

Nanjing Tengyi Petrochemical Co., Ltd.

XSNANO Nanotechnology Fuel Additive

(NDA-288,NGA-288)

Petroleum Product Blending Case Analysis

Nanjing Tengyi Petrochemical Co., Ltd.

XUNSN International Group Ltd.

February 2, 2015



General

Nanjing Tengyi Petrochemical Co., Ltd. is a private energy enterprise in Jiangsu mainly engaged in petrochemical production. It blends and produces over 500,000 tons of diesel, gasoline and shipping fuel a year. To solve problems like incomplete and nonuniform combustion, pollution and emission issues, we constantly strive to make breakthroughs with relentless efforts and have produced and blended quality, up-to-standard gasoline and diesel fuel as well as special-purpose oil for imported internal combustion engines. We aim to do our bit in environmental protection, energy conservation and emission reduction and the PM2.5 pollution problem by constantly blazing new trails in a pioneering spirit, improving technology content and perfecting our skills. Since we have used the **XSNANO** fuel additive, we have been able to make significant breakthroughs in homogeneity, cleansing and dispersing of oil products and up-to-standard discharge. Well received by the market, the **XSNANO** fuel additive has also helped us improve the quality of petroleum products and reduce oil refining costs.

XSNANO fuel additive, a high-tech product developed by XUNSN International Group Ltd. that has combined such technologies as liquid phase nanotechnology and radiation chemical engineering, is currently the world's most advanced fuel additive and also the most efficient clean fuel additive. With a solid foundation in international scientific research and talents, the company has been constantly developing high-tech nanotechnology series products. The company's production base is equipped with a production capacity of over 1,000 tons of nanotechnology fuel additives and nanotechnology lubricating oil additives a year. With the technological strength from Beijing University accumulated for over one hundred years and XUNSN International Group Ltd.'s abundant capital and resources, the company incubates high-tech projects and transforms them into social productive forces. The company's goal is to integrate the latest technology with business and civil use and is committed to protecting the environment and benefiting the society.

We are honored to cooperate with XUNSN International Group Ltd. to jointly realize fuel quality that is aligned with China's National V Standard and stop the use of chemical additives with metal or oxidising agents and finally to lower oil refining costs and reduce environmental pollution.

Case Analysis Objectives

Nanjing Tengyi Petrochemical Co., Ltd. has tested the application of XSNANO fuel additive in petroleum product blending repeatedly. To improve its knock resistance, we have increased its octane rating; we've solved knockings and exhaust gas emission, as well as problems like incomplete combustion and carbon deposition at valve core.

Effects of XSNANO fuel additive

In the conventional linear blending, blending methods like blending property control (BPC) and blending ratio control (BRC) are adopted. Arene, naphtha, BTX aromatics, MTBE and a certain proportion of MMT additive are used for linear blending of gasoline. During the blending process, it has been found that this blending method has shortcomings such as uneven liquid phase dispersion affecting the homogeneity of the product, limited octane rating increase and colloid deposition and gradation. The long-term use of the oil products that are blended with the conventional blending can damage the three-way catalytic converters of vehicles, cause oxygen sensors to fail, corrode vehicle engine system and exhaust system, block oil ways and nozzles, cause deposit sediments, and colloid and carbon deposition in valves and cylinders until directly affecting the normal operation of gasoline engines. After using XSNANO fuel additive, we have adopted different methods for blending and have found:

1. The blending components are distributed evenly in phases
2. The increase of octane level is significant, and the proportion of additive is reduced
3. Among the emission indicators, the emission of nitrogen, oxygen, sulfur and heavy metal is reduced significantly.

Conclusions

After adding XSNANO fuel additive, the knock resistance of the petroleum products improved significantly, with antiknock index up 4 to 6; the power also increased impressively, the rotating speed stability was excellent and petroleum product acidity and colloid were reduced largely. We have therefore summed up an effective linear blending solution with data storage management modules and task control modules.

Case Analysis

1. No additive:

Naphtha	BTX aromatics	MTBE	MMT
75	15	8	2

2. Adding additive

Add XSNANO nanometer fuel additive according to the proportion (1:20,000):

Naphtha	BTX aromatics	MTBE	MMT
80	13	5	1

3. Adding additive

Add XSNANO nanometer fuel additive according to a different proportion (1:10,000):

Naphtha	BTX aromatics	MTBE	MMT	Other
84	10	4	0.6	Increasing chroma

Physical and chemical properties of XSNANO nanometer fuel additive:

Appearance: transparent brown oil based liquid

Solubility: Easily dispersed in fuel

Corrosivity: Copper corrosion test according to the ASTM D130 method was conducted, and XSNANO fuel additive was introduced according to the 1:10,000 proportion.

Thermal stability:

Heating: Away from direct sunlight, heated to 85°C. There is no demulsification of the product despite the temperature was maintained at this level, or layering after being cooled to room temperature.

Freezing: Frozen at an ultra-low temperature freezer to minus 40°C. No floccule in 24 hours.

Specific weight: No significant change in weight of the petroleum product after the additive was added.

pH value: No change in pH value after adding the additive.

Toxic substance: No new toxic substance is found after adding the additive.

Physical and chemical properties: The physical and chemical indicators of the finished products with the additive are qualified.

The petroleum product met the required standards and specifications.

Analysis:

Octane rating is the most important indicator of the knock resistance of petroleum products. Octane rating, as a parameter that can directly reflect knock resistance, is a label of petroleum products. While knock resistance can directly reflect the combustion uniformity of petroleum products under certain combustion conditions. XSNANO fuel additive has adopted liquid phase nanotechnology, which wedges nanometer liquid into petroleum products with nanometer assembly technology. The molecules then improve the knock resistance of petroleum products during the combustion.

XSNANO fuel additive has such unique functions as cleaning carbon deposition and eliminating periodic combustion difference. Moreover, it can reduce engine knockings significantly and thus reduce octane rating demand by 4 to 6. The minor knock before combustion can loosen and crush the carbon deposition on the wall of the combustor, enabling the engine to maintain/recover to operate on the designed optimal level. That can thus extend the useful life of the engine and reduce maintenance frequency and costs.

After testing the additive on dozens of vehicle models according to the national regulations on environmental protection testing, it can reduce exhaust emission by over 40%, and 95% at the highest level. In particular, it has great effect on the “focus of environmental protection”- oxynitrides.

Nanjing Tengyi Petrochemical Co., Ltd. (Official Seal)

Date: February 2, 2015



A. MMT 汽油 vs 无 MMT 汽油 - 火花塞对比



B. MMT 汽油 vs 无 MMT 汽油 - 气门对比



C. MMT 汽油 VS 无 MMT 汽油---尾气含氧传感器对比

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Test Program Observations continued

Typical Oxygen Sensor Deposits

MMT-Fuelled Vehicle



AE01 - 1U
50,944 odom

Clear-Fuelled Vehicle



CE01 - 1U
50,724 odom

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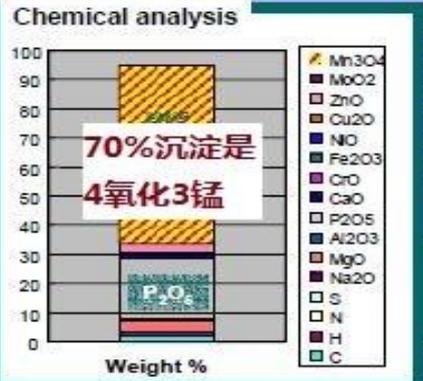
D. MMT 汽油 vs 无 MMT 汽油 - 气门杆和三元催化器堵塞沉淀物分析

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Mechanism - Deposits

MMT Additive Combustion Process
 $C_9H_7MnO_3 + O_2 \rightarrow Mn_2O_4 - \text{melting point } 1705^\circ C + CO_2 + H_2O$

Chemical analysis



70%沉淀是
4氧化3锰

Weight %

- Mn3O4
- MnO2
- ZnO
- Cu2O
- NiO
- Fe2O3
- CrO
- CaO
- P2O5
- Al2O3
- MgO
- Na2O
- S
- N
- H
- C

400 CPSI Cat

Mn₂O₄ is a metal oxide - it adheres and accumulates on exhaust system components as a solid after combustion.





Valve Burning due To Exhaust leakage

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E. MMT 汽油 vs 无 MMT 汽油 - 尾气检验合格率对比



含MMT汽油的汽车样本 无MMT汽油的汽车样本

F.其他对比照片



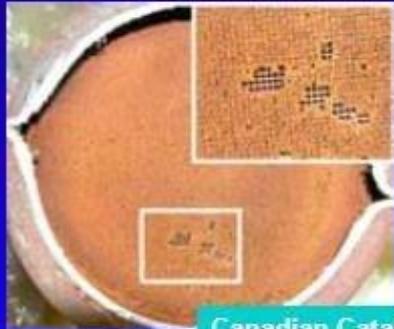
MMT汽油

爱卡网 7.3万公里

无MMT汽油

7.7万公里

Sample of Comparable Canadian and U.S. Catalyst



Canadian Catalyst
Mileage 84,131 kms



U.S. Catalyst
Mileage 222,595 kms

Model year:	2002 / 2001
Certification level:	ULEV
Catalyst Density (Cells/in ²):	600
Close coupled (Yes/No):	Yes
Analysis of Deposit (Major Component):	Mn
Customer complaint:	MIL came on & low power

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添加MMT汽油的加拿大发
动机，行驶仅8.4万公里

使用不含MMT汽油的美国同型
号汽车，行驶超过22万公里

Sample of Comparable Canadian and U.S. Catalyst



Canadian Catalyst
Mileage 97,603 km



U.S. Catalyst
Mileage 89,400 km

Model year:	2002
Certification level:	ULEV
Catalyst Density (Cells/in ²):	400
Close coupled (Yes/No):	Yes
Analysis of Deposit (Major Component):	Mn, O ₂

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MMT汽油：
9.7万公里

无MMT汽油：
8.9万公里