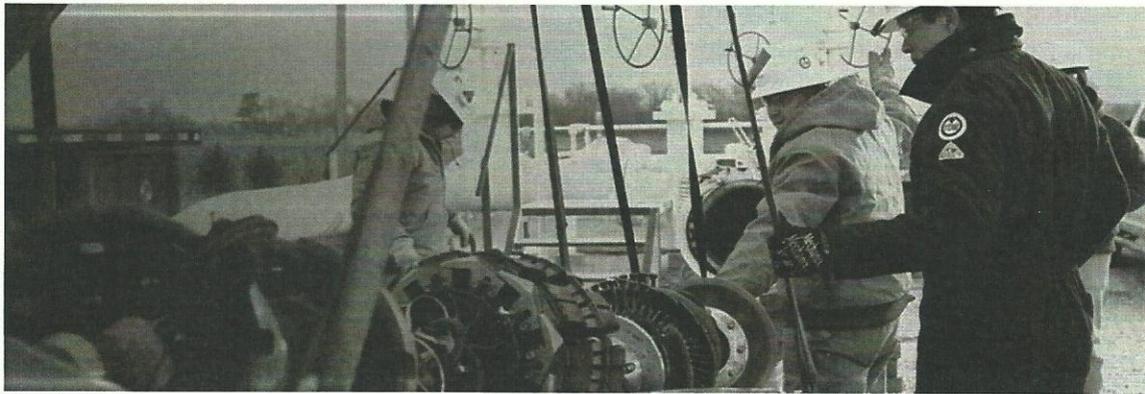


# Oil & Mining Industry

Magnetic Process Enhancement

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MagTech



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## Introducing the Scientists & Technology background:

Russian technology developed through 50 institutes with over 500 scientists during the 70's and 80's latterly under the leadership of Prof Yuri Tkatchenko. During the early 90's the Professor relocated a small science management R&D team to the UAE and created a long term partnership and the Magnetic Technologies Company with Sheikh Junaid Khoory. During the past 20 years further research and development continued along with expansion into the global market place, with over 50 different applications into various industries and sectors of the environment.

The technology spectrum not only addresses land based solutions but also weather modification and atmospheric influencing technologies, dissipating air pollution over cities, enhancing rainfall in to catchment zones, shielding critical communities from sand storms, protecting transport infrastructure from fog and reducing humidity within cities.

Magnetology is the earths' oldest technology, which it uses to protect itself from the extremes of the sun and for realignment of the waters molecular structure and much more; it is the life force of everything living. The scientists within Magnetic Technologies carry forward the understanding that magnetism is a natural resource, that upon being understood and applied correctly can create enormous benefits and contributions to many of the earths' environmental, water and food resource and health challenges.

This briefing is to introduce the benefits of developed science within Magnetic Technologies UAE to the Oil Producing and refining Industries including drilling, pumping and separation processes.

## The Magnetic Enhancement summary:

- By magnetising the water used for drilling lubrication, we can extend the life of the core drills and increase the efficiency of the drilling process;
- By magnetising the extracted liquids prior to pumps reduces the affects of saline encrustation and after pumps improves the flow capacity of the liquids through pipes to settlement or storage tanks.
- By the same magnetisation upon extracted combined oil water liquid, we can significantly improve the efficiency of the platforms initial dewatering process.
- By magnetising immediately prior to settlement or separation tanks we can improve sedimentation and the separation process.

## Handling scale in oil production facilities:

**Oilfield scale consists mainly of inorganic salts, with calcium carbonates, barium and strontium sulphates as the commonest components.**

Scale can form from brine (formation water) as it undergoes changes in pressure and temperature, or where two incompatible fluids are intermingled.

An example is formation water rich in calcium, strontium and barium when mixed with seawater high in sulphate. The first of these mechanism generally gives rise to carbonate scales, while the second usually produces sulphate scales.



## Examples of heavy scale crustation

Scale problems can arise in various circumstances:

- during drilling and well completion, if the drilling mud or completion fluid is incompatible with the formation water
- at the commissioning stage of new injectors, if the injection water is incompatible with the formation water
- during production, when a well starts to produce formation water with the hydrocarbons
- during wellstream processing, when significant quantities of produced water put process equipment at risk
- commingled production, where wellstreams from various formations, reservoirs or individual wells are mixed together, can make matters worse.

Statoil's research has been aimed at understanding scale formation, using computer programmes to predict its occurrence, and testing chemicals to eliminate or inhibit its development.

A new, patented oil-soluble scale inhibitor (OSI) allows a reservoir formation to be treated chemically just as a well has been completed and before it is brought into full, uninterrupted production.

Known as squeeze on completion (SOC), this procedure has several advantages:

- it allows wells to be chemically injected while the drilling rig is still on site, thereby saving time and money for subsea wells
- it reduces concern about when to squeeze and the risk of early formation and well damage having an adverse affect on productivity
- it effectively extends the lifetime of a well, and thereby postpones redundancy (decommissioning).

### Use of water injection:

- The process of processing crude oil includes the injection of desalinated water from the Thumbli saline water system into the wells to extract crude oil. The crude oil then goes through a first stage separation of oil, associated gas and water.
- The associated gas is recovered for further firing of the steam turbines and the separated water is sent back for water treatment. The crude then goes through a heater for second-stage separation, after which it enters a settling tank.
- The final associated residual gas is taken off the top of the settling tank. The crude then goes through a dehydrator to take out the last remnants of water, after which it is sent to the export oil storage tanks. From the storage tanks it is pumped in to the heated pipeline.

### Saline build up:

- When operating flooded oil wells almost all fields there is a significant accumulation of salts in the pipes. The most intense deposition of salts is observed during operation of compressor wells.
- Salt precipitation intensity depends on the chemical composition of formation water, produced water amount, the amount of recoverable carbon dioxide, pressure and fluid velocity. Precipitation of salts are deposited in the pipes have different structures - powder, coarse layers and stone-like.
- Many ways of dealing with the salt deposits in the pipes (chemical, cathodic protection, paint, special pipes, etc.) are not widely used because of its low efficiency and excessive costs for their implementation. The most effective is currently the way to fight the salt deposits, based on the use of magnetic technology.

### The Magnetic Device

- Typically, the magnetic system is located in a cylindrical housing and the device the length of 560-600 mm is set in the riser. In operation, a well fluid stream passing through the system modifies its physical properties, changing the viscosity and electrical conductivity of the liquid, inhibiting loss of salts. As a result, the magnetic treatment of calcium salts, which are extracted from the oil - water emulsion in the form of a thin slurry, do not adhere to the surface of the pipe wall. Studies have shown that the influence of the magnetic field is stable for the time of passage of fluid from the well bottom to the mouth.

- Crude oil, compressed natural gas and liquid petroleum products are moved long distances through pipelines at speeds from 5.5 to 9 km per hour by large pumps or compressors located along the route of the pipeline at intervals ranging from 90 km to over 270 km. The distance between pumping or compressor stations is determined by the pump capacity, viscosity of the product, size of the pipeline and the type of terrain crossed. Regardless of these factors, pipeline pumping pressures and flow rates are controlled throughout the system to maintain a constant movement of product within the pipeline.
- By passing the liquid through the magnetic inline device, pumping become more efficient increasing capacity and reducing solidifying material to establish on pipe walls and within pumping systems.

### Magnetic affects upon Wax Deposits

- Wax deposition in oilfield equipment cause significant complications in the operation of oil wells and pipelines
- The results of tests of the magnetic method for controlling paraffin deposits on the example Shkapovskogo oilfield where 50 test wells that have a variety of positive results in respect of flow rates, water cut, buffer pressure and efficiency of operation. The effects were obtained in all wells.
- The Wax deposition process will depend on many factors, the main problem is the change in pressure loss of the light ends, lower temperature, the increase content of asphalt-resinous substances, the presence of oil in the water and mechanical impurities. It is practically difficult to isolate the net effect of magnetic field on wax deposition, but it was generally accepted that magnetising the flow is significantly beneficial especially in its ability to reduce the wax crystallization process

### Magnetic Key Benefits:

Magnetic technology allows you to:

1. Change structure of oil and fractional composition;
2. Destroy water emulsions;
3. Dried and desalted oil emulsion;
4. Significantly reduce salt deposits in pipes, particularly during operation of compressor wells;
5. Significantly reduce wax deposition in oilfield equipment and highways transport of oil;
6. Changing the potential content of fractions of petroleum products ;
7. Improve solubility and selectivity of organic solvents ;
8. Significantly increase the stability of visbreaking boiler fuels ;
9. Sufficiently reduce the viscosity of residual oil ;
- 10 . Significantly improve miscibility gasoline- ethanol compositions;
11. enhances pumping when using sea water to maintain reservoir pressure ;
12. Reduce the ratio of " gas-oil " ;
13. Increase the productivity of desalination plants ;
14. Increase efficiency coolants

### Magnetic Enhancement Expectations:

Some figures on the above features of the magnetic technology are:

1. Increasing the yield of light fractions in the range 3-17 % ;
- 2 . For diesel fractions 140-380 and 180-350 ° C, as well as oil fractions 300-350 and 350-420 ° C significantly (by 5-10 ° C) reduces the pour point , which has a positive impact on the performance properties of petroleum products;
- 3 . Reduced viscosity fractions 300-350 ° C of 2-2.5;
- 4 . Delamination speed emulsion increases 3 times;
- 5 . Depth dehydration and desalting emulsions and oil increased by 1.5-2 times ;
6. Reduces the intensity of the salt deposits in 3-8 times ;
7. Reduces paraffin deposits in 1.8-3.2 times;
8. For high-boiling hydrocarbons boiling point rises to 20-50 ° C, and the growth of middle distillate yield increased by 4-12,5 % ;
9. Overall yield of distillate fractions increased by 3-5%;
- 10 . Dissolution of organic solvents increases 1.7-2.5 times.

### Summary of the effect of magnetic oil treatment:

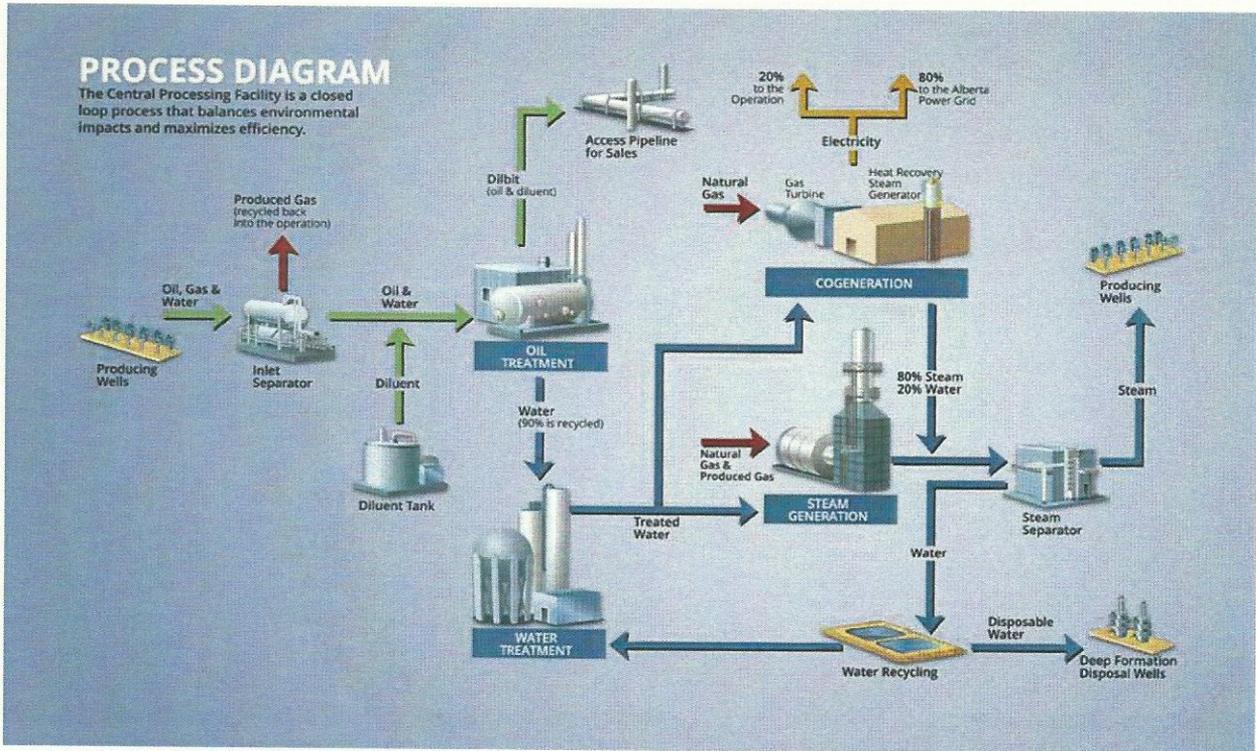
Company "Magnetic Technologies" has the technology and equipment, providing an increase of initial boiling point of any oil, condensate oil and refined products, which ultimately creates the conditions for a significant reduction in the loss of light ends during storage and transportation of oil and oil products.

### Key benefits: For the Oil-Mining and Oil-Refining Industry, Fuel and Energy

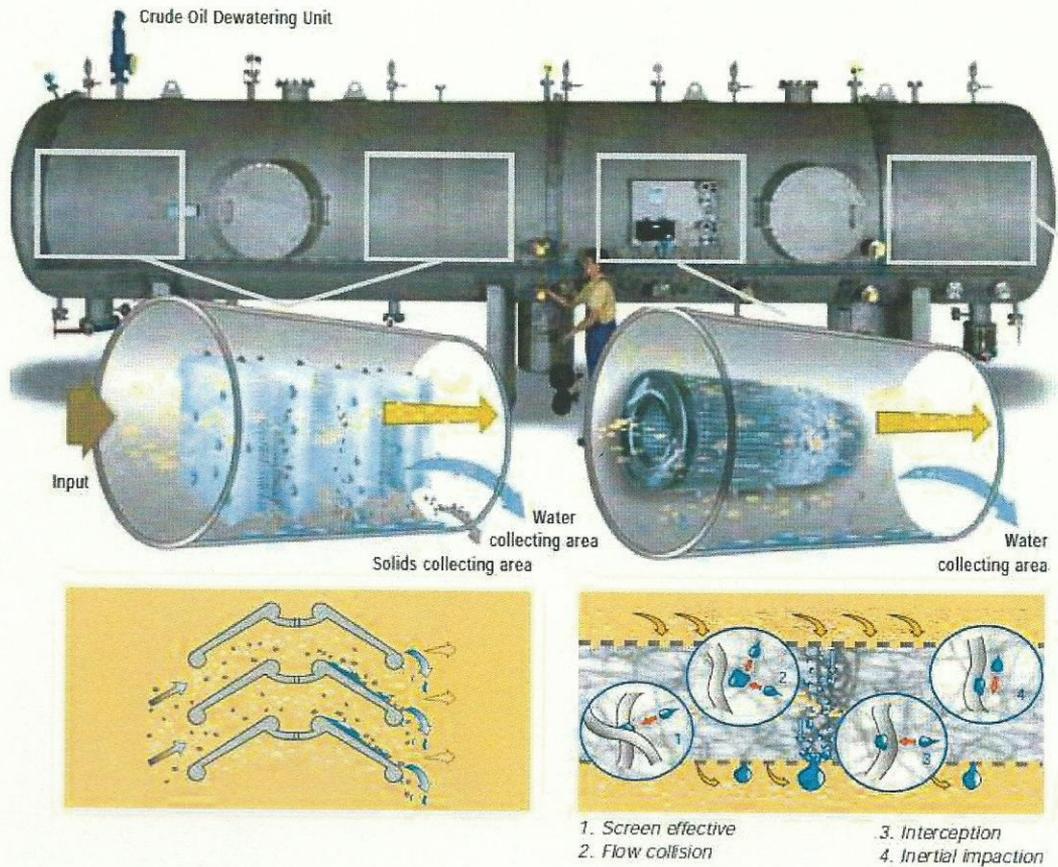
1. Influence of magnetic treatment on operational characteristics of jet fuel.
2. Efficiency of magnetic systems in improving operational properties of fuel and dopes.
3. Influence of magnetic modifier on physical and chemical properties of petrol.
4. Influence of magnetic modifier on anti-knock efficiency of petrol that with ferrous dopes.
5. Influence of magnetic modifier on the engine power, fuel consumption, contents of CO, CH, NOx in exhaust gases in the running mode.
6. Influence of graded magnetic treatment on basic physical and chemical properties of diesel and boiler fuel.
7. Influence of graded magnetic treatment on basic operational properties of jet fuel.
8. Influence of magnetic treatment of petroleum on its properties.
9. Influence of magnetic field on physical, chemical, reological and operational properties of lubricants.
10. Changes in physical, chemical and reological properties of lubricants as affected by magnetic field.
11. Changes in properties of magnetized synthetic aviation oil.
12. Influence of magnetic field on changes in physical, chemical and operational properties of oil products and xeolytes.
13. Influence of magnetic field on potential fraction contents.
14. Influence of magnetic field on dissolving capacity and selectivity of organic solvents.
15. Influence of magnetic field on viscosity of oil products.
16. Influence of magnetic field on blending petrol and ethanol compositions.
17. Influence of magnetic field on oil preparation for refining; changes on physical and chemical properties of wax-contained oil and deposits.
18. Petroleum classification of oils according to its magnetic properties.
19. Magnetic susceptibility and its calculation. Pascal & Dorfmann's scheme.

20. Magnetic properties of individual petroleum components.
21. Breaking of water and oil emulsions in the magnetic field.
22. Magnetic method of controlling wax build-ups.
23. Influence of magnetic field on oil preparation for refining.
24. Influence of magnetic field on changes in physical, chemical, and reological properties of wax-enriched oil.
25. Influence of magnetic field on scale formation.
26. Influence of magnetic treatment on properties of zeolites, adsorbents and catalysts for oil refining.
27. Influence of magnetic treatment on synthesis and properties of zeolites with high silica contents.
28. Synthesis of general-use zeolites (NaA, NaX) aided by magnetized water; property studies of produced zeolites and adsorbents formed on their base.
29. Preparation of isomerization catalyst samples of aromatic hydrocarbons aided by magnetized water and studies of their physical, chemical and catalytic properties.
30. Effects of magnetic treatment on properties of aluminosilicate carriers.
31. Magnetic treatment efficiency of cooling and lubricating fluids and water-diluted inhibited film oil compositions; choice of treatment technology.
32. Magnetic modifier for better operational properties of diesel oil and diesel additives.
33. Magnetic modifier for better operational properties of petrol.
34. Effects of magnetic treatment on knock properties of petrol and engines.
35. Effects of magnetic treatment on petrol evaporation.
36. Effects of magnetic treatment on petrol stability and purity.
37. Effects of magnetic treatment on power, economical and ecological properties of the engine on a testing ground and on the road.
38. Influence of magnetic field on changes in physical, chemical and operational features of lubricants – products of oil-refining and petrochemical industry.
39. Influence of magnetic field on structure formation and properties of lithium lubricants, paste reduction gear lubricants, thickening capacity of modified lubricants and properties of silica-gel lubricants.
40. Influence of magnetic field on physical, chemical and operational properties of motor oil.
41. Influence of magnetic field on physical, chemical, bactericide and other operational properties of emulsified lubricants and coolants.
42. Influence of magnetic field on properties and stability of oil-graphite and oil-molybdenum disulphide compositions.
43. Influence of magnetic field on better qualitative characteristics of liquids.
44. Systems for magnetic treatment of fluids.
45. Influence of magnetic treatment on operational properties of petroleum and synthetic oils.
46. Influence of magnetic treatment on fuel operational properties.
47. Magnetic systems for oil purification.
48. Engineering of a device for evaluation of fluid magnetization.
49. Application of magnetized water for industrial production of aluminium oxide and aluminium oxide-based catalysts.
50. Effects of magnetized water on production of aluminium oxide and catalysts and its impact of physical, chemical and catalytic properties.
51. Efficiency of magnetic treatment of liquids.
52. Influence of magnetic field on physical, chemical, reological and operational properties of motor oil.

Oil Production and Distribution system diagram



Dewatering system [MAHLE]



### Magnetic Technologies Summary Statement

We believe that within Magnetic Technologies LLC UAE we can make a significant contribution to the oil industry by magnetically enhancing efficiency and capacity and by improving the environmental image of the industry through magnetic enhancement of its water recycling and waste management systems.



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