

Robert Mandaković

ISSN 0350-350X

GOMABN 46, 6, 437-474

Review

UDK 621.892 : .002.237 : 380.134 : (497.13 -194.2) : (100)

TRENDS IN BASE STOCK AND LUBRICANTS BUSINESS AND PARTICULARITIES OF MARKETS IN CROATIA AND THE SURROUNDING REGION

Abstract

The constant rise in consumption of lubricants and base oils is not equally spread in different markets and regions of the world. The trends in lubricant and base oil quality requirements, as well as the unevenness in demand depending on the quality and specifications of the certain markets have a great influence on the lubricant, base oil and lubricant additives industry.

The latest regulations on the environment protection have a special impact on the lubricant business in Europe and Croatia and they will primarily increase the responsibility of the industry, but simultaneously decrease its competitiveness.

The latest trends in the lubricant business in Croatia and the surrounding region as well as the synergistic effect of the continuous and increasing imports of the new industrial equipment and vehicles as well as current quality requirements in Europe will continue to show decrease in lubricant consumption in Croatia and the surrounding region.

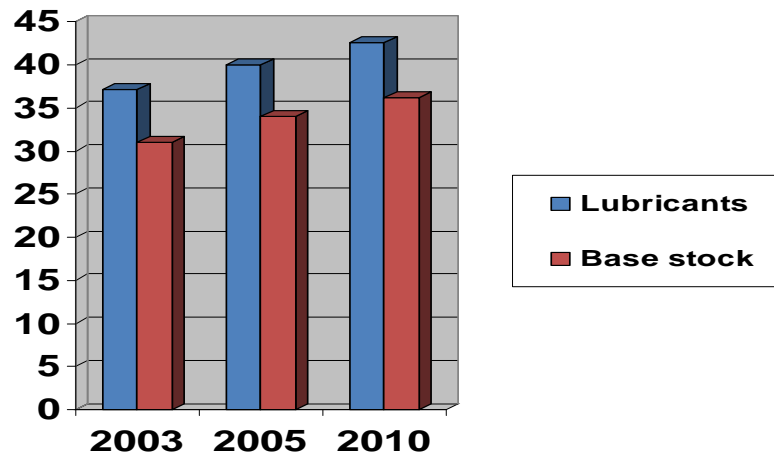
Estimated global demand of finished lubricants and base stock, 2003-2010

On the basis of the latest research done by Total ⁽¹⁾ it has been estimated that the global demand of lubricants and base stock will be increased by the 6% growth in the period from 2005 to 2010.

Figure 1 shows that the global lubricant consumption has been increased from 37.1 million to approx. 40 million tons which stands for the growth of huge 7.8%. Accordingly, there is also a significant growth trend with base stock which is 9.6%; in

2003 the base stock consumption was 31 million tons and it has reached 34 million tons in 2005. Still, this growth trend will be slowed down.

Figure 1: Estimated global demand of finished lubricants and base stock, 2003 – 2010 (10^6 t)



It has been estimated ⁽¹⁾ that by the year 2010 the global demand of lubricants will reach 42.6 million tons (6%). Simultaneously, the base stock demand will be increased for approx. 6.4%. In 2010 the total demand of base stock will be 36.2 million tons maximum.

The same source estimates that the decrease of lubricant demand will be continued in the Western Europe for 1,3% per year. Here we also have to mention that the demand of lubricants in the Central and Eastern Europe, which approximately equals the demand in the Western Europe at the moment, will continuously grow.

Some observers believe that the terms like the Central and Eastern Europe are old-fashioned and it's still quite touchy to attach them to certain countries, so they could present an obstacle for lubricant business today in this part of Europe. The new market division of the 'rest' of Europe ⁽²⁾ into 3 geographical groups has been well accepted. The first group consists of the Central European countries: the Czech Republic, Hungary, Poland, Slovakia and Slovenia. The countries of the South Europe make the second group: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Rumania, Serbia (Kosovo) and Monte Negro. The former Soviet Union countries make the third group: Byelorussia, Estonia, Latvia, Lithuania, Russia, Ukraine and Moldavia. Nevertheless, apart from geographical and historical reasons, there are also some other more significant similarities within these groups, especially when a budget growth and foreign investments are concerned.

The tables 1 and 2 show estimated lubricant and base stock consumption in the world by regions from 2005 to 2010. Due to its special features marine oils are excluded.

The table 1 shows that the lubricant market in North America will be mostly stable, also with the possibility of very small increase by 0.3% in the period mentioned. The greatest increase, 3-3.5% per year, will be in Asia and Pacific, which already has the biggest share in the global lubricant consumption (more than 34%).

Table 1: Estimated lubricant consumption by region, 2005-2010, including Mexico*

| | 2005 | | 2010 | |
|----------------|-------------------|-------|-------------------|-------|
| | 10 ⁶ t | % | 10 ⁶ t | % |
| Asia – Pacific | 12.6 | 31.5 | 14.6 | 34.3 |
| North America | 9.2 | 23.0 | 9.3 | 21.9 |
| West Europe | 4.5 | 11.3 | 4.2 | 9.9 |
| East Europe | 4.3 | 10.8 | 4.6 | 10.8 |
| Latin America* | 3.0 | 7.5 | 3.2 | 7.5 |
| Middle East | 2.0 | 5.0 | 2.2 | 5.1 |
| Africa | 1.9 | 4.8 | 2.0 | 4.7 |
| Marine oils | 2.5 | 6.3 | 2,5 | 5.9 |
| Total | 40 | 100.0 | 42.6 | 100.0 |

The estimated current capacities of base stock production in the world are about 46 million tons coming from 143 plants (out of 151 plants) which produce base stock. The production capacity of Group I base oils is about 28 million tons, Group II a bit more than 10 million tons, Group III almost 3 million tons. The production capacity of naphthenic base oils is a bit less than 4 million tons ⁽³⁾. The tables 1 and 2 show the quantities in million tons (x10⁶ t). The table 2 shows that Asia and Pacific have the greatest share in the global distribution of lubricant consumption. They are closely followed by North America. The biggest growth in the demand of base stocks by 2010 is expected again in Asia and Pacific.

Table 2: Estimated base oil consumption by region, 2005-2010, x10⁶ t

| | 2005 | 2010 |
|----------------|------|------|
| Asia – Pacific | 10.7 | 12.4 |
| North America | 7.8 | 7.9 |
| West Europe | 3.8 | 3.6 |
| East Europe | 3.7 | 3.9 |
| Latin America* | 2.6 | 2.7 |
| Middle East | 1.7 | 1.9 |
| Africa | 1.6 | 1.7 |
| Marine oils | 2.1 | 2.1 |
| Total | 34.0 | 35.2 |

New capacities, estimated balance of base stock distribution, production economy

A few big well known oil companies have already announced 11 projects of building new base oil production plants in the period 2007-2013, all in Asia and Pacific. That will certainly increase the offer of high quality base stocks for additional 6,45 million tons⁽⁴⁾. The production technology in all these projects is based on the catalytic dewaxing process or GTL technology (Gas-to-liquid). The only GTL project that has been delayed is ExxonMobil in Qatar. Still, even without it, 5 million tons of high quality base stocks are expected on the market. The ExxonMobil Corporation is currently the biggest base oil producer in the world; it produces approx. 24000 t/day and holds 16% of total production in the world. The ExxonMobil is followed by the 8 base oils biggest producers (coming by this order):

1. Shell, Motiva
2. PetroChina, Sinopec (China)
3. Petroleos de Venezuela (Nynas, Citgo)
4. Lukoil (Russia)
5. S-Oil (Korea)
6. Petrobras (Brasil)
7. SK Corp. (Korea)
8. Chevron/Texaco

It is interesting to note that the BP Company, being the biggest base stock consumer in the world, is not among the first 9 main base stock producers. With the lubricants the order is somehow different. There are 12 big lubricant producers which cover approx. 55% of the global lubricant production (from Shell which produces approx. 5000 t/day to Yukos/Sibneft which produces only 500 t/day⁽⁴⁾). They are:

1. Shell
2. ExxonMobil
3. BP (Castrol, Aral...)
4. PetroChina/Sinopec
5. Chevron/Texaco
6. Total
7. Lukoil
8. Fuchs
9. Nippon Oil
10. Valvoline
11. Conoco Phillips
12. Yukos/Sibneft

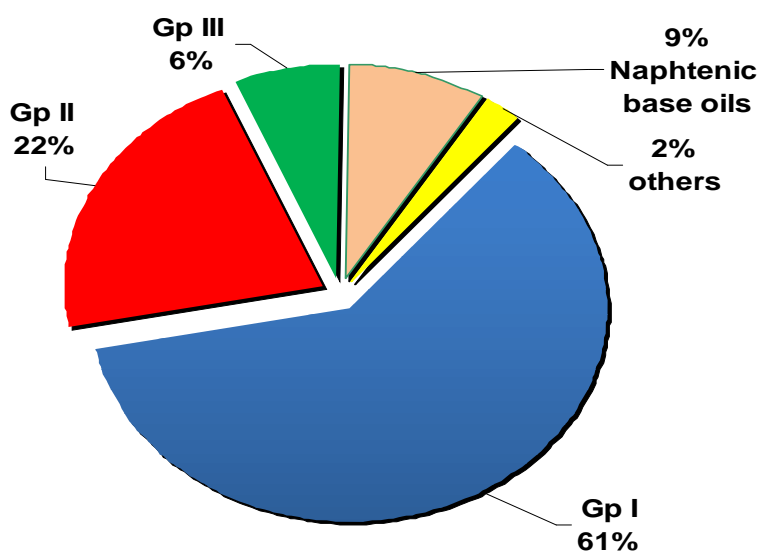
The Figure 2 shows that the Group I base oils with their 61% share are still dominant in the global consumption, but there is still a big disproportion in demand and offer according to types and regions^(3, 7). Most experts and observers estimate that today's supply surplus (3 million tons of Group II base oils) will be decreased to less than 2 million tons during the next 5 years (till 2012). At the same time the surplus of

Group I base oils will be decreased, so the current shortage of 2 million tons will be lowered to 1 million tons in 2012.

Nevertheless, in most parts of Europe the situation is completely different. The surplus of Group I base oils (approx. 1 million tons) will be gradually increased to 2 million tons till 2012. On the other hand, the current shortage of Group II base oils (1 million) in Europe will be increased even in 2012 (2 million tons). In Asia the shortage of high viscosity base oils will grow, primarily Group I base oils, but also Group II base oils. The growth demand will lead to chronic shortage of Group I base oils, primarily in Asia and Africa.

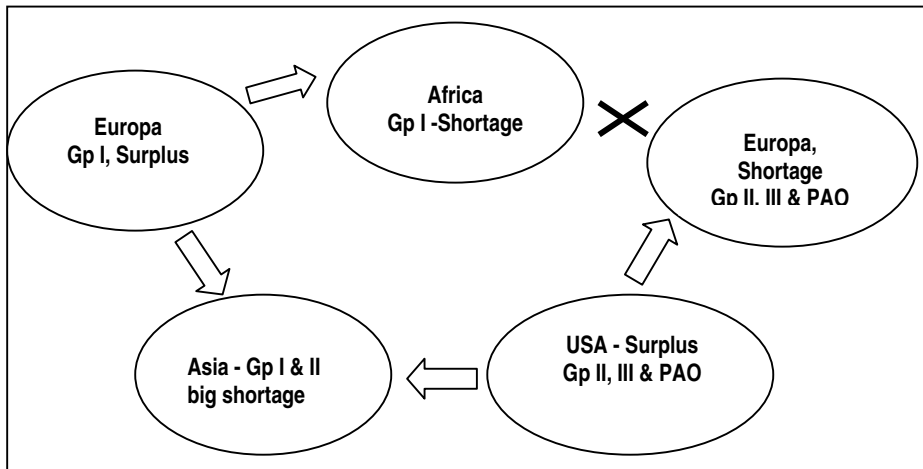
In the future a certain change is expected with share increase of Group III base oils in relation with the current consumption distribution. At this moment it is very difficult to estimate what the distribution will be like after GTL base oils come to the market.

Figure 2: Estimated consumption distribution of base oil by types, 2005



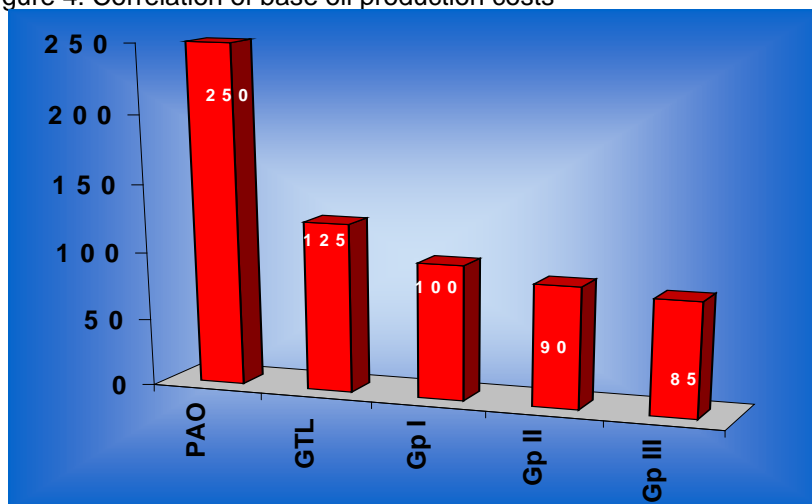
Generally the Group III base oils will become a conventional replacement for Group I and II base oils. The trend of distributing the Group II and III base oil surplus from North America to Europe will continue. The only thing which is uncertain is how will the expected and announced base oils delivery from Russia influence this situation and established (in)balance. The Figure 3 shows the current and most probable future situation of the established base oils distribution balance. The estimation has been done according to the trend of growing demand and shortage and according to the estimated capacity of 52.5 million tons in the year 2013.

Figure 3: Base stock production / distribution balance till 2012-2013



The costs of base oil production were and will be the crucial factor when making a decision to close a certain plant. As the Figure 4 shows we have used the index 100 to present the usual costs of Group I SN base stock production for the sake of comparison. The managers, especially in Europe, should be worried about the fact that the costs of Group II base stock production are lower than the costs of Group I base stock production at the moment. The Group III base stock production based on the isodewaxing method is also more cost-effective than the production of solvent refined and dewaxed Group I base stock.

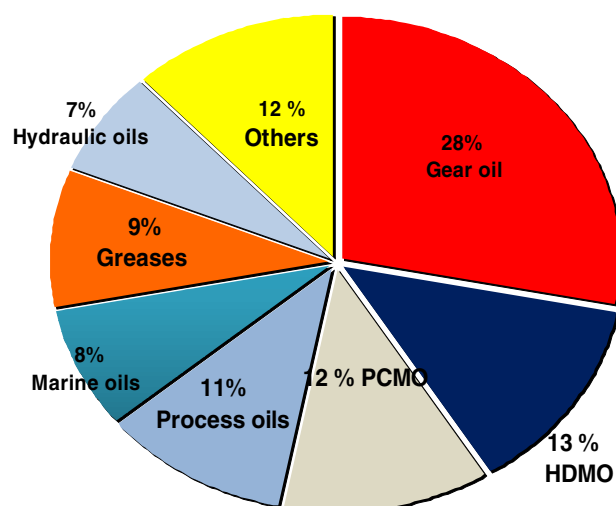
Figure 4: Correlation of base oil production costs



Furthermore, the cost index of GTL base stock production is 125 and of PAO is 250. That means that the GTL base stock based on the gas to liquid technology will, inevitably and very soon, replace PAO or polyalphaolefines in all the lubricant formulations. All these facts confirm the opinion of most observers that there will be no new investments into the building of solvent dewaxing plants. The most of observers in the world^(4,5) also agree that the closing of one part of Group I base stock production capacities is inevitable.

Still, there is one more problem to be solved. The catalytic dewaxing plants are not able to produce the base stocks of higher viscosity like 500N and brightstock^(4,5,6,15). There are 82 base oil refineries which can produce brightstock of different viscosities. At the moment the brightstock production capacity is reduced to approx. 9300 t/day. Due to closing Group I base oil plants, the brightstock production capacity is decreased by 1150 t/day in the last year and a half. This decrease trend will continue and it will be 11% till 2015. This is the reason why some experts and the leading managers in the base stock business fight against easy and quick closing of Group I base stock production plants. Brightstock will not be used in 'for life' formulations of engine and gear oils anymore. The Figure 5 shows the estimated brightstock application in the existing lubricant formulations (2006).

Figure 5: Brightstock application in lubricants, 2006



Finally, all the observers^(4, 5, 6, 15) agree that a huge demand growth of Group III base stocks can be expected. By the year 2010 the global demand will be increased for 1.2-1.6 million tons (in Europe 486 000 tons).

Impact of new requirements on the market and base stock and lubricants quality

The new lubricant specifications will primarily require lubricants with a low content of sulphate ash, phosphorus and sulphur (low SAPS). There are the requirements for better low temperature and, generally, rheological properties, also for low volatility. Viscosity grade OW-XX and 5W-XX⁽⁷⁾ gradually prevail in modern engine oil formulations.

All this means that base stocks must have a higher viscosity index (at least 115), very low sulphur content (less than 0,03%) and saturated hydrocarbons (at least 90%). The Group I base stock can not meet all these requirements at all. In particular cases some Group II and even Group III base oils do not meet these requirements. Today on the market we already have base stocks with Group II+ declarations as oppose to standard Group II. These oils have a higher viscosity index (110-120). In proportion to that by the end of 2010 we expect the Group III (or Group III+) base oils with improved quality and higher IV (approx. 140 or more) and lower volatility (Noack). The Group I base oils will be less used and the sales of the Group II base stock will also decrease, but just in one part of engine oil and some gear oil applications. This is to happen because of high content of Group I in additive package (due to a better miscibility of some components). The Group II base oils quality which would be added to engine oil formulation within this package is not good enough for meeting the requirements of final lubricants. This will, among other things, contribute to better selling of the Group III base oils until the base oils based on GTL technology appear on the market.

However, at this moment Europe is a good market for the Group II base oils and the situation is different here. There is a big area for application of the Group II base oils⁽⁴⁾. These are the following groups of lubricants:

- Medium quality engine oils with low approval costs
- Engine oils for vehicles on LPG or biogas
- Engine oil formulation with low SAPS, because Group II base oils with 0% S are excellent in blending; this is especially important in cases when we need higher flexibility and less dependence on Group III base oil delivery.
- Turbine oils, compressor oils, paper machine oils, metalworking fluids and oils.

It has been estimated that by the year 2010 the Group III base oil will be used in 50% of engine oil formulations in Europe.

Note: In relation to Group I and Group II application with the current engine oil formulations we expect not just high approval costs, but also less flexibility with Group III base oils change. In other words, ATIEL and API have set very high criteria in a case of possible change of the selected and approved Group III base oils from tested formulations with Group III base oils of another producer in commercial lubricants.

Impact of new regulations on environmental protection REACH

REACH is the abbreviation for Registration, Evaluation and Authorisation of Chemicals. The system of environmental protection, REACH is confirmed by the Council of Environment Ministers of European Parliament.

The general target of this system is the improvement of human health and environmental care through better and preventive identification of chemical properties of products. However, the main target of the REACH system is the intention to extend responsibility of industry in regard with handling, protection from danger and chemical threatening. Therefore, all the lubricant producers and importers are obligated to report all the necessary information about properties and potential risks to the central data base Chemicals Agency ⁽⁹⁾.

Some observers ⁽⁸⁾ believe that the impact of the REACH system on the lubricant business will bear long-term and quite negative consequences in Western Europe. The costs of lubricant production and import in the EU will be higher. Consequently, although there are also some reasons, the decrease of lubricant demand will be 7-10% till 2010. The imperative for more rationalization and uniforming of production lines in Europe is inevitable. On the other hand, the export of lubricants from the EU is becoming uncompetitive. The biggest problem for lubricant formulators and producers is that they have to reveal lubricant formulations to Chemicals Agency. All these facts could lead to dislocation of lubricant development laboratories somewhere out of the EU and to the decrease in innovations and product development. Regardless of REACH regulations, the dislocation of production (or a part of it) out of the EU will certainly happen.

Key drivers for lubricant industry ⁽⁴⁾

New lubricant specifications regularly have an impact on the lubricant industry. The large number of new specifications for automotive lubricants is expected by 2009. The latest automotive specifications Euro 3 and Euro 4 (2000-2005) relate to solid particles emission reducing for 66%, together with other key drivers have resulted in new technology of vehicle construction. They are:

- EGR-exhaust gas recirculation
- DPF-diesel particle filter
- RFI-retarded fuel injection

The requirements for engine oil quality which are listed in the new American specification API CJ-4 (2006) are based on technology of new vehicles which, among other things, consist of exhaust gas recirculation (EGR) and particle filter system (DPF). Vehicle designers have to consider the requirements of Kyoto protocol and constant low production costs demands. There are also automotive industry demands for higher efficiency of engine oils and engines. As a domino theory, the industry of lubricant additives has already developed and commercialized new additive technologies to decrease content of sulphate ash, phosphorus and sulphur (low SAPS). Here we also have to mention the new/old OEM requirements

for increasing application of low viscosity engine oils with improved friction reduction properties and extended oil change interval.

All the OEM representatives demand the extended oil change interval and higher load carrying capacity. As before, these requirements are due to different and difficult conditions of vehicle applications which influence the change in vehicle designs and engine designs. Of course, this has significantly raised the costs of lubricant formulations and which is also contributed by using better (more expensive) base oils and higher cost of lubricant approval.

The latest Euro 5 norm repeatedly requires a considerable emission limit reduction and now it definitely requires the obligatory application of Group II and/or Group III base oils. The application of Euro 5 specification for HDMO (heavy duty motor oils) is expected in October 2008. Accordingly, the application of Euro 5 for PCMO (passenger car motor oils) is expected in September 2009.

The requirements of the new ACEA E9 Super High Performance standard are very close to API CJ-4 (2006). There is stronger demand for TBN and low SAPS which all together calls for more use of Group II base oil. The current ACEA E6-04 issue 2 specification is even more stringent about phosphorus and sulphur contents when related to API CJ-4. The new ACEA C4-07 standard for passenger car engines with exhaust gas treatment systems has been introduced. The C3-07 specification has become more stringent. In 2010 a new GF-5 specification is expected in the USA. It has to be emphasized that all these specifications need to be tested with at least 7-10 motor tests which raises approval prices and final lubricant costs. All the test motor systems consist of at least one new technology like:

- Exhaust gas treatment system (three-way catalyst and diesel particle filter-DPF)
- Exhaust gas recirculation (EGR)
- Catalyst for selected catalytic reduction (SCR)

Generally taken, the requirements of ACEA and European OEM will probably lead to differentiation into two categories for low SAPS demands for PCMO. Considerably, there will be two important requirements for operating characteristics:

1. Increased sludge handling capability.
2. Increased diesel injection performance.

The consequences of OEM representatives and new ACEA specifications (and others) demands are quite opposite than it was expected. The thing is that, due to global market special features and different specifications, the industry aspiration is to make universal, global lubricant specifications, to simplify the production and to reduce costs. Most observers^(1, 4, 5, 6, 10) agree that this is exactly what they wanted to avoid. When we consider all the consequences and the global lubricant industry today we can conclude:

- Lubricant production process is being snatched, it is becoming more difficult to plan and realize big series.
- Production is more complex and it costs more.

- New lubricant formulations cost more (raw material, approval costs, production costs).
- Consolidation of additive industry depends on additive demands and closing of plants which results in reducing of capacities for 10-15%.⁽¹⁵⁾
- Producers and distributors can not reduce the assortment, but they have to increase the lubricant assortment due to the market demands.
- The constant problem for lubricant producers and distributors is a delivery in due time with a complete lubricant assortment according to the market demands.

However, by 2010 in Europe we expect the differentiation of PCMO assortment into four quality groups according to the vehicle age. They are:

1. Euro 5 motor oils for new vehicles and factory filling
2. Euro 4 motor oils for 1,5-5 years old vehicles (produced in 2005 and after)
3. Euro 3 lubricants for 5-10 years old vehicles (2000-2005)
4. Euro 2 the lowest lubricant quality for vehicles of 10 and more years old (before 2000).

Trends and lubricant consumption in Croatia and the surrounding

The countries in South and Central Europe still have relatively high share in lubricant retail trade, approx. 8-10%, and in some countries, for example Kosovo, even to 30%. The petrol station retail net is certainly very important for each lube producer. In this part of Europe the ownership structure of the companies dealing with lubricant production and distribution has been completely changed in the last 4-5 years. At the moment of writing this paper (summer, 2007) big European and world companies still have not finished the complete taking over the lubricant and fuel business capacities of this region (its retail net and production capacities). In this moment, the Hungarian company MOL owns 25+1% share of INA (the leading Croatian oil company) and intends to take even more. INA has two lubricant production plants which are oversized, 416 petrol stations all over Croatia (June, 2007) and retail trade in 100-130 other petrol stations.

After taking over Energopetrol in Bosnia and Herzegovina INA and MOL also own 135 petrol stations there. Also 7-8 petrol stations in Slovenia and Montenegro are to be added to this number. We have to note that MOL which produces two lubricant brands (Slovnaft), also bought another Croatian company TIFON with 33 petrol stations. Company OMV as a base oil and lube producer, owns more than 1000 petrol stations in 12 European countries (362 petrol stations in Croatia, Serbia, Slovenia and Bosnia and Herzegovina all together) has an intention to take the dominant role in Southern and Central Europe. On several occasions during 2007 OMV was willing to buy all the MOL shares from small shareholders. It could become the owner more than 50% of shares and if this happens, OMV will have to sell shares MOL has got within INA (monopol limitation in EU). On the other hand, Lukoil and Gazprom, the Russian companies, which openly show their interest in buying shares or taking over the oil or gas business in this part of Europe. The

Lukoilpetrol was established in Ljubljana on 9 September, 2006 and Lukoil owns 49% of its shares. The interesting thing is that Petrol brand names and visual logo have not been changed yet. At the beginning the new company guaranteed for delivery of all the necessary amounts of products being base oils, fuels and other products. By the end of 2006 this new established company owned the biggest retail net in this part of Europe with the impressive number of petrol stations; they have 584 petrol stations in Serbia, Slovenia, Bosnia and Herzegovina, Montenegro and Macedonia and an ambitious plan to build another 100 new ones. Although Lukoil still wants to buy MOL, there are some unconfirmed information that Lukoil and Petrol (the Slovenian part) separated and there is no the Lukoilpetrol company anymore. On the other hand, there are unconfirmed information coming from the Slovenian market which say that Valvoline CEE (with its centre in Croatia) intends to take over completely or become 50% owner of the only two Slovenian lube producers Mapetrol (Maribor) and Olma (Ljubljana) with relatively small production capacities by the end of 2007.

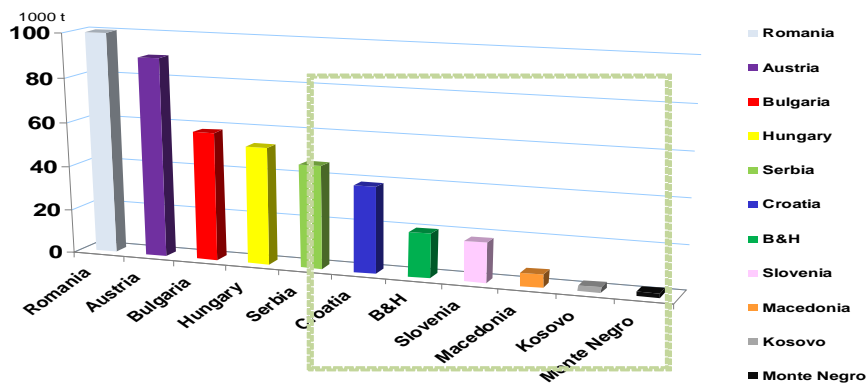
As other lube producers from the surrounding region are concerned, there has been a ownership change. The Neochimiki Company from Greece bought Rafinerija Beograd, the Serbian lube producer, although it is not known who actually owns Neochimiki. The NefteGazinKor Company from Russia, which is a branch of Zarubezhneft, bought the base oils and lubricant production plant of former Rafinerija Modriča (ca. 88%), Rafinerija Bosanski Brod and the complete Petrol retail net in the Republic of Srpska with 80 petrol stations. The new Russian owners say that they will continue the base oils and lubricant production with the total 120000 t capacity. In other parts of Southern Europe there is also Prista Oil, the Bulgarian company. The Prista Oil Company intends to take over FAM Kruševac which is mostly owned by PP Beograd (Delta).

This trend of taking over of the production and/or distributing capacities in the region will influence not only the rationalization of production capacities, but also creating strategies of the assortment and the future of research and development laboratories.

If we look at the Group I base oil capacities in the region (Rafinerija Modriča-Zarubezhnefta with at least 100 000 t, INA (in Rijeka) and MOL with their production capacity of 120 000 each), we can only conclude that they overwhelm the real demand. Even more, each of them would be enough to cover the market separately. There is also a fact that suppliers from Greece or Russia can deliver enough of Group I base oils depending on quality and costs. It is not a problem for the producers from the region even to supply the countries of former Yugoslavia, Hungary and Bulgaria, with their total base oil demand being approx. 160 000 tons. So here we face the question of the very need for Group I base oils production capacities in the region. The trend of lubricants consumption decrease in the region, when compared to the one two years ago ⁽¹⁰⁾, together with high costs of its production make certain plants very likely to close.

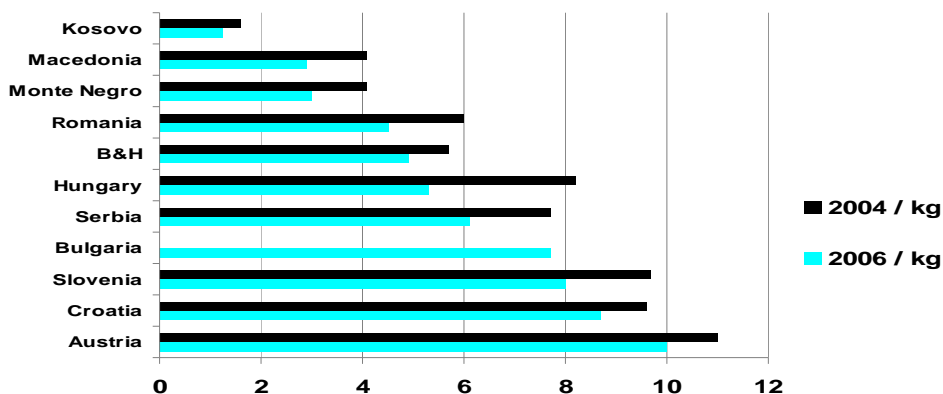
The Figure 6 shows that the order of the countries according to their lubricants and related products consumption stays the same. The evaluation of consumption is listed in 1000 t shows very similar results. According to the data collected from 2004 to 2006, there is a trend of consumption decrease per capita ⁽⁷⁾. The average or total consumption decrease in the countries of former Yugoslavia is about 7.6% in relation to the year 2004. The total estimated consumption is 134 000 tons and Serbia is the most perspective market. Croatia is still in the second place, although there has been a big decrease in consumption.

Figure 6: Evaluation of lubricants consumption in region, 2006



However, the reasons for this situation are different depending on a country and its economy. In more economically developed countries the consumption decrease is partially the result of rationalization in the application of higher quality and longer oil change interval lubricants and the use of more technically developed energy users.

Figure 7: Evaluation of lubricants consumption per capita in region, 2004 / 2006



In the most of the former Yugoslavian countries there are still painful transformation processes of industry, ownership, market formation going on. There is the same kind of trend in all the Southern European countries-decrease of production industry, consumption increase per capita, import increase and a bad economical situation with weak investing into new technologies. The information about the average consumption per capita could be the basis for more detailed lubricant market analysis.

Characteristics of lubricant market in Croatia in 2006

There was 4% growth of industrial consumption in the first 10 months of 2006. The state authorities estimate that the average growth of consumption per capita by the end of 2007 will be 6%. However, lubricants consumption per capita will keep decreasing and it is very hard to predict when it will become stable. As a consequence of a number of factors, there has been approx. 7.4% lubricants consumption decrease in the period 2004-2007.

The biggest nominal turnover growth based on the import has been noticed at the end of 2006 in lubricant and fuel retail turnover (10.1%). Furthermore, as a competitive market, Croatia now takes the 51st place in the world (Slovenia 33, Serbia and Montenegro 87, Bosnia and Herzegovina 98). There was a decrease in lubricant and fuel prices for 3.5% at the end of 2006 due to bigger lubricant offer and very aggressive competition. In the first 6 months of 2007 lubricant prices have stagnated, but a small growth is expected by the end of the year^(11, 12). It has been estimated that lubricants and related products consumption in Croatia is 39000 tons and that decrease trend continues. The Figure 8 shows the consumption distribution by lubricant groups in Croatia.

The engine oils consumption makes 52% of total consumption and when we add other types of lubricants and related products for vehicles, without marine oils, it is even more (~66%). In total that makes the impressive more than 66% of total consumption in Croatia (over 25 500 tons). In this area of application there is a rather small decrease in consumption (about 2000 tons). It has to be noted that the number of newly registered vehicles continues to be high and it is about 8.4% of total number of vehicles (1 859 650 vehicles⁽¹³⁾).

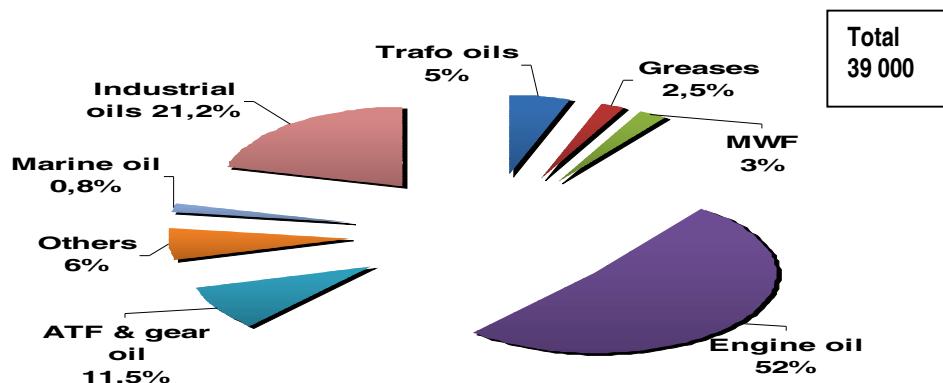
The Figure 9 shows that passenger cars are most represented (77%), including 8% of newly registered ones, but the greatest growth is with motorcycles and mopeds (over 10%). With the new vehicles there also came a certain quantity of first fill lubricants which are not being changed during the first year.

This has been a trend in the last 20 years and accordingly in the last 10 years in the intensive reduction in vehicle/energy user numbers which used to be big consumers of lubricants and related lower quality products.

The new thing is the introducing the *eco tax* for import or production of non-used lubricants at the price of 1,0 kn by an imported or produced litre of a lubricant +0.22 kn/l VAT. This is based on the evaluation done by Agency for environmental protection which says that 35 000 tons of lubricating oils have been imported into or

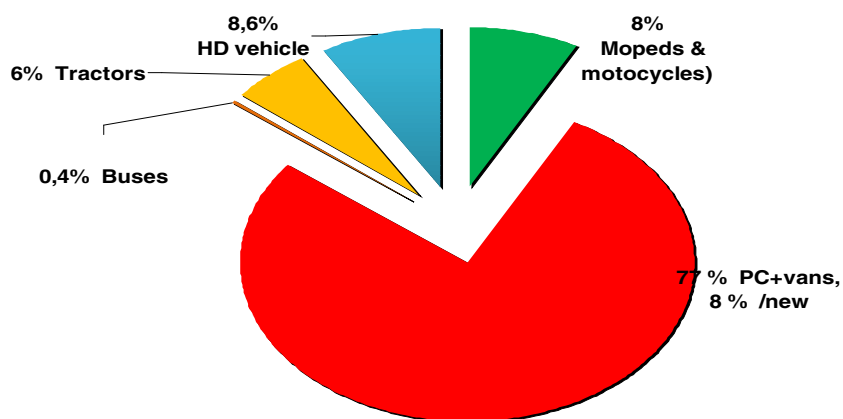
produced in Croatia. This Agency ensures compensations to corporations or companies approved by the state for collecting and/or elimination of wasted oils. It has been estimated by the same source that the costs of this system are 30 000 000 kn (~4 170 000 €)!

Figure 8: Evaluation of lubricants and related product consumption in Croatia, 2006.



It has also been estimated that during the first year of this law enforcement at least 38 000 000 kn without VAT (~5 200 000 €) is to be collected. It is still not clear how much the system costs and what is the tax money used for. It is widely accepted that only 10-12% of used lubricants can be collected (related to the estimated 35 000 t).

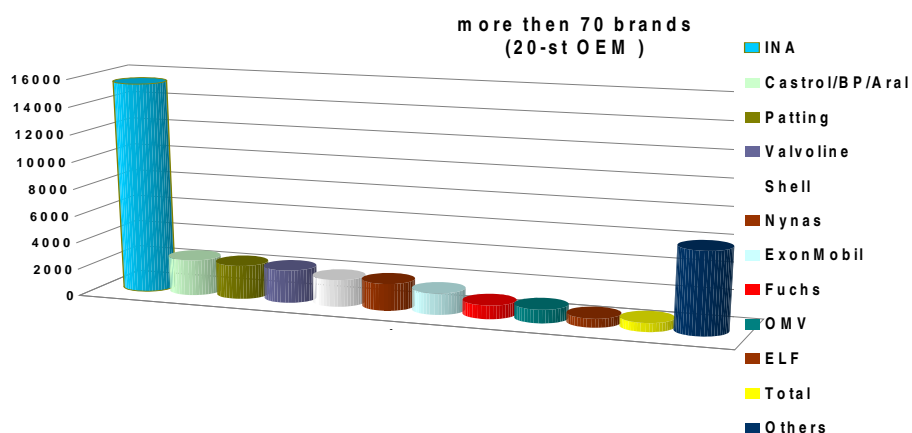
Figure 9: Vehicle park in Croatia, on 31.12.2006



Anyway, this will certainly contribute to the more aggressive competition at the market, since the biggest load will be carried by the final buyers, but at the end the consequences will mostly impact the small lubricant dealers (they will lose a certain part of the market).

However, more important thing is the consumption decrease of industrial lubricants which is 1000 tons (since 2004). The privatization process, the trend of maintenance cost decrease and the whole of economical situation certainly do not stimulate the lubricant consumption. Because of this situation the number of genuine brands of engine producers, vehicles and vehicle equipment has been increased. It has been estimated that among approx. 70-80** brands (Fig. 10) at the Croatian market, only 20 of them are genuine. The most of these oils are actually produced in Belgium, Germany and the USA.

Figure 10: Market share/main lubricants brand in Croatia, 2006



**About 10 more brands are announced to come to the Croatian market during 2007

The Figure 10 shows that INA is still the biggest producer at the Croatian market. But if we compare the data from 2004 we can conclude that INA has lost at least 25% of the market. The latest unofficial information (till September 1, 2007) confirms that this decrease trend continues. All the other companies/brands have kept their position at the market (stagnation). The exception may be Valvoline and partially Mobil, because the official data (the customs) might not be completely correct and that makes the Valvoline company the second one at the market with ~3600 t. This information also assumes the growth trend of these two companies, which brings new place changes within the competition. It is important to notice that the part of

the market INA lost from 2004 to 2006 has been taken over by some less known companies. Significantly, all the lubricant companies and distributors with the growth trend usually are traders of a larger number of brands.

The trends of consumption decrease of 7% in Croatia or 7.6% in the region in the last few years (compared to 2004) can be divided into two directions. The first are the positive/sometimes negative long-term trends:

- Reducing maintenance costs (which sometimes is not reasonable)
- Constant trends in the import growth of new vehicles, machinery and industrial equipment (which also means the import of high quality lubricants)
- The demands for the use of improved quality lubricants which provide the extended oil change interval
- Aggressive (and often disloyal) competition
- Growth in lubricant offer and brand number.

The other ones are extremely negative, but short term trends:

- Import growth of genuine lubricants in first filling (oversupply and import stabilization)
- Lubricants are expensive-not due to cost growth trends which have been recently slowed down, but due to reducing of business costs
- The market is not stable because of the bad economic situation, decreasing number of big final users and business trend by the means of compensations
- Erasure of differences among brands
- The most negative trend: quality is not the dominant category when final users are selecting a brand, it is all about the price.

Conclusion - evaluations

Global trends

- Till 2010, lubricant consumption growth (+6%) and base oil consumption growth (12.5%)
- No new investments in Group II base oil technology
- PAO will be completely replaced by GTL base stock, and Group III starts to be a conventional replacement for Group I and II base oils in lubricant formulations (higher quality engine oils)
- Balanced offer and demand of Group I, II and III base oils
- Till 2012 depending on demand by regions and base oils types, capacity surplus will be reduced to 2 million tons only
- Till 2015 (when related to 2006) the constant decrease of 11% in brightstock consumption

New key drivers in lubricant business:

- Great impact of new technology development and engine design

- New specifications, EURO 5, ACEA E9 Super High Performance, GF-5 specification and ACEA E6-04 issue 2, ACEA C4-07, API CJ-4
- Additional OEM requirements (for example, extended oil change interval)
- Growing impact of environmental protection and, especially, emission reducing (REACH, Kyoto protocol)

More stringent lube quality requirements for the industry of additives and lubricants:

- Low content of sulphated ash, phosphorus and sulphur (low SAPS or low SPAsh)
- Low volatility-Noack
- Improved friction reduction capacity
- Increased sludge handling capability
- Improved Group II and III base oil quality with high viscosity

Consequences of these requirements to the lube market:

- More complex and more expensive lubricant production
- Lubricant are becoming specialties
- Higher prices of new lubricant formulations when related to conventional quality

Europe

Apart from the already mentioned trends, there are also some other factors in Europe which impact the lubricant business:

- Lubricant consumption decrease trend (from 1.3% to 7-10% till 2010) continues. Partially influenced by REACH.
- New requirements, especially EURO 5, will prompt use of Group II and III base oils (2009)
- Till 2010 in 50% of engine oil formulations primarily Group III base oils will be used
- Dominant impact on lubricant quality in Europe (in Croatia as well) by OEM special requirements

Croatia and the region

- Quality will not be the dominant request for a while
- Production reducing or closing of base oil and lubricant plants in the region will continue
- Consumption decrease, but less intensive
- Although lubricant business is not highly profitable any more, there is a growth trend of brand number
- Ownership change and market consolidation, especially in the lubricants and base stock retail net, continues
- Bad predictions about the future of organizations and laboratories with lubricant research and development laboratories

- Companies dealing with lubricant trade and distribution will continue not to use the professional services of lubricant application experts.
- Lubricant production in the surrounding region will be irregular, too expensive and some plants will have to be closed. Some plants will extend their redistribution of retail net.

There will have to be radical changes at the markets in Croatia and the surrounding region before 2010 with consideration to the last years of the 20th century.

Literature

- 1) A. Faure, Total, 11th ICIS World Base Oils Conference, *Lube Report*, Feb. 2007.
- 2) R. Vanacek, Dow Corning, ELGI Meting, Praha 2006.
- 3) 2006 Guide to Global Base Oil Refining, Lubes`n` Greases.
- 4) N. de Marco, T. Sullivan, *Lube Report*, Jan. – Dec. 2006., Jan. – July 2007.
- 5) T. Hoffman, Valero Energy, ICIS PAN-American Base Oil&Lubricants Conference, 2006.
- 6) V. Keppens, Chevron, ICIS World Base oil Conference, 2007.
- 7) R. Mandaković, Trendovi u djelatnosti maziva s posebnim osvrtom na Hrvatsku i okolna tržišta, *Goriva i maziva*, 46, 6, 381-416, 2005.
- 8) M. Fuchs, Svjetsko tržište maziva, *Goriva i maziva*, 42, 6, 389-413, 2003
- 9) REACH , web-site
- 10) *Goriva i maziva*, 1-6, 2006; 1-4-2007.
- 11) Statistički zavod RH
- 12) Web-site Vlade RH
- 13) MUP RH
- 14) Neovisni Poslovni dnevnik, Hrvatska 2006.-2007.
- 15) F.Camera, C.D. Neveu, M.A. Alibert,, Creating value in a Complex, Global and Commoditized Lube market, 40. simpozij Maziva 2007, Pula 2007.

| UDK | ključne riječi | key words |
|------------------|--|--|
| 621.892 | maziva | lubricants |
| .002.237 | gledište pooštrenja zahtjeva za kvalitetom | viewpoint of increasing quality requirements |
| 380.134 | tržišni razvoj i predviđanja | market development and forecast |
| (497.13 - 194.2) | Hrvatska i susjedne zemlje | Croatia and surrounding countries |
| (100) | svijet | world |

Author

Robert Mandaković, Valvoline CEE, e-mail: rmandakovic@valvolinecee.com

Received

15.11.2007.