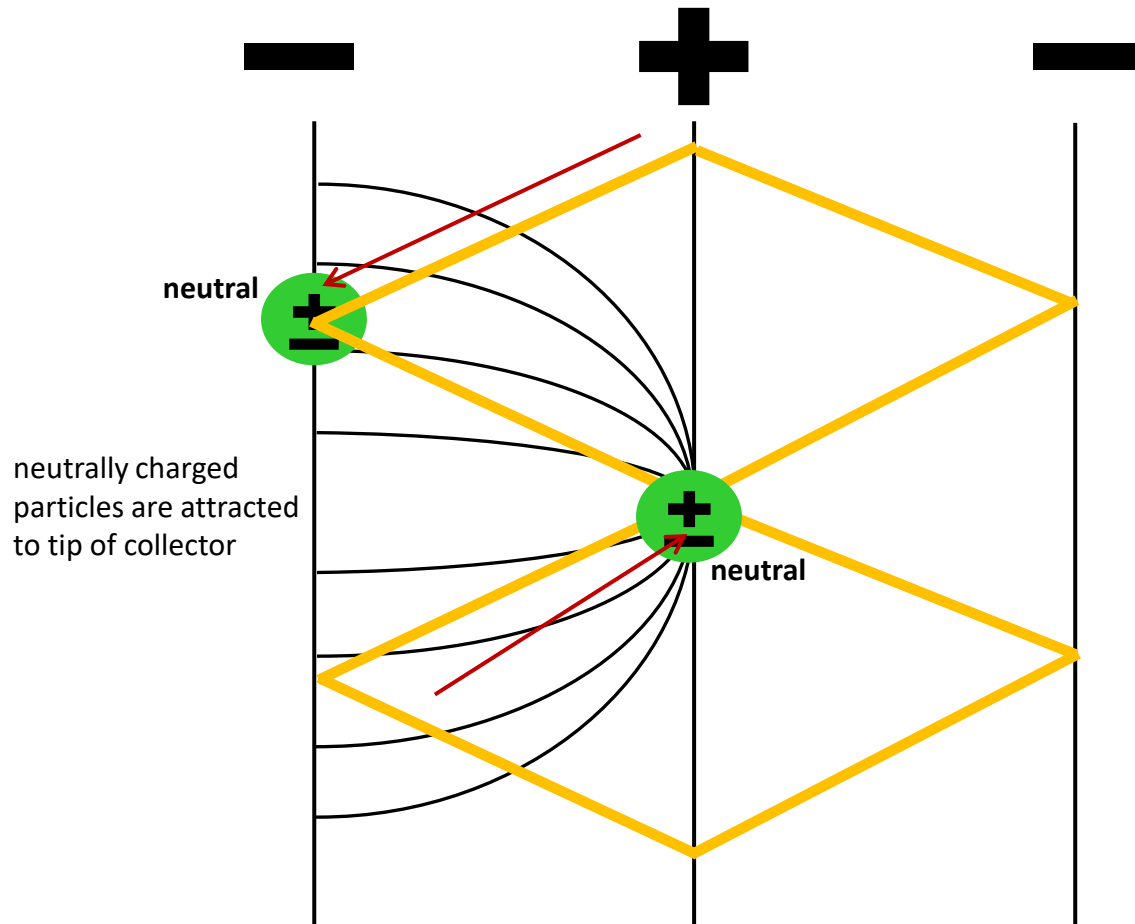
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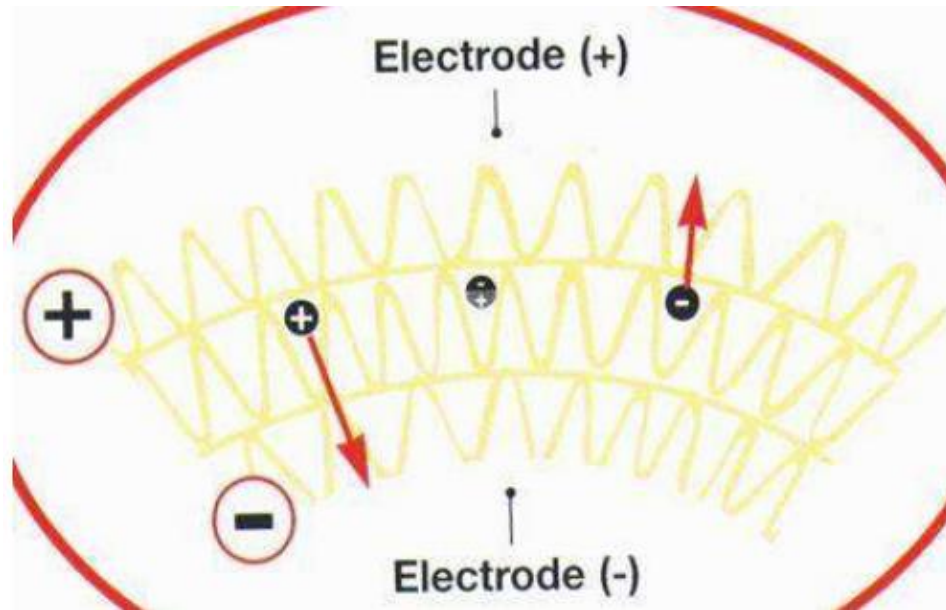
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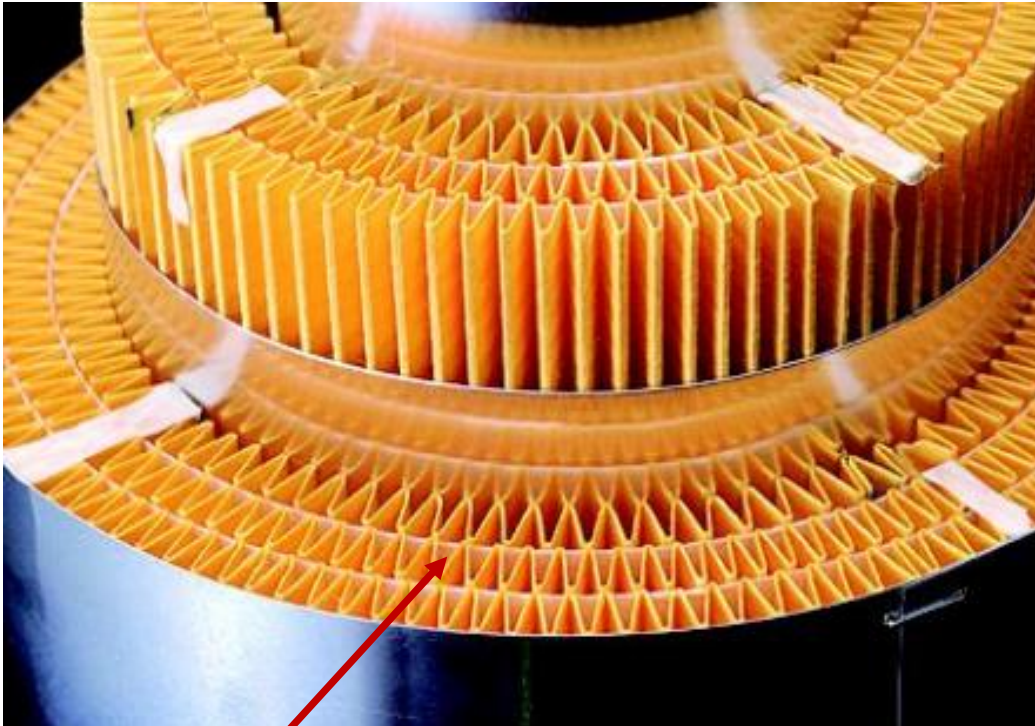
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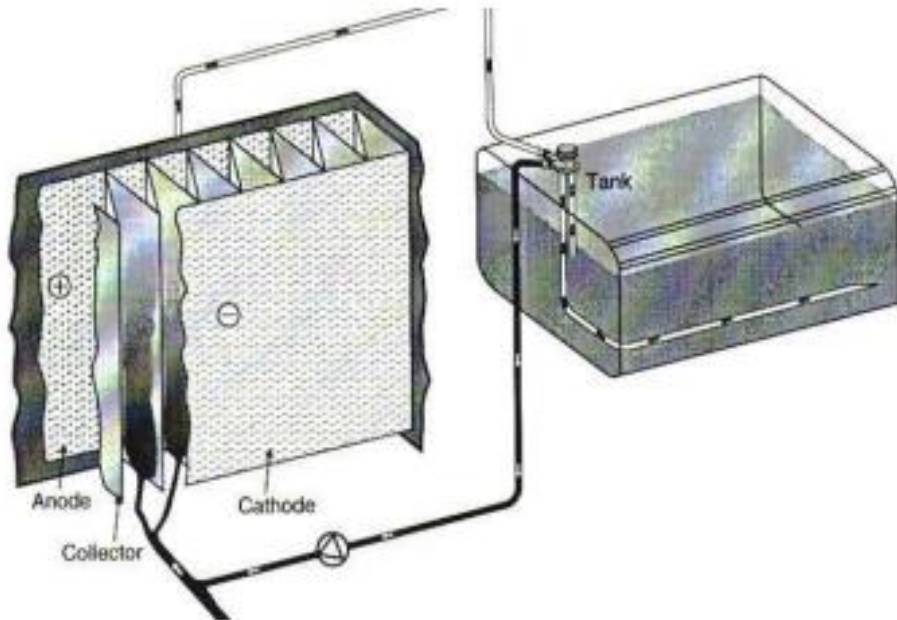
Honeycomb Structure

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## 5. Implementing and Operating Electrostatic Oil Cleaner (“EOC”)



### Implementing, Operating and Running your EOC

- ✓ Simple, quick and straightforward Implementation and Installation
- ✓ No modification to your existing machine/system is required
- ✓ Promote Active-Active (“online”)/Active-Passive (“off-line”) setup, no downtime is required for mission-critical application
- ✓ Just connect the power supply, one inlet and return hose to and from your Kleentek, Electrostatic Oil Cleaner, and your system will be up and running in no time

## 5. Implementing and Operating EOC



### Change of Kleentek: Cartridge Collector

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- ✓ Cartridge Collectors are replaced every 2,000 hours

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- ✓ Necessary to ensure maximum cleaning efficiency

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- ✓ Procedure requires only 30 minutes

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- ✓ Primary machine is not require to shutdown

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## 6. Comparison between using an EOC vs Conventional in-line Filter

### Using a Traditional and Conventional in-line Filter

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Replace line-filter when clogging occurs



Change of oil when hydraulic failures occurs



Change of oil when oil providers recommends a oil change  
(without system flushing)



Oil change continue to be part of the requirement of the preventive maintenance schedule with accordance to majority of the manufacturer – environmentally not sustainable



Remove up to micro-level particles (6 $\mu$ m) sized particles only. This is equivalent of particle sized up fine iron oxide

### Using a Kleentek: Electrostatic Oil Cleaner

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No clogging of the Kleentek Cartridge Collectors upon reaching it lifespan of approximately 2,000 hours  
Note: depending on the level of contamination



Removal of sub-micron particles and oil oxidation products that accounts for 70% of the contaminations that take place in a hydraulic system



Removal of oil oxidation product from the surface of the internal component without removal of complex components



No oil change is would be required  
Note: small quantity of oil (5% to 10%) top-up would be required in order to replenish the drop in level of oil additive and due to depletion of oil samples for testing



Ability to remove up to sub-micro level particles (0.03 $\mu$ m) sized particles. This is equivalent of up to carbon sized particles at a microscopic level.

## 7. Advantage of Using Electrostatic Oil Cleaner (“EOC”) – TP series

### Measures

### Details

#### Productivity

- reduce machine downtime
- reduce the no. of defective parts produce
- ensure consistent and high-quality of manufactured parts

#### Environment

- extend life of lubricating fluid/oil used
- encourage energy saving
- reduce oil leakage – from components and oil seals

#### Cost Reduction

- reduce freq. and vol. of oil purchases, disposing of expenses
- reduce cost of maintenances of equipment
- reduce and eliminate the occurrence of servo valve failure and pump failure

#### Sustainability

- reduce the use of non-renewable natural resources
- refocus of refined minerals oil/lubricant
- promote the use of sustainable practices



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Subjected to changes without notices.

## 8. Case Study – Tokyo Motomotive Co., Ltd, Japan – Cost Benefits Analysis

Item	Description of Content	w/o Kleentek Implementation (USD)	with Kleentek Implementation (USD)	Cost Saving (dollars/year) (USD)
servo valve replacement	average 3 times a year (@USD 6,250/year)	18,750	0	18,750
cost of oil replacement	$\frac{7,000 \text{ litres}}{3 \text{ years}} = 2,333 \text{ litres/year}$ $2,333 \text{ litres} \times \text{USD } 4.00 = \text{USD } 9,333$	9,333	0	9,333
cost of collector per year	replacement of collector twice per year @ USD 820 per collector	0	1,640	-1,640
oil addition (recommended)	5% of tank capacity of 7,000 litres (7,000 litres x 5% = 350 litres) (350 litres x USD4.00 = USD1,400.00)	0	1,400	-1,400
energy saving	reduce 5% of power consumption of hydraulic pump motor 417kW (150kW x 2 machine x 95 x 22kW (417kW X 46% X 18h X 22 days X 12 months X 5% X USD013USD/kWh)	118,500	112,580	5,920
<b>Total Saving</b>		<b>146,580</b>	<b>115,620</b>	<b>30,960</b>

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## 9. Case Study – Tokyo Motomotive Co., Ltd, Japan

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**Customer,  
Region** Tokyo Motormotives Co., Ltd  
Tokyo Shinangawa

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**Department** Engineering and Production Facilities  
Maintenance Department

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**Equipment** Hydraulic Press Machine  
Qty: 5 units  
Vol. of Oil Tank: 4,000 litres

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**Operating Parameters** Operating Temp: 45°C  
Lubri. Brand & Grade: Shell Tellus, VG46

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**Current Practice** Oil Change Cycle: once every 2 years  
Line Filter Replacement: once every year

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**Challenges** Hydraulic Failures  
Value Replacement: once every 3 years  
Pump Malfunction: once every 2 years



# 9. Case Study – Tokyo Motomotive Co., Ltd, Japan (cont.)

## ANALYSIS REPORT

No. 20669-1 ( T-H ) 47307  
 DATE OF REPORT : 03MAY2021  
 SALES CONTACT : TSUBACO

Customer: AQUA ELECTRIC APPLIANCE VIETNAM

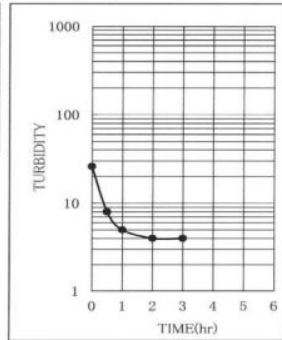
We're pleased to report the analysis results of your oil as follows :

### 1. TEST

SAMPLE DATA	
OIL NAME	Shell Tellus Oil S2 M46
EQUIPMENT	Injection machine
CLEANER	NONE
OPERATING HOURS	
OIL VOLUME	2,500L
FLUID TEMP	40-50
TESTING CONDITIONS	
CLEANER TYPE	EDC-03
TRIAL QUANTITY	1.0L
TEMPERATURE	18.6→27.0°C
VOLTAGE	14kV
CURRENT	0.7→1.5 μ A
FLOW RATE	0.34l/min

### 2. SHIFT OF TURBIDITY

TIME(hr)	TURBIDITY
0	26
0.5	8
1	5
2	4
3	4



### 3. TEST RESULT

SAMPLE	USED OIL	EDC 3hrs	
GRAVIMETRIC LEVEL	7.1mg/100ml	0.4mg/100ml	
WATER CONTENT	60ppm	—	
Membrane Filter MILLIPORE CAT No.,AAWG04700 Size : 0.8 μ m Fluid Volume : 100ml			

## Sample Oil



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