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Производственные и экономические вопросы нефтяной и газовой промышленности

Методические указания к практическим занятиям

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1 VENEZUELA'S OIL REVENUES

In 1976 the Venezuelan government took over all the foreign oil companies in the country, paid $ 1 billion in compensation, and placed the country's $ 5-billion industry under a holding company called Petroleos de Venezuela (Petroven). Almost overnight this new state-owned enterprise made its entry on the world oil scene. Yet, to the surprise of many, it soon proved to be a roaring success, combining efficient management with imaginative marketing and distribution of its products.

The holding company, Petroven, employs some 24,000 employees. It is managed almost entirely by Venezuelans. From the very beginning, it has steered clear of trouble. There have been no costly strikes; no shutdowns of plants. It has experienced none of the problems sometimes associated with nationalized industries in Latin America — bureaucratic slowness, financial losses, corruption, feath-erbedding.

Petroven controls 14 operating companies (soon to be reduced 5 or 6) which were former affiliates of foreign oil companies. To its oil outside Venezuela, the government uses the services of the big multinationals such as Exxon and Shell. These provide technological and marketing knowhow under contract.

Petroven's most important customers are the US (which takes about 35% of Venezuela's oil exports), Canada and the Caribbean countries. It has also successfully used its marketing expertise to build up sales to non-traditional clients, who now account for 20% of oil exports. These new customers, about 50 in all, are generally final users rather than oil companies or traders. They are, for example, power authorities, small refineries and government organizations. In approaching new customers, Petroven has one important advantage. It can offer

a much wider range of crude oils and refined products than most Middle East oil producers.

The country's oil revenues make a big contribution to the government's income. In its first 18 month's of operation, Petroven collected about $14 billion for sales of crude oil, refined products and natural gas. It paid the government taxes and royalties of about $10 billion. The sum represented about 70% of the state's ordinary income.

These revenues will continue for many years to come. Admittedly, the level of proven reserves is diminishing. In fact, the country may not be able to continue producing 2.2 million barrels a day up to the end of the century. However, it has huge 'probable reserves' locked up in the Orinoco Tar belt in the south. These are perhaps seven times as great as the amount of proven reserves, but they may be difficult to extract and refine because of their high tar content. Also, there is an ongoing programme of oil exploration. No doubt, new fields will be discovered in due course.

Venezuela, in common with other oil producers, faces the challenge of how best to spend its revenues in the interests of the country.

Its answer has been to work out an ambitious programme of spending on industrial and social development. This Fifth National Plan provided for massive government spending between 1976— 1980 although all the projects probably will not be completed until 1982 or 1983. Its main aim is to reduce the country's dependence on oil revenues, and to diversify the economy by strengthening the industrial and agricultural sectors. A second objective is to redistribute national wealth by creating hundreds of thousands of new jobs.

This programme will involve public and private investment in the region of $52 billion − a lot of money to spend on 12 million People in a short time. In this country, the state participates heavily in the economy. Some say the Venezuelan government has a 'finger in every pie' Because of its dominating role, much of the

spending is being don by the government. It is investing in the steel, aluminium, hydroelectric and nuclear power industries; it is also putting money into social welfare programmes. Finally, by using various incentives, for example cheap credit, it is trying to channel private investment into such areas as agriculture, tourism and light industry.

Venezuela has found that elaborate development programmes bring plenty of problems. Like Saudi Arabia and Nigeria, its ports have struggled to cope with the volume of imported goods. Bottlenecks in supplies have occurred. Costs have risen. Building-materials, especially, have been in short supply.

The major problem has been that there are not enough trained and skilled personnel to carry out all these projects. The government is now pulling out all the stops to remedy the situation. It is offering comprehensive training programmes at Venezuelan universities and technical colleges; it has a scholarship scheme which supports thousands of Venezuelans studying overseas; it has signed an agreement with a European inter-governmental organization, the purpose of which is to encourage skilled workers, technicians and professional people to work in Venezuela. It is also making local companies train specified numbers of new apprentices.

Another problem is that the country's domestic consumption of petrol has been increasing at an alarming rate. However, in order to control inflation, the government has been selling petrol at prices the President calls 'the lowest in the world'. It is doubtful that Venezuela can continue to invest millions of dollars in refining capacity, only for the petrol to be sold to its people at prices below production cost.

A question people are asking is: 'Will the country's commitments to costly projects put too great a pressure on its resources? Has the government, in fact, bitten off more than it can chew?'

The key to Venezuela's future prosperity is its oil industry. Provided this remains competitive, there seems no reason why development cannot be sustained. And why should one doubt Petroven's abilities? It is run professionally and has an excellent track record. Obviously, the programme may be implemented at a slower pace; so rephasing may be necessary. But the plan should not be prohibitively expensive. After all, in five or ten years time, certain industries like steel and aluminium should be producing enough for the import bill of these goods to be reduced.

In years to come, we will be able to judge how well the government has used the oil revenues. Some will measure success by looking at how the country has broadened and strengthened its industrial bases. Others will look to see if it has become a more egalitarian society. Venezuela has the highest per capita income in Latin America, but its wealth is unevenly distributed. There are rich people in Caracas who will pay $100,000 to join the Country Club, but there are large numbers of urban poor, some living in shanty towns.

An intriguing question is: will Venezuela achieve real social and economic progress with its five-year plan, or will the country end up with massive debts and lost illusions?

Vocabulary

shutdowns of plants	- закрытие заводов
featherbedding	- искусственное раздувание штата
crude oil	- сырая нефть
revenues	- годовой доход
incentives	- стимул
cope with v	- бороться
bottlenecks	- перебои

remedy v	- исправить
consumption	- потребление
per capita	- на душу населения
egalitarian	- уравнительный

Questions

What problems might a government experience after nationalizing an oil industry previously run by foreign multinational organizations?

What do the letters OPEC stand for?

Which countries belong to this organization?

What is the main aim of OPEC?

Venezuela, like other OPEC countries, is receiving huge revenues each year from the sale of its oil. What are some of the ways in which this wealth could be used?

Are there, in your view, any obvious priority areas, common to most oil-producing countries, to which these revenues should be invested?

2 CONSTRUCTION CONTRACTS IN THE MIDDLE EAST

Oil has provided many Middle East countries with the means of financing ambitious development plans. As a result of these, multi-million dollar contracts are on offer to foreign civil engineering and construction companies. Some of the contracts relate to the building of port and harbour complexes, dry docks, motor-ways and similar schemes which will set up the basic infrastructure of these countries. Others involve expensive capital projects such as power plants, re-fineries, petro-chemical installations and electrification networks. In Kuwait, one contract offered the challenge of creating an entirely new town.

Projects of this scale and complexity are potentially very lucrative for the companies chosen to implement them; they stimulate business activity in the region and also offer opportunities to small and medium-sized firms in the form of subcontracting work and consultancy assignments.

Nevertheless, while the rewards of doing business in the Mid¬dle East are considerable, so also are the risks. The foreign contrac- tor is negotiating in a buyers market. He finds out, sometimes too late and the hard way, that the terms of his contract are weighted in favour of the Arab employer. There are, he learns, few easy pickings in these countries for foreign firms; but plenty of pitfalls for the unwary and inexperienced businessman.

To illustrate just how tough it can be to do business in the Middle East, we shall take a look at the problems faced by contractors in Saudi Arabia.

In this country, as in most other Middle East regions, fixed price, lump-sum contracts are the rule. These create many headaches for the foreign contractor. It must be remembered that a company is often tendering for a project which will take three or four years to. complete. The contractor is in effect selling his product before he makes it − not afterwards. He cannot therefore adjust his price to changes in costs. When making a tender, he must make allowances in his quoted price for possible increased costs, but it is far from easy to calculate how great these will be.

One factor the contractor must take into consideration when making a bid is the rate of inflation in Saudi Arabia. Unfortunately, this is impossible to estimate accurately because reliable statistics are not reliable. If a tender is to appear reasonable, a contractor cannot really allow for an annual increase of more than 25%, yet the current rate of inflation may be exceeding that figure, and who can say what it might be in three or four years time. Another snag is that costs may rise because of changes in specifications made by the ministry awarding the contract. Such changes will often involve extra expense for the company concerned. Disputes can arise leading to delays in the completion of the

work. In such cases penalty clauses are sometimes invoked. Naturally, the foreign contractor feels that he has been treated rather unfairly.

Foreign businessmen operating in Saudi Arabia believe that escalation or revision clauses should be allowed in contracts. These would take into account changes in wages, salaries, raw materials, transportation costs, etc. However, the Saudis have, on the whole, been against escalation clauses because they think these give the contractor an open-ended license to raise prices. From the foreign company's point of view, a cost-plus contract is probably ideal because it gives a guaranteed return for the work done.

The question of fair pricing of tenders came to a head in 1977 when Saudi Arabia angrily rejected the 'inflated bids' made by Western and Japanese groups for power projects in the country. Previous to this decision there had been a growing feeling among Saudi officials that their country was regarded as a soft touch by certain foreign companies. The Saudis claimed that the companies were exaggerating conditions in the Kingdom so as to inflate their tender prices. After some rather public rows between the two sides, the Saudis began, as a matter of policy, to award big contracts − including those for the power stations − to Far Eastern construction companies, mainly from India, Pakistan and South Korea. Explaining the rejection of the bids for the power plants, a Saudi Minister of Planning said it proved his country was not 'easy meat'.

The attitude of the companies was that the Saudis were suffering from feelings of paranoia and exploitation while they ignored factors like the rate of inflation, high cost of living, bottlenecks in supplies and bureaucratic slowness, all of which pushed up prices. Company spokesmen also pointed out that tenders could be inflated because of the commissions that needed to be paid to intermediaries. These could vary from 5% to 35% of the contract value. Some of these critics added that winning a big contract usually depended on a Princely personage getting a slice of the cake.

There were, to be sure, arguments on both sides. Certainly there have been at times huge gaps between estimates for a project drawn up by independent

consultants and the pricing of bids b companies tendering for the contracts. The classic case is provided by the Philips tender for a nationwide switching project in Saudi Arabia. Sophisticated technology would have been used to increase the number of telephones from 200,000 to 600,000. After one year's negotiations, the final figure set by the Dutch company was 24 billion riyals ($6.76 billion). This figure compared with that of 4 billion riyals estimated by the Minister of Posts, Telegraphs and Telephones; a staggering discrepancy in estimates!

Another difficulty for a foreign firm, especially if it is small or medium-sized, is how to finance the bonds and related guarantees connected with contract bids.

First, a company must meet the bid bond requirement. This takes the form of a bank guarantee representing 1% to 2% of the total contract value. This idea is to make sure the company has serious intentions, and that it will not withdraw after it has been awarded the contract. Most contractors do not object to the bid bond, although it can be a substantial amount in the case of a big project.

The performance guarantees are a different matter. Generally set at about 5% to 10% of the contract value, they are meant to ensure the project is completed by the contractor.

Vocabulary

lucrative	- прибыльный
pickings	- воровство
pitfall	- ловушка
lump-sum contract	- аккордный подряд
tender v	- принимать участие в конкурсе
allowance	- жалование
make a bid v	- предлагать цену
snag	- препятствие

award a contract v	- заключать контракт
invoke v	- призывать
revision clauses	- пункт о возможности пересмотра договора
escalation clauses	- пункт о скользящих ценах, зарплате
cost-.plus contract	- договор на условиях оплаты фактических расходов плюс вознаграждение
claim v	- заявлять (неоправданно)
exaggerate v	- преувеличивать
row	- спор, ссора
intermediary	- посредник
discrepancy	- несоответствие

Questions

Many Middle East countries are currently earning vast revenues from oil. How do you think the money should be spent? (Bear in mind that oil reserves are finite).

From a foreign company's point of view, what are some problems and risks of doing business in Middle East countries?

What kinds of business opportunities does Saudi Arabia offer foreign companies?

3 TROUBLE IN THE PIPELINE

('The Economist', 1998) ASIA, Myanmar

In the past couple of years, a stream of western companies have stopped doing business in Myanmar. But the demurrings of companies like Heineken, a

Dutch brewer, and Macy's, a New York department store, are mere pinpricks. Arguably, there is only one project that really matters to the military junta that runs the country. That is the pipeline being built by two oil companies, Unocal of California and Total of France. Their $1 billion joint-venture with state-owned companies from both Myanmar and Thailand, to pipe gas from Andaman Sea to Thailand, accounts for about a third of all foreign investment committed in Myanmar. The gas sold to Thailand will, on conservative estimates, earn Myanmar $200m a year – equivalent to a quarter of the country's total 1996 export earnings. Gas used domestically would increase Myanmar's generating capacity by 30%. Small wonder the pipeline is known as *Yodano,* "treasure".

The pipeline may be a treasure to the junta, but it is an increasing worry to the western companies involved. Late last year. Bill Clinton signed legislation giving him the power to ban all new American investment in Myanmar. Unocal, whose investment is ready under way, may not be directly affected. But it could still get fed up with the hassle associated with its involvement. The company says it would have no trouble finding a buyer, probably in Asia, for its 28.26% stake in the project.

Unocal and Total (the pipeline's operator) see themselves as victims of a concerted disinformation campaign. At first they were attacked for the environmental consequences of the project; then attention turned to alleged mistreatment of the locals. They are fighting back, taking journalists and American congressmen on tours of the pipeline area.

Work is proceeding steadily, on schedule for production to start in July 1998. Thousands of lengths of pipe have already been shipped in. Many lie ready for welding and burying. In the next few months, the dry season, the way will he cleared through hilly jungle to the Thai border. The pipeline will have to be heavily protected, because it has become a target for the junta's enemies, including a rebel ethnic group, the Karen National Union. In March 1995, a Total

survey team, guarded by soldiers, was ambushed by guerrillas from this group. Five of Total's local employees were killed. Total denies reports of three further attacks, the most recent last October. But its workers and subcontractors now move by bullet-proof jeep and helicopter within a "security corridor" along the proposed route. In theory, they stay inside the corridor, and the government's soldiers stay out.

Reality is messier than that. The government of Myanmar is contractually obliged to provide access to Total's corridor and to protect it. Two lawsuits brought by human-rights activists in America allege that, in securing access to the pipeline, the army has indulged in a range of brutal behaviour. One suit includes evidence from local inhabitants. If its backers can establish jurisdiction in America, they say they will have to prove only "proximate cause" − that the project's sponsors should have foreseen that there would be brutality. Refugees who have fled the area for the Thai border say some villagers have been forcibly uprooted, and that conscript labour is widely used for building roads and for a north-south railway line that will cross the pipeline.

Total says that, to win local support, it gives generous compensation for land acquired for the route, and pays, by Myanmar's standards, high wages to its workers, whom it hires directly. It also plays for a $2m-a-year "socio-economic programme". It has brought generators to villages that had no electricity, and provided schools, doctors, hospitals and even a church roof. It also gives seed money for shrimp, pig, cattle, poultry and goat farms.

Because of all this, says Total, the 35,000 people in the 13 villages in its corridor welcome the project. And indeed, when confronted by a delegation of oil-company managers and journalists, local residents confirm this. But in one tea-shop the jolly music blaring from a cassette player is a Karen National Union campaign song.

The social budget has another use: paying local inhabitants conscripted by the army for forced labour. Total officials reason that, since the practice cannot be stopped altogether even in "their" area, its effects should at least be mitigated. In one six-week period last dry season, 463 villagers were paid for conscripted labour, even though Total says the tasks they performed had nothing to do with their project.

Such payments sum up the debate about foreign investment in Myanmar. Do they show how foreign money can help improve life? Or do they, rather, show how it helps prop up a repellent system? Myanmar's opposition leader, Suu Kyi, has no doubt. She has repeatedly asked foreigners to wait before investing. In 1990, her party easily won a free election − so she is more than just a carping dissident. Foreign businesses naturally resist taking sides in domestic political disputes. Miss Suu Kyi, however, has left them no choice.

Vocabulary

demur $_v$	- колебаться
pinpricks	- булавочные уколы
hassle	- раздражение
allege $_v$	- доказывать, ссылаться
ambush $_v$	- устраивать засаду
concert $_v$	- сговариваться
conscript labour	- подневольный труд
conscript $_v$	- проводить набор (обыч. на военную службу)
uproot $_v$	- искоренять
Prop up $_v$	- поддерживать
seed money	- начальные инвестиции
carp $_v$	- критиковать

Questions

Why is the above mentioned pipeline is both a treasure and a hassle?

What companies are involved in the construction of the pi pipeline

Why did Bill Clinton sign legislation giving him the power ban all new American investment in Myanmar?

Why do Unocal and Total (the pipeline's operator) see themselves as victims of a concerted disinformation campaign?

From whom will the pipeline have to be heavily protected?

What is the Karen National Union?

What is done by companies to win local support?

What local population welcomes the project?

What sort of problems is connected with conscripted labour?

4 THE PRESSURE RISES

In 'Comment and Analysis' column Robert Corzine explains why OPEC members, facing demands to loosen oil production constraints, have to prove they can work together in the good times as well as the bad ('*The Financial Times*', *December*, *1999*)

The senior official from a member of the Organisation of Petroleum Exporting Countries stood beside his blue Bentley one evening this month and pulled a miniature oil price monitor from the pock of an immaculately tailored suit.

He smiled as the electronic device came alive, glowing with the news that Brent crude oil futures − the market's estimate of the likely price of oil in two months' time − had risen above $23 a barrel. The price was a 32-month high, a remarkable upswing since the low of just above $10 last February, the culmination of two years of falling prices due to oversupply.

"Last year, the longs got screwed," said the official softly, referring to speculators who bet against the price of oil falling to its lowest real level since the early 1970s. "This year, we'll screw the shorts".

As oil ministers from the Opec countries gather in Vienna today to review a series of production cuts made over the past 18 months, they may − at least privately − feel a similar sense of power.

The past few months have proved one of the more successful periods in the history of Opec's attempts to control the oil price. Not only have its member countries largely stuck by the reduction cuts and avoided the past practice of "quota cheating" − but non-Opec members have been unable to take up the slack. Helped by the oil price speculators that its officials disdain, Opec has emerged from a traumatic period.

In recent weeks, the cartel's members have watched with amazement as the oil price has risen to levels that some believe are unsustainable. "If they are stupid enough to give it to us, then we'll take it," says one Gulf oil producer philosophically.

Yet higher prices carry a cost: pressure from inside and outside the cartel to reverse its current production constraints. Oil companies that were forced into mergers by the earlier price fall remain skeptical about higher prices being sustained. But if prices remain high − or rise further − it could have serious inflationary consequences for western economies, including the US.

Opec's critics warn that prices could rise sharply if oil stocks fall further in the run-up to winter. They say Opec ministers must agree now to release more crude oil if they are to avoid a further upward spike. As these external pressures grow, internal divisions have also emerged on whether Opec should try to moderate prices now, or wait to make sure that past surpluses of oil have been eliminated.

Last week Hugo Chavez, Venezuela's president, said oil prices were high enough. Venezuela wants Opec to set a broad band in which it would defend prices by adding or cutting output -although its proposal has gained little backing. Other Opec members, including Saudi Arabia, the world's biggest oil producer and exporter, say Opec's actions should be linked to the level of global crude oil stocks.

The problem faced by Opec is that accurate data about oil inventories remain scarce, in spite of efforts to compile them by companies, government agencies and industry consultants. Neither is the oil price itself as reliable a guide as it used to be, since price turns tend to be magnified in the short term by futures trading.

In practice, most oil industry experts believe that global crude stocks are still at relatively high levels in spite of Opec's cuts. That has led some Opec

member states to advocate an extension of the Present production constraints beyond March.

They fear the consequences of increasing output in the second quarter of next year, when world oil demand is usually at the low point in its annual cycle. "There is an inclination towards freezing production because any increase in output in March would be the most dangerous thing we can embark upon ahead of the summer, says Sheikh Saud Nasser al-Sabah, Kuwait's oil minister.

Such views make it unlikely that Opec ministers will move immediately towards relaxing production constraints. Yet the outlook for the oil price depends on a number of factors that are ultimately outside the collective control of ministers. First, and perhaps most important, is the question of whether Opec can maintain its new-found discipline, or whether quota cheating will breakout among its members.

So far this year, the usual suspects within Opec have been on their best behaviour. This is certainly true of Venezuela, where the new government under Mr Chavez has overturned the approach of its predecessor. Before Mr Chavez, Venezuela had openly flouted Opec quotas and was trying to engineer a huge increase in production capacity by inviting foreign companies to develop new fields.

Venezuela's short-term ability to cheat is also being under-mined by government-ordered investment cuts at Petroleos de Venezuela (Petroven or PDVSA) the national oil company. Unlike the big Middle Eastern producers, whose large output comes from a relatively small number of wells in a few giant fields, PDVSA needs constantly to drill new wells on its many small fields in order to sustain production. Some oil executives believe Venezuela may even struggle to fill its Opec quota in 2000-01 unless more investment is directed towards its domestic oil production industry.

The fact that Mexico, another Latin American producer and a fierce competitor of Venezuela in the lucrative US oil market, is cooperating with Opec's production restraint pact has given Caracas added confidence that sticking with the cuts will not leave it at a commercial disadvantage.

Iran has also fallen into line, in part because of this year's diplomatic rapprochement with Saudi Arabia, while civil unrest in Nigeria's oil-producing region in the Niger Delta has left it with little leeway for quota busting. Iraq, whose steady production build up of recent years under the United Nations oil-for-food programme was another cause of last year's price fall, is nearing the end of what it can do without foreign investment in its industry, which is being discussed at the UN.

The second factor determining the oil price is demand. Here, the macro-economic outlook appears generally positive for Opec. There are signs of economic recovery in Asia, which in spite of its recent financial problems remains the region where oil demand growth is expected to be greatest in the coming decade. A continuation of the strong economy in the US, the world's biggest oil market, also bodes well. There are other factors that could support demand for oil- many refineries worldwide may boost their crude oil stocks in coming months in order to avoid any Y2K-related supply disruptions, while a return to normal winter temperatures in the northern hemisphere after two mild winters would help consumption.

Third, there is the question of how quickly non-Opec members − such as the UK and Norway − will be able to raise output to take advantage of higher prices. Last year's low prices forced some operators in higher-cost, non-Opec regions to slop production at low productivity wells, in some cases permanently. Drilling activity in non-Opec areas remains at relatively low levels, since many oil companies are still smarting from the effects of the oil price fall.

Many of the west's biggest oil companies have also reined in capital expenditure. More than a few are skeptical about how long crude oil prices will stay at present levels and have, so far at least, not relaxed strict investment hurdle rates imposed during the collapse.

Mark Moody-Stuart, chairman of Royal Dutch/Shell, the Anglo-Dutch oil group, recently warned that Opec could easily reverse its present policy and send prices tumbling again in order to discourage a new round of investment in higher cost, non-Opec regions. He also noted that even small changes in Opec output can have a big effect on prices, given that sentiment and perceptions play such a role in oil markets.

Some commentators, such as the Centre tor Global Energy Studies in London run by Sheikh Zaki Yamani, the former Saudi oil minister, believe the price rise is eventually bound to stimulate higher output from non-Opec members. "As night follows day, high Prices lead to slower demand growth and more non-Opec supplies," the centre says. That view, however, is disputed by other experts, who believe that non-Opec producers no longer have big enough reserves to take advantage of Opec's production cuts, and capture a larger share of the world oil market.

But if the ministers in Vienna can this week bask in their resurgent power, the damage wrought by last year's price collapse will be fresh in many of their minds. The US government's Energy Information Administration estimates that Opec oil revenues this year will be about $123bn, nearly $24bn more than in 1998. But in real terms that is less than a quarter of Opec revenues in its peak earning year of 1980, when the populations of many member states were substantially smaller.

Ministers would also be wise to remember that success had traditionally been a rather fleeting experience for Opec. A number of political and economic factors have converged this year to enhance the prospect that oil prices will

remain firm in the short term. But Opec has rarely been able to sustain such successes for long. "Opec should consider changing its logo to a tea bag, because it only works when it's in hot water," says Robert Mabro, director of the Oxford Centre for Energy Studies. The challenge for Opec's oil ministers this week is to prove that it can function effectively in good times as well. Only then will it be able to punish those speculating against higher oil prices as effectively as some officials believe.

Vocabulary

long $_{n}$	- спекулянт, играющий на повышение курса
short $_{n}$	- спекулянт, играющий на понижение курса
slack	- спад активности, затишье
screw n	- (жарг.) зарплата
disdain v	- пренебрегать
emerge from v	- оправиться
traumatic	- трудный, болезненный
spike	- вершина
oil inventories	- запасы нефти
stick by $_{v}$	- придерживаться
output	- добыча
flout $_{v}$	- насмехаться
cheat	- мошеничество
bust	- банкротство
bode $_{v}$	- предвещать
disruption	- спад, разрушение
hurdle $_{v}$	- преодолевать
tumble $_{v}$	- падать (о ценах, курсах)

bask $_{v}$	- наслаждаться
resurgent	- возрожденный
take up $_{v}$	- приобретать
wrought p (p. part. от *work*)	- ..сделанный
fleeting	- быстротечный
leeway	- дрейф
futures $_{n}$ *(stocks bought at prices agreed upon at the time of purchase but paid later)*	- фьючерс
rapprochement	- возрождение дружбы
rapport	- доверительность
in hot water	- в трудной ситуации
upswing	- резкий взлет
downswing	- резкое падение
month high	высший показатель месяца

Questions

What was the lowest price of oil and when?

What type of cost do high prices carry?

Why have the past few months of 1999 proved one of the more successful periods in the history of Opec?

What external and internal pressures have emerged?

Is it likely that Opec will move to relaxing production constrains?

What is the difference in production strategies between the big Middle East producers and Latin American ones, say Venezuela (*Petrovan*)?

What are the factors determining oil price?

What country is the biggest oil market?

Who runs the Centre for global Energy studies?

Where is the Centre for global Energy studies situated?

What does the Centre for global Energy studies say about the interconnection between oil prices and demand?

What were the Opec oil revenues to be in 1999?

Do you happen to know whether these plans were fulfilled?

How can you explain the metaphor that Opec should consider changing its logo to a tea-bag, because it only works when it's in hot water?

Write down words belonging to the financial sphere.

Do a SWAT analysis of the situation in Opec. A SWOT analysis is an evaluation of a project's or company's *strengths, weaknesses, opportunities and threats.*

5 UPSTREAM AND DOWNSTREAM: WELCOME TO OUR OIL AND GAS WORLD

(*Clive Tayler, Editor of 'International Oil and Gas Engineer*)'

In this publication we aim to cover the full spectrum of the oil and gas business from early survey and exploration work to production, transportation and processing: from management to technology; from sea to land; upstream and downstream and east to west. The oil and gas industries have always been among the most innovative of industrial sectors. However it is hard to imagine that at any stage in their long history they have ever faced so many opportunities and challenges all at the same time.

For the oil industry, the main challenge as we approach the new millennium is coping with an oil price which is as low as it was in the early 1980s and which stubbornly refuses to move to a level which guarantees any sort of return. So

rumours of takeovers and mergers which were dismissed as speculation at the start of 1998 have proved to be accurate. Assuming shareholders and regulatory authorities give the go-ahead, a new breed of mega companies will begin to emerge in 1999 as consolidation continues in an effort to raise profits.

At the same time it is becoming difficult and therefore more expensive to reach and extract the world's oil reserves. For example, great leaps in materials and process technology have been needed to exploit reserves in the more difficult areas of the North Sea and the Gulf of Mexico. However, this too is threatened by the low oil price and many companies have already revised their investment plans in more difficult fields.

The gas industry, by contrast, has benefited from consistently low prices. In the UK privatization of the electricity generating industry in the early 1990s has allowed gas to grab a healthy slice of the market. Every major electricity generating plant built this decade has been powered for gas and, despite a government moratorium on any more being built, the so-called 'dash for gas' has changed the UK energy market for the foreseeable future. The price, cleanliness and efficiency of gas are great attractions. It is no wonder that both the USA and other European countries are looking closely at the UK experience, as they look to open their own energy markets. As with oil, advances in technology have opened up more and more gas fields and the future looks very bright.

However, one challenge which faces both the oil and gas industries is increasing regulation. In Europe, for example, various air quality initiatives are forcing refiners to develop new technologies to remove sulphur from oil. Carbon dioxide emissions will eventually have to meet levels agreed at Kyoto. At the same time, dealing with solid and liquid waste is becoming increasingly expensive and new methodologies and technologies are being developed for this. So it is definitely an interesting time to be involved with the oil and gas industries.

As this inaugural issue of International Oil & Gas Engineer shows, there is no shortage of innovation. In the Gulf of Mexico, the world's largest free-standing compliant tower came on-line. The technical hurdles it overcame have opened up a new area for exploration. Similarly, in Europe, the UK has been linked into the continent's gas grid with the opening of the 235 km Interconnector gas pipeline. The goal of atrue, seamless single gas market for Europe has come a huge step nearer. Developments in communications are bringing other, massive benefits to the oil and gas industries. Today, engineers based in offices thousands of kilo-metres apart, can work on projects simultaneously, again helping to reduce those all-important costs.

Vocabulary

cope with	- преодолевать
dash for gas	- спрос на газ
return	- отдача
hurdle	- преграда
royalties	- налог на недра

Questions

What is the main challenge for the oil industry as we approach the new millennium?

Why will a new breed of mega companies begin to emerge in the new millennium?

Why is it more difficult and therefore more expensive to reach and extract the world's oil reserves?

What are the reasons that allowed gas to grab a healthy slice of the energy market?

What is the length of the UK's Interconnector gas pipeline?

What is the world's largest free-standing compliant tower?

6 NORTH SEA OIL

As the summer draws to a close, the oil companies remain optimistic about the prospects of oil flowing ashore from new rigs in their North Sea fields before their target dates next autumn. Assuming no unexpected snags arise, they will accomplish their aim. They have settled disputes and strikes among the men and overcome various technical and political problems; but recently the elements have caused the worst hold-ups.

Abnormally high seas and howling gales have prevented engineers from lifting essential heavy equipment into position on the production platforms erected off the Scottish coast. If this spell of exceptional weather continues throughout the autumn, it will be necessary to stop work until next spring, for the oilmen know from experience that major operations are impossible in the winter months owing to the stormy seas. They are confident, however, that they will achieve their object, provided the weather breaks for just one day during the next few weeks.

The British Government is also eager for the timely completion of these operations. Britain's economic position will deteriorate, many think, unless revenue from the oil rescues her from her continuing balance of payments problems.

Vocabulary

elements	- стихия (особенно ветер и дождь)
deteriorate	- ухудшать
the weather breaks	- распогодится
erect v	- возводить
rescue v	- спасать

Questions

What has been overcome by the oil companies in order to accomplish the aim?

What has caused the worst hold-ups in the target dates?

Where are the production platforms erected?

Are the major operations possible in the winter months?

When will it be possible to achieve the objective?

7 DATA WAREHOUSE SHOWS THE FUTURE FOR PLANT INFORMATION MANAGEMENT

A novel information management system implemented for Asgard B, the world's largest floating gas platform, is likely to save 10 per cent of capital investment costs over the project's lifetime, Stanley Port explains.

Lying in deep water about 200 km off mid Norway, near the Arctic circle, Statoil's Asgard is one of the largest and most extensive oil / gas developments on the Norwegian continental shelf. Around NOK 33 billion ($US4.4 billion) is being invested in production facilities, wells, and subsea installations for the field. Oil production wasdue to start in late 1998 from Asgard A, one of the world's largest oil production ships. It has a processing capacity of 201 000 barrels of oil per day and can store over 900 000 barrels. Gas exports will begin in the year 2000 from

Asgard B, the largest floating gas platform in the world.

By 007 Asgard will be delivering 10 billion m3/y of

gas to continental Europe, or roughly 15 per cent of annual Norwegian gas deliveries. At the same time, it will be able to produce 41000 barrels of oil and 94 000 barrels of condensate per day.

Apart from Statoil. the licensees in the Asgard project include NorskAgip, Total Norge. Mobil Exploration Norway, Neste Petroleum, Saga Petroleum, and Norsk Hydro Produksjon. Norway's Kvaerner group and Statoil are collaborating through an integrated central engineering tear. (CET) of about 550 people with joint responsibility for building and completing the Asgard B platform.

Traditionally, projects on Asgard's scale have caused fragmentation of information and activities among the numerous contractors, subcontractors and suppliers involved. Inevitably the only solutions available in the past were to employ more man-hours and to create fountains of documentation in the offices of the many participants; All this, in turn, led to duplication of work, lack of control, errors and to even more fragmentation.

The pressure is always for cost reduction, faster project completion, and for the practice of concurrent engineering. The scale and complexity of these projects, the number of participating organizations, as well as prevalent issues of safety and the environment, all combine to cry out for a better solution for managing the life-cycle information (LCI) for the plant.

Pose/Caesar standards

The solution required for Asgard was a single source of accurate, up-to-date, and consistent plant data which was accessible electronically, the data store had to be dynamic, in order to cope with the mounting volume of information and continual changes in the types of data required at every stage in the lengthy plant life-cycle. This was interpreted by Statoil as a requirement for an open and flexible solution based on international standards, such as Pose/ Caesar *(P/C).*

The P/C project was born in 1994 with the aim of reducing the life-cycle cost and development time of oil and gas facilities by improving sharing and exchange of information among those involved.

P/C has three priority areas of work: to produce agreed standards for digital descriptions of facility products; to understand and facilitate the use of available technology for implementing the standards; and to encourage and assist adoption of the standards and technology by business. P/C has also worked to develop two deliverables of its own: first the product data model (P/C-PDM). which defines the underlying data terminology and structure; and second, the reference data library (P/C-RDL), a dictionary defining standard data items that are relevant for petrochemical assets, including all the various materials, activities, facilities, and relationships between things.

Statoil created the team of Saga Petroleum and Norsk Hydro, both working on offshore development projects in Norway, to implement a data warehouse based on the P/C model. A data warehouse draws on raw data from different sources throughout a company, as well as from external sources, and organizes the data into ready-to-use business information. It differs from conventional data storage because it aims to be:

I. *Integrated.* Source Data is integrated and stored in the ware-house in a standardised neutral format, in this case using the P/C model. Integration is essential because business decisions are generally based on engineering data generated in different departments and organizations, and by several disciplines of people.

II. *Subject-oriented.* Data from fragmented systems is stored in the warehouse by subject, so it can be retrieved, analyzed, and used more easily.

III. *Time-variant.* This means data is unalterable by users after it has been submitted for storage, though new data including plant modifications or changes may be added from various applications, and may be time-stamped.

IV. *Non-volatile.* Data is stored as read-only. Users can extract data and analyze or manipulate it, without altering the data store itself. Data is additive.

Vocabulary

concurrent	- параллельный
alter v	- изменять
implement v	- применять
access	- доступ
flexible	гибкий

Questions

What is the world's largest floating gas platform?

Where is Statoil's Asgard situated?

Why is it considered one of the largest and most extensive oil / gas developments on the Norwegian continental shelf?.

How much is being invested in production facilities, wells, and subsea installations for the field?

What is the quantity of oil/gas production per year?

What led to duplication of work, lack of control, etc in the past?

What can solve the problems of safety and environment?

What can solve the problems of managing the life-cycle info mation for the plant?

When was the P/C project born? What is the aim of the P/C project?

In which ways does P/C project differ from conventional data storage?

8 DEEPWATER FIELD DEVELOPMENT USING A FREE-STANDING COMPLIANT TOWER

The Baldpate project in the Gulf of Mexico uses a giant free-standing compliant tower platform standing in 503 metres of water. John V Simon and J

Craig Edel review the project and the many technical challenges it posed. John V Simon is Baldpate project manager and J Craig Edel is Baldpate project structural engineer. Both are with Amerada Hess Corporation in Houston, USA.

The Gulf of Mexico Garden Banks (GB) blocks 215 S/2, 216, 259 and 260 were acquired in USA offshore continental lease sales in 1984, 1987 and 1989. The Baldpate unit, which is made up of blocks GB 215 S/2, GB 259 and *IV 260,* was approved by the US Minerals Management Service in February 1991. GB 216 was added to the unit in February 1994.

The Baldpate discovery well was drilled by the Diamond Offshore Ocean Rover in late 1991, finding 55 metres of net pay. After several sidetracks to delineate the reservoir and comprehensive bottom survey work to identify a suitable platform site, the GB 260 number three well was drilled – and temporarily abandoned – in late 1993/early 1994 from what was destined to be the future Baldpate development site. A nine-slot drilling template was set over the well and sjx additional wells were drilled and temporarily abandoned. The Baldpate project was sanctioned in November 1995 with a budget of US$320 million.

The primary Baldpate pay sands, 'Big Sand' and 'Twin Sand' are Pliocene period, basin-floor fans truncated along the south-west flank of a shallow tabular salt feature. They are sheet-type sands with excellent lateral continuity and consistency with average porosity of 29 per cent and permeability of 500 millidarcies. The accumulation has a hydrocarbon column height of 488 metres, with the deepest horizon over 5180 metres subsea. These reservoir

characteristics are expected to result in a widely uniform drainage pattern, enabling recovery of reserves through three wells in each of the two main sands.

The two main reservoirs are at very high pressures, approaching 13 600 psig. Both fluid systems are above saturation pressures, with compositional gradients across the hydrocarbon column. Flow rates from the completions are expected to average up to 8000 barrels of oil per day (BOPD), with gas/oil ratios (GORs) averaging 3000 standard cubic feet (SCF) per barrel.

Just to the north of the major Baldpate accumulation is the Baldpate North reservoir, somewhat shallower and of Lentic age. The last of the pre-drilled development wells, the GB 259 number three, will drain Baldpate North reserves. Total output from these seven wells is expected to exceed 50 000 BOPD and 150 000 million SCF/d (MMSCFD).Anticipated recoverable reserves from the two reservoirs are estimated at 118 million barrels of oil equivalent (MMBOEJ, of which 60 per cent is projected to be oil and the rest gas.

A compliant structure

What makes the Baldpate project unlike any other is the configuration and compliant nature of the GB 260 structure. The design of deepwater Gulf of Mexico structures is largely driven by forces projected to be generated by the extreme events that can occur there, such as loop currents and hurricanes. The high-energy, significant waves associated with hurricanes have periods of about 15 seconds. So any structure there must

have a very different primary natural response period, or 'resonance' could occur. Most Gulf of Mexico structures achieve this with low natural periods, typically under three seconds and up to six seconds in deeper waters. In 503 metres of water it is not practical to keep the period under six seconds as an extraordinary steel tonnage would be required to give such a structure sufficient stiffness.

A compliant tower avoids problems by using a much higher Primary bending period, for example over 30 seconds. 'Compliant' refers to its softer response to wave forces. The GB 260 tower has been configured with axial tubes (two at each of the four legs of the tower section) and an articulation point 152 metres above the sea floor. Together they govern the dynamic characteristics of the structure, giving it a natural period of about 33 seconds. The result in typical Gulf of Mexico sea conditions, the tower wil1 move somewhat more than conventional platforms- It may displace as much as three metres during more severe winter storms. However, lateral movements are expected to be relatively subtle, with accelerations less than 0.05 g (less than an elevator, for example).

The tower structure was constructed in several pieces and is configured similar to an office tower. It was engineered and designed by Houston-based McDermott Engineering. The jacket base section, from J Ray McDermott of Amelia in Louisiana, is 107 metres tall. It is 43 x 43 metres at its base, tapering to 27 x 27 metres at the top. The base weighs about 8700 tonnes. The jacket section, constructed by Aker Gulf Marine, is 402 metres tall. It weighs 18300 tonnes and has legs up to 3.25 metres diameter and up to 9.5 cm in thickness.

The GB260 topside comprise a deck structure with three main levels weighing 2180 tonnes without equipment. Incorporated into the topsides is all the process and utility equipment required to accommodate process rates of 60 000 BOPD, 200 MMSCFGD and 75 000 BWPD and provide accommodation for up to 28 personnel. The facility was designed to process production from the 15 000 psig Baldpate wells as well as the tie-ins of off-site 'satellite' production such as the

planned GB 216 subsea development. The GB 260 facility will emplov waste heat from the generators and cooling from seawater circulation systems to save fuel, as well as meet the combined temperature objectives of mitigating paraffin deposition and meeting pipeline requirements.

The 12 inch GB gas line is 21.2 km long. The GB260 end of the gas line is attached to the tower with a steel catenary riser (SCR). This SCR comprises of a section of heavier wall pipe suspended from a clamp attached to the tower a bout 122 metres beneath the water line, hung in catenary configuration . The point where the pipe line touches down on the seafloor is about 198 metres from the base of the structure. The SCR is coated with Neoprene to reduce the effects of corrosion and is fitted out with helical strakes to suppress vortex-induced vibration that could be caused by sub-surface currents. The downstream end of the gas line interconnects, via a subsea tie-in assembly located in GB 85, into the 30 inch Garden Banks gas pipeline.

The 16 inch Baldpate oil pipeline is 27 km long. There is a 16 inch SCR at GB 260 for the oil line, which like the gas line is coated with Neoprene and fitted with strakes. The downstream end interconnects with the Poseidon pipeline system through piping installed on Mobil's SMI 205 A platform.

Baldpate installation

Heerema Offshore installed the GB 260 platform, including topsides and ancillary packages. In April 1998, the base section was transported to location on and launched from the Intermac 650 barge. Once launched, the base floated with six per cent reserve buoyancy and self-righted.

After pulling the floating base section alongside its Balder derrick barge, Heerema connected the pre-installed slings to its two main cranes, ballasted the base section to 1000 tonnes hook load and lowered the base. Just above the sea door, Balder repositioned the base over the two docking piles installed in the autumn of 1996. These two piles mated with two receptacles fabricated onto the

base. Once captured, these docking piles guided the base as it was lowered to the sea floor, where it then rested on four 'levelling' piles.

Once the base was in place Heerem**.1** commenced installation of 12 foundation piles. Each was to be picked up in one piece, lowered to the seafloor, stabbed through a skirt pile and allowed 'to free fall' into the sea floor for self-support. Then each pile was to be driven to design penetration (140 meters) using Heerema's underwater pile-driving hammers.

Unfortunately, after picking up the first pile from the transport barge, and while lowering it. в crane cable failure resulted in the pile free-falling to the sea floor. Fortunately, no personnel were injured and no part of the work was damaged- Fabrication of a replacement pile was awarded to Aker Gulf Marine soon after the loss. After a delay of about ten days for re-reeving the Balder cranes, attempting unsuccessfully to retrieve the lost pile, and some weather downtime, pile installation resumed. After installing, driving and grouting the remaining 11 foundation piles, the replacement pile was completed at Aker Gulf Marine — less than three weeks after the contract was awarded. The base section was then ready to accept the tower, having established the structure foundation that will withstand the environmental and operational loads which the platform will be subjected to over its 20-year design life.

In mid-May, the tower section was towed to location and launched. After self-righting and floating for only a few hours it slowly beneath the water's surface and came to rest on the sea floor in about 448 metres of water about 3 km from the base site. Later investigations identified the cause of the incident as four axial tube compartment flood valves that inadvertently failed open. After re-trieving anchors and then re-setting them at the tower site, the Balder was able to lower the main block of its 4000 tonne crane to a position just above the top of the tower section which was about 52 metres below the sea.

Using robot vehicles (ROVs), the rigging that had been pre-installed on the top of the tower section was connected to the Balder block. About 60 hours after the tower section had dropped beneath the surface, it resurfaced on the hook of the Balder − lift weight off the bottom being about 860 tonnes. Extensive ROV inspections found no damage other than mud-covered pins at the bottom of the tower.These were cleaned using ROVs first equipped with water jets and then, with scrubbing brushes. Compressed air was then used to de-ballast the flooded axial tube chambers and return them to the required pre-installation conditions.

Heerema then relocated the Balder over the base site, re-anchored, ballasted the tower section to 1000 tonnes hook load and positioned the tower over the base. ROVs with cameras were then used to ensure that the Balder lowered the tower and stabbed the longest pin in its mate receptacle at the top of the base. The tower position was then adjusted to stab the second-longest pin and then it was lowered until it rested completely on the base.

In late May the integrated topsides was transported by barge and lifted and set on top of the tower using both Balder cranes. The lift weight was about 3610 tonnes. Once in place the deck legs were welded to the tower and the main deck packaged, including the quarters, generator package, compressor units and ENSCO drilling rig 23 components were set. Following hook-up of the topsides, the flare boom was added bringing the overall height of the Baldpate facility to 580 metres − eclipsing the CN Tower in Toronto as the tallest, man-made free-standing structure in the world.

A few weeks later, Cat Dive used the dynamically-positioned diving support vessel CSO Constructor to lift in sequence the ends of the 16 inch and 12 inch pipelines and hang them from their planned catenary configuration from pre-installed clamps on the tower.

Facility and pipeline hook-up and commissioning efforts lasted eight weeks. Once rigged up, tie-back and completion efforts proceeded on the first well, the

GB 260 A-l (formerly GB 260 number six). Production from that first well resulted in first oil in mid-September. Subsequently, completions of the remaining pre-drilled wells continue, with each subsequent well being brought on production as it is completed. Production from the platform is expected to peak in the first half of 1999 at rates approaching facility oil and gas capacities.

Vocabulary

net pay	рентабельный пласт
pay sand	промышленный пласт
consistency	плотность •
porosity	пористость
drilling template	опорная плита для бурения
recovery	добыча
recoverable reserves	запасы
saturation	насыщение
articulation point	шарнирное соединение
mitigate v	снижать

Questions

What does the word 'compliant' refer to?

When was the Baldpate project sanctioned in November?

How much was invested in the Baldpate project?

What makes the Baldpate project unlike any other?

Give the most important engineering characteristics of the Bald-Pate project.

What companies participated in the installation of the GB260 Platform?

What happened during the installation of the GB 260 platform foundation piles?

What was the cause of the incident during the launch of the tower section in mid-May?

What is the overall height of the Baldpate facility?

What does the Baldpate facility eclipse?

When is production from this platform expected to peak a rates approaching facility oil and gas capacities?

Is the given information precise? Why?

9 EXPERIMENT IN INTERNATIONAL WORK-SHARING IS JUDGED A SUCCESS

A work-sharing project between a UK and a Norwegian company for a North Sea floating production unit relied on high-speed links between engineers often working 1000 km apart. Nigel R Wardell describes the challenges involved and shows how similar strategies could be adopted for future projects. Nigel R Wardell is a principal consultant in the Petroleum Development Division of Foster Wheeler Energy Ltd, Reading, UK. He was project coordinate the Troll C work-sharing task force.

As part of a ten-year cooperation agreement between Foster Wheeler Energy Ltd's Petroleum Development Division and Umoe Olje og Gass of Norway, a task force was set up in Foster Wheeler's Glasgow office, to work on the detailed design of part of the giant Troll C floating production unit (FPU).

Umoe's contract for the Troll C project covers the design, procurement and construction of a new oil and gas processing unit to be installed in the Troll West Oil Province in the Norwegian sector of the North Sea. The FPU will comprise

process and utility equipment, together with accommodation quarters on the topside of a semi-submersible pontoon hull. When complete, the FPU will weigh 32 400 tonnes (55 700 tonnes operating weight) and have a total height of 138 metres. It will be able to process and export 20 000 m/d oil and 9m standard m^d of gas.

The distance from the keel of the substructure to the underside of the deck will be 39.5 metres, approximately the height of Glasgow's famous 'Armadillo' landmark, the Scottish Exhibition and Conference Centre. The FPU will be operated by Umoe's client Norsk Hydro partners in the Troll West Oil Province.

Arrangements for work-sharing

Foster Wheeler had cooperated with Umoe from the start of the Troll C project, undertaking topside layout and processing studies, in its UK office, subsequently providing a task force people to work in Oslo on the detailed plan, commencing in January 1997. The concept of work-sharing between Norway and Britain appeared early in March 1999. By the end of March, a 22-strong task force had started working on the project at Foster Wheeler's Glasgow office, Foley House.

To ensure that production work started rapidly, this team included five people from both Umoe and Foster Wheeler who had already worked on the Troll C project. The work-sharing arrangement was recognized to be a pilot project which could provide valuable future cooperation by establishing the means of controlling such a concept.

The scope which was agreed for work-sharing was essentially the modeling of piping and the design of the structural outfitting steel for the upper starboard part of the process deck, an area known as 1US. This part of the FPU contains the gas compressors, associated waste heat recovery units, the compressor suction scrubber vessels and the gas dehydration vessels.

The ATM link

Whilst the work-sharing arrangement was being agreed between Umoe and Foster Wheeler, Umoe also initiated enquiries for, and subsequently placed a contract for, a megastream link between Norway and Scotland.

Telenor, the Norwegian telecommunications company, and British Telecom (BT) cooperated in providing a 10 million bits per second (Mbps) communications link from Umoe's office in Strand, near Oslo, to Foley House. Normally such a link would have taken many months to arrange, even though much of the (fibre-optic) cable infrastructure was in place. In the event, Telenor and BT were able to commission the link within five weeks.

The routing of the communication link is through national / international asynchronous transmission mode (ATM) networks from Oslo to the south of Norway, across to Denmark, and from there across the North Sea to Scarborough and through BTs network to Glasgow. ATM is very fast; it took only 30 ms for signals to travel between Glasgow and Oslo. Although file transfer rates were initially about 290 kbps, following Telenor's advice network parameters for the CAD workstations (operating with Windows NT version 4.0) were optimised to achieve transfer rates of over 500 kbps.

Work execution

During the first phase of the work-sharing project the Glasgow task force worked on a copy of the 3D model, intending to synchronize it with the master model in Oslo by file transfers over the Internet each night. While it proved possible to copy the 5 MB of files for 1US from Glasgow to Oslo with reasonable certainty, the converse transfer of the 300 MB of compressed files covering the rest of the FPU often failed. The difficulties of accomplishing such transfers with any certainty proved the worth of the subsequent ATM link.

When the 10 Mbps ATM link was commissioned, the local area network (LAN) for the project in Glasgow, together with the design workstations and PCs in the task force, were switched over from a local server to the ATM line via a

router. The LAN was then based on servers in Oslo, with a local server in Glasgow only for the Lotus Notes email system. From this point, the engineers and designers in Glasgow (more than 30 in number by June 1998) were working on the 3D model held in Oslo; they were using exactly the same working methods and had access to the same information as their counterparts in Oslo. The task force area in Foley House therefore became a virtual extension of Umoe's office and was often referred to as the 'fifth floor' to Umoe's four-storey building at Strand in Norway.

Input data for the modelling activities, such as process design information, were read over the link, supplemented by paper documents where necessary. Design files and 2D drawing files were stored on the Oslo server, so there was no longer a requirement for batch transfer of files except for updating the design review workstation. Designers in Glasgow loaded the design files and reference files directly from the Oslo server into their workstation memory, subsequently saving the updated design files back to the Oslo server.

Interfaces

Most of the communication between the Glasgow task force and the team in Oslo was done by email over the 10 Mbps link, or by telephone. The email infrastructure was also used for access to project notices, bulletins and project procedures. This ensured that the Glasgow task force was able to access the same project information as its Oslo counterpart. A few visits were made by Glasgo personnel to Oslo and vice versa for meetings and the more elaborate discussions.

The height of interactive working was, perhaps design review when personnel at both offices reviewed the electronic model simultaneously, synchronised 'walk-through' workstations. This was achieved using Intergraph Product Model Review software. The discussions around the review were conducted using video conferencing, so that all present were able to see and

converse with the parties at both ends, as well as seeing the same of the electronic model. The same set-up was used for regular meetings between the Glasgow task force and project team in Oslo.

Video conferencing was also used for a project information meeting attended by all members of the project at which the Glasgow task force was able to see and hear addresses by Umoe and Norsk Hydro project managers. This further served to encourage team spirit.

Conclusion

The Troll C work-sharing project has demonstrated that it is feasible to work interactively, over a high speed link, achieving flexibility of resources while maintaining the desired quality. Because the work-sharing has been accomplished in a truly interactive way, it has been possible to manage the very complicated, 3D interfaces, which are inherent in design of an offshore platform. The use of the same systems and procedures in two locations ensured that the scope of work could be handled in a flexible way, to suit the availability of resources in both locations which changed as the work progressed. Both Foster Wheeler and Umoe see the possibility of work-sharing as being very beneficial and such split-location working forms an important part of future strategies of both companies.

Vocabulary

work-sharing	- совместная работа
task force	- группа разработчиков
processing studies	- изучение технологии
procurement	- снабжение
submersible	- погружающаяся
hull	- корпус
keel	- киль

landmark	- веха, символ
starboard	- правая сторона
suction	- всасывание
discrete	- отдельный
master model	- основная модель
batch transfer	- групповая передача
feasible	- возможный

Questions

What countries participate in a work-sharing project for a North Sea floating production unit?

How can engineers often working 1000 km apart manage to cooperate concurrently?

What does Umoe's contract for the Troll C project cover?

What does Foster Wheeler's contract for the Troll C project cover?

What was essentially the scope of work which was agreed for work-sharing?

What does FPU mean?

What does 1US contain?

What companies from Britain and Norway were additionally involved into the work-sharing arrangement?

What is the routing of the communication link from Oslo to Glasgow?

How fast is ATM (asynchronous transmission mode)?

What were initial file transfer rates and how were they optimized?

How was the local area network switched over from a local server to the ATM line?

What has become a virtual extension of Umoe's office?

Why was the task force area in Foley House often referred to as the 'fifth floor' to Umoe's four-storey building at Strand in Norway.

From where did designers in Glasgow load the design files and reference files into their workstation memory?

What was used for the communication between the Glasgow task force and the team in Oslo?

What was the height of interactive working and how was it achieved?

What has the Troll C work-sharing project demonstrated?

Do a SWOT analysis of the above project.

10 THE UK GAS INTERCONNECTOR AND ITS EUROPEAN IMPACT

The UK is now linked to mainland Europe by a 235 km gas pipeline. As Roger Cornish explains, the Interconnector brings increased competition and security of supply, but it also poses some interesting challenges in terms of a true, seamless single market.

For over 200 years Britain has developed a gas industry entirely within its own shores. Just two years ago the line to Ireland represented the first export of gas directly from the UK, but on 1 October 1998 the valves of the UK-continent Interconnector opened. For the first time gas flowed between the British Isles and the rest of Europe.

The facility itself consists of a compression plant at Bacton in Norfolk transmitting bulk supplies of natural gas, up to 20 billion m^3/y, through a 235km subsea pipeline to a reception terminal at Zeebrugge in Belgium and from there into the continental grid. The cost was around 400 million Sterling. Construction was completed on time and under budget. Although the initial flow is from the UK. there is provision for reverse flow.

The massive changes which have led to the Interconnector have been driven by both the European Commission and individual countries. With energy prices significantly higher in Europe than in the USA there is a pressing need to increase competition if the overall competitiveness of the European Union is to be sustained. While the Interconnector is only one example of these changes – and someone once described it as just a piece of debottlenecking of the European gas grid – its impact has been significant.

However, the idea of an interconnector is not new. The concept was being discussed within British Gas as far back as 1979. Studies continued sporadically through the 1980s spurred on, in part, by the same political drive that gave rise the Channel Tunnel. But it was not until the acceptance of the concept that gas oversupply in the UK was leading to a potential stagnation of exploration and development activities in the North Sea that the idea of an interconnector link to Europe started to gain real traction among those organizations whose financial performance was being limited by both the size and structure of the UK market.

In the meantime, continental Europe has moved towards a greater reliance and acceptance of imports from Norway, Algeria and Russia, but with a realization

that a diverse supply would offer tangible advantages both in terms of security of supply and competitive leverage.

Early plans

The spur to action was provided by the UK energy minister Tim Eggar, but it was made clear from the start that no public finance would be available. Through an open, well-publicized procedure, a study group of seven companies produced a brochure which was circulated to 100 companies. This in turn led to 9 companies committing to form Interconnector UK Ltd (IUK) in December 1994. In the following years the company has grown to nearly 40 core staff, competed a complex lease financing arrangement with Abbey National Building Society and the European Investment Bank, created several project alliances and let contracts for all works and supplies. In addition, it has worked with Aberdeen-based Electronic Data Systems Ltd to develop software to manage the allocation and nomination system known as ISIS − the interconnector shipper information system.

The original philosophy behind the line was that it would flow from the UK to Belgium while there was a supply overhang in the UK. When UK resources begin to decline -say in five to ten years time − it could be turned around to flow the other way. To meet this need, a scheme of 'cheap flow reversal' was achieved by reconfiguring the compressor pipe work to enable them to 'pull' gas through the line as well as 'push'. The compressors are less efficient in pull mode and the result is that only 8.5 billion m^3 rather than 20 billion m^3 can flow from Belgium to the UK with the current facility layout.

Purely from a mechanical viewpoint it is possible to switch from forward to reverse flow rapidly when inventory can be bled off into the national transmission system (NTS). Potential delays come when switching back to forward flow: inventory must be replaced prior to the flow leaving at Zeebrugge. The exact time this would take is impossible to gauge as it depends, among other things, on

nominations at the time, ramp rate build-up from the NTS and pressure in the Belgian grid.

More challenges

Translating these physical operations into commercial reality brings even more challenges. Inventory belongs not to IUK, but to each shipper on its due proportions as a capacity holder in the Interconnector. As such, to remove it and replace it at short notice creates some difficulties. 1UK will continue to develop its commercial rules regarding fluid reversal.

Since its inception, the interconnector has been a source of enthusiasm and controversy. Some see it as a further level of gas competition, while others see it as a threat. What does seem to be certain is that its anticipated impact far outstrips the size of its contribution in terms of physical gas flow. Its capacity is less than five per cent of the total European forward flow and two per cent of reverse flow. How can such a small source of gas have such an important impact? After all, without new and unexpectedly large gas discoveries in the future, the UK is unlikely to become a major exporter of gas in Europe to rival Russia, Norway. Algeria, or the Netherlands.

Currently announced sales contracts amount to 8 billion m^3/y from 1 October 1998. Popular estimates have this rising to around 12 billion m^3/y by 2002. It is unlikely to reach 20 billion m^3/y in the near future and actual flows could be less than the publicly-announced contractual quantities.

The stakeholders

The main stakeholders in the gas business are producers, transporters, consumers and governments. Obviously the market created by the Interconnector has grown for producers no matter whether production is in Russia, Algeria, the Netherlands or the UK Norwegian sectors of the North Sea.

The addition of so many more producers and an additional geopolitical source provides a greater certainty of supply for a Europe becoming dependent

on four main sources. The reverse is even more the case when viewed from a UK standpoint. Some express concern that the UK should consider the export of gas, but conversely it is rare that the nation has demonstrated such excellent timing for the installation of such a key piece of infrastructure which should protect and provide for its long-term gas energy needs.

For the two transporting systems connected to the Interconnector, the project was in part seen as a way of increasing transit revenue in a constrained and locally-mature transportation network. In Belgium, Interconnector's forward-flow capacity represents 150 per cent of the domestic market, whereas in the UK it is 20 per cent. Revenues to be generated from such levels of flow are clearly attractive in what were thought to be mature businesses. It is true, however, that both connected transporters were obliged to invest heavily in their own networks to take advantage of this opportunity.

Volumes not critical

While it is clear that the volumes in the Interconnector are not critical, those that are sold can respond rapidly through the UK pricing system to the needs of the market at the margin. Presumably some NTS shippers are willing to offer this previously unavailable service, and the Interconnector will be the conduit through which not only gas flows but also the flexible response of the UK pricing mechanism.

The UK has been enjoying the benefits of an oversupplied market where prices have fallen. Soon there will be an alternative destination for that oversupply which may result in the tightening of UK supply and prices. Conversely, Norwegian, Russian, and Dutch gas now has a chance to reach and compete within the UK market.

In continental Europe, the depth to which competition will be allowed to penetrate remains speculation, but market forces are now clearly backed by the recently-endorsed European Gas Directive. The key to the Directive's success

appears, to have been the generation of a pan-European debate and the setting of back-stops behind the consensus achieved thus far.

Vocabulary

sustain v	-	поддерживать
leverage	-	рычаг
bleed off v	-	сливать, стекать
shipper	-	грузоотправитель
inventory	-	остаток (нефтепродуктов)
inception	-	начало

Questions

When did gas between the British Isles and the rest of Europe flow for the first time?

What are major exporters of gas in Europe?

What are the main stakeholders in the gas business?

What is the attitude to Interconnector in the UK?

What share of the domestic market does Interconnector's forward-flow capacity represent in Belgium? In the UK ?

What can happen in the oversupplied UK gas market?

Why does Norwegian, Russian and Dutch gas now have a chance to reach and compete within the UK market?

11 TRENDS AND FUTURE TECHNOLOGY FOR REFINERY WASTE MANAGEMENT

With modem refineries having 100 000 bbl/d capacities and generating 3-5 t/d of sludge waste, it is essential to develop safe disposal methods and proper management methods. Tahir Husain and Saleha Husain discuss and evaluate the methods of disposal and remediation technologies currently in use in the Gulf region.

Saudi Arabia alone has expanded its refining capacity from 70 000 bbl/d day in the early 1970s to its current capacity of more than 1.8m bbl/d. Typical refining processes release primary pollutants such as sulphur dioxide, carbon monoxide and nitrogen oxides − as well as hydrocarbons, and the solid and liquid wastes.

However, the amount of pollutants generated in solid, liquid or gaseous form depends on the characteristics of the crude oil, the refinery processes being used, control technology employed and the types and quantities of refinery products. Crude oil, in general, is composed of a variety of organic compounds which may enter the environment, particularly into soils and ground water, directly as a result of oil spills during transportation or leakage from waste disposal or storage sites, improper disposal practices and/or leakage from industrial facilities.

Disposal practices

Two common methods for disposal of petroleum waste in Gulf countries are land-filling and land-farming. Land filling in a lined landfill is usually an acceptable disposal option for petroleum waste. However, growing environmental concerns and stricter environmental regulations mean its use is steadily declining.

Land-farming is becoming more popular due to favourable climatic conditions and availability of land and soil in the region. In this case, waste is

spread in a thin layer on the soil surface from where it is then incorporated into the upper soil zone. Reduction in waste is accomplished by biodegradation, photo degradation and volatilization practices.

The following factors are important when considering land-farming as an option:

- Application rates of the waste and thickness of its spreading.
- Physical and chemical compositions of the waste.
- Availability and the type of surface soil layer, depth of incorporation and frequency of cultivation.
- Climatic conditions − especially temperature and precipitation.
- Concentration and types of waste-degrading microorganisms.
- Temperature, pH, availability of oxygen, water and nutrients in soil.

The success of land treatment of petroleum waste depends upon the bioremediation capabilities of the indigenous microorganisms. This is the process by which organic or inorganic wastes are biologically degraded or transformed by the action of certain microorganisms − such as bacteria, actinomycetes and fungi − usually to innocuous materials.

Natural bioremediation, also known as intrinsic bioremediation, is very slow and usually not feasible. Enhanced bioremediation is a commonly-used bioremediation technology which increases the microbial biodegradation rates of contaminants by the supply of nutrients, electron acceptors and other rate-limiting factors.

Two basic types of bioremediation technologies are currently being practiced: the microbiological approach and the microbial ecological approach.

The microbiological approach involves augmenting the contaminated site with one or more microbial species that are specific for degrading the contaminant. Degradation of the contaminant is enhanced due to artificial increase in concentration of degraders specific to it. Two types of contaminant-

specific degraders can be used in this approach: prepacked and site-specific. Pre-packed degraders are often supplied by bioremediation companies, but as they are often originally isolated from other locations they may pose an ecological and health hazard when used in foreign locations. Site-specific degraders are naturally present and are enhanced to degrade a specific contaminant of concern.

Vocabulary

remediation	- восстановление
volatility	- летучесть
innocuous	- безвредный
intrinsic	- естественный
contaminate $_v$	- заражать

Questions

What are two common methods for disposal of petroleum waste in Gulf countries?

When is land-filling used?

What factors are important when considering land-farming as an option?

Will you describe two basic types of bioremediation technologies: microbiological approach and the microbial ecological approach?

12 LEUNA 2000: EUROPE'S NEWEST REFINERY COMES ON LINE

Europe's most modem refinery cost DM 3.2 billion. The challenges, however, were more than financial. At the peak of construction, over 7000 people were working on site and over 65 000 tonnes of scaffolding was in use. The project's success, as Scan Ottewell reports, lay in good planning and coordination.

The 9m t/y Leuna 2000 refinery is located in the German state of Sachsen-Anhalt, about 30 km south-west of Leipzig. The project was given the go-ahead by investors and the German authorities in late 1992. What followed was one of the biggest European engineering challenges of recent times.

Once approval was given, the first step, in November 1992, was the formation of a joint venture company to manage the contract. Three companies – Lurgi, Thyssen and Technip – formed TLT to do this. Its first step, in close co-operation with the client Mittel-deutsche Erdol Raffinerie (Mider), was to establish a project directorate made up of experts from the member companies of TLT.

The directorate was charged with coordinating and controlling implementation of the whole project: from initial studies on the refinery concept, through to commissioning the entire complex.

Work was shared within the joint venture by dividing it into three main areas of responsibility: project implementation, project control and subcontracting, along with construction, installation and commissioning. Within

the project directorate, four suborganisations were created. These suborganisations had specific responsibilities for:

– Implementation, with centres in Frankfurt and Chemnitz (Lurgi) and in Paris (Technip).

– Central areas, such as subcontracting, overall project control, contract management and engineering co-ordination.

– Central site organization, comprising staff from the joint venture partners and imported specialists.

The electronic nerve centre for construction at Leuna was 180 networked computers. All engineering and drawing documents, including 3D models required on the site, were accessible by electronic data processing (EDP). The same applied to all scheduling and to suppliers' contracts. Documentation, reporting and correspondence with Mider were standardized, recorded by EDP and documented.

Safety, health and environment

Leuna 2000 is the first project in Europe since the 1970s involving the construction of a completely new refinery. As a result, the project has set up standards in the environmental engineering aspects of refinery construction with respect to both product quality and product processing. The result is a plant with excellent energy balance and safety technology which TLT meets with the strictest standards.

The refinery produces high-octane gasoline with a low benzene content, and also high-cetane number diesel. Very low sulpher content is another feature. The refinery also uses the zero spare-fuel process to avoid producing residues. Leuna is a motor fuel refinery, so it does not have to market heavy fuel oil. A package metanol plant converts heavy fuel into methanol, for which there is a readier market.

When maximum values were being specified for furnace flue gas emissions, the firing efficiencies of all the refinery furnaces were added together. This gave very low emission values. The operator, Mider, has said that it will declare the actual emissions from all plants in the refinery complex to the authorities every two years.

Vocabulary

scaffolding	- леса, строительный материал
commissioning	- сдача в эксплуатацию
residue	- осадок, твердый остаток
furnace	- печь

Questions

What companies formed TLT joint venture to manage the contract?

Will you name the three main areas of responsibility which were shared within the joint venture?

What are the main characteristics of the plant which has set up standards in the environmental engineering aspects of refinery construction?

What does the new refinery produce?

How often will the actual emissions from all plants in the refinery complex be declared to the authorities?

13 RESIDUE GASIFICATION FOR BETTER QUALITY PRODUCTS AND ENVIRONMENT

As part of a major refinery revamp, Shell needed a new source of hydrogen at its Pernis refinery in the Netherlands. It opted for a gasification process which makes use of very heavy refinery residues and improves environmental

performance. Jan de Graaf and Piet Zuideveld show how the process has been integrated into the overall refinery operations.

Shell Pernis is one of the biggest industrial complexes in the Netherlands. Two independent companies operate on the site Shell Nederland Raffinaderij BV (SNR) and Shell Nederland Chemie BV. Refinery activities began at the current site in the early 1930s and today's refinery is highly complex with a capacity of about 400 000 bbl/d.

A strategic study was started in the late 1980s covering the period into the next century. With a poorer US Dollar/Dutch Guilder (NLG) exchange rate leading to higher Dollar cost, ageing facilities and tightening environmental requirements and product quality specifications, a step change was required to provide a sustainable future for the refinery. The age of existing units also played a role here − cat cracker number one was over 45 years old and modification of this unit to comply with environmental legislation would be questionable. This resulted in a refinery rejuvenation project (called PER+) in which the Shell gasification process plays a major role. The project centred around integration of the following units:

- a world-scale hydrocracking unit of 8000 t/d throughput with a hydrogen consumption of 285 t/d.
- a 1650 t/d residue gasification unit for the production of both the hydrogen for the hydrocracker and clean fuel gas for a co-generation power plant.

– a co-generation power plant comprising two GE Frame 6 gas turbines and two steam turbine generator sets that consume both the clean gas from the gasification not needed for the production of hydrogen and all the steam generated in the effluent boilers.

Construction started in 1993 and the full project was completed about 12 months ago. The three installations are now part of the overall refinery process.

Hydrogen manufacture

A number of options were considered, but in the end a process based on Shell's own gasification technology was selected as it reduces high-sulphur fuel oil production, enhances crude oil flexibility of the refinery and at the same time improves the refinery's environmental fingerprint.

It is called the Shell gasification hydrogen plant (SGHP). Gasification is carried out in three parallel trains with a total capacity of 1650 t/d residue, either vacuum flash cracked residue from the thermal cracking unit or a mixture of straight-run vacuum residue and propane asphalt. A larger capacity is installed than required for hydrogen production, the excess syngas being used as a clean

fuel for the gas turbines of the new co-generation power plant. Other effluent streams from the downstream gas treating unit in the SGHP are also admixed to the excess syngas.

Gasification is performed at about 1350 C and 65 bar. The product of the partial oxidation reaction is a raw synthesis gas which contains particles of soot and ash. Typical values are around 0.5 per cent weight on feed.

Vocabulary

revamp $_v$	- ремонтировать, переоборудовать
opt $_v$	- предпочитать
cat cracker	- крекинг-установка, скважина
rejuvenation	- восстановление
cracking	- расщепление

Questions

What independent companies operate on the site?

When did the refinery activities begin?

What resulted in a refinery rejuvenation project?

What units were to be constructed according to the project?

Why was a process based on Shell's own gasification technology selected?

How is gasification carried out?

What is the product of the partial oxidation reaction?

What does the abbreviation SGHP stand for?

GRAMMAR APPENDIX

СИНТАКСИЧЕСКИЕ ОСОБЕННОСТИ
профессионально ориентированного текста

Чтение иностранного профессионально ориентированного текста – сложный процесс, который предполагает не только владение техникой и приемами грамматического чтения, но и понимание информации, выраженной на другом языке. При межъязыковом преобразовании неизбежны потери, то есть возможна неполная передача значений, выраженных текстом подлинника, поэтому текст перевода никогда не может быть полным и абсолютным эквивалентом текста подлинника. Поэтому необходимо сделать эту эквивалентность как можно более полной, то есть добиваться сведения потерь до минимума. Смысловая эквивалентность текстов при этом устанавливается не на уровне отдельных слов или даже предложений, а на уровне всего текста в целом.

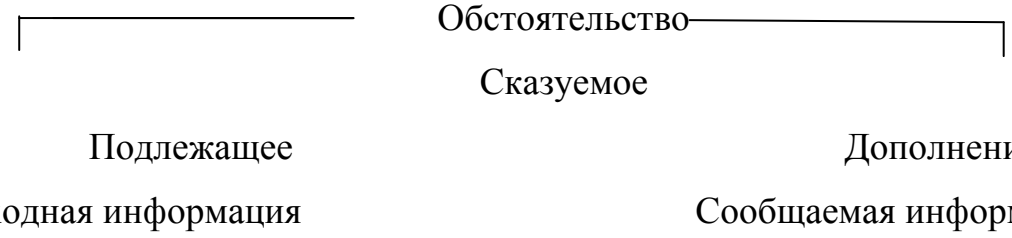
Профессионально ориентированные тексты на английском языке отличаются большим количеством сложных предложений, синтаксических конструкций с инфинитивными, причастными и герундиальными оборотами, сложным дополнением и подлежащим, различными придаточными предложениями, что значительно затрудняет понимание таких текстов.

Основным приемом полного осмысления любого предложения является лексико-грамматический анализ текста, который осуществляется в процессе грамматического чтения. *Грамматическое чтение предложения* – это членение данного предложения на отдельные смысловые группы (группу подлежащего, сказуемого, обстоятельства и т.д.). При этом важно раскрыть связь, как между отдельными смысловыми группами, так и между словами в пределах каждой из них.

В русском языке в нейтральной, неэмоциональной речи предложения строятся по принципу ‘от исходного – к сообщаемому’ с последовательным нарастанием смысловой нагрузки к концу предложения. Подавляющее большинство английских предложений в такой речи строится по этому же принципу. Например:

Many people think that the use of oil for artificial lighting was its springboard to fame.	*Многие люди считают, что использование нефти для искусственного освещения явилось трамплином к ее славе*

В английском языке смысловая структура предложения-высказывания тесно связана с его грамматической структурой и порядок слов является основным формальным организатором структуры предложения, поэтому смысловую структуру самого распространенного высказывания можно схематично представить следующим образом:



В процессе грамматического чтения все предложение разбивается на смысловые группы в зависимости от наличия в нем членов предложения и по порядку их следования, при этом необходимо помнить о порядке слов в английском утвердительном предложении и учитывать особенности английского языка, связанные со слабо развитой морфологической системой.

Английское утвердительное предложение имеет следующий порядок слов:

первое место занимает *подлежащее*,

второе – *сказуемое*,

третье – *дополнение*,

на нулевом (или четвертом) месте находится *обстоятельство*.

Следует отметить, что определение не имеет постоянного места в структуре предложения: оно обычно входит в состав смысловой группы определяемого слова и располагается перед ним или после него.

Как уже отмечалось, первым шагом в процессе грамматического чтения предложения является членение предложения на смысловые группы. В начале каждой смысловой группы стоит служебное слово, т.е. артикль, предлог, союз, вспомогательное слово и т.д. Служебные слова осуществляют связь слов в пределах смысловой группы или словосочетания и одновременно указывают на связь данной группы слов с другими группами в рассматриваемом предложении. Например: в предложении *In 1859, Edwin L. Drake, a retired railroad conductor, drilled a well 22 meters deep to the first crude oil discovered near Pennsylvania, U.S.A.* можно выделить следующие смысловые группы:

In 1859 – группа обстоятельства, начинающаяся с предлога *in;*

Edwin L. Drake, a retired railroad conductor – группа подлежащего с определением, стоящим после определяемого слова;

drilled a well 22 meters deep to the first crude oil discovered near Pennsylvania, U.S.A. – группа сказуемого с прямым и косвенным дополнениями, начинающаяся с глагола в личной форме *drilled* .

Итак, каждая смысловая группа имеет свои характерные признаки, причем следует помнить, что группы подлежащего и сказуемого несут основную смысловую нагрузку и определяют содержание предложения .

Рассмотрим характерные признаки отдельных смысловых групп в порядке их следования.

1. ПОДЛЕЖАЩЕЕ – обязательный член всех предложений в английском языке, кроме повелительных, в которых оно подразумевается. Даже в безличных предложениях типа "говорят", "известно", "можно сказать"

и т.д. подлежащим является местоимение *it* или *one*. Например: *It is said; It is to be noted; One can say*.

В соответствии со структурой английского предложения подлежащее всегда стоит перед сказуемым. Следует отметить, что в функции подлежащего выступает существительное только в общем падеже, существительное, стоящее за предлогом, не может быть подлежащим.

Формальным показателем подлежащего является артикль, указательное, притяжательное или неопределенное местоимение, числительное и т.д. Например:

The programme has been welcomed …
These two external factors are of great significance...
This article summarises...
An pump-compressing system has...
One of the aims is...

Подлежащее может быть выражено именем существительным, местоимением, числительным, инфинитивом, герундием, придаточным подлежащим предложением. Например:

Achieving this reqires work-based training...
They will continue to receive benefits...

2. СКАЗУЕМОЕ является вторым главным членом предложения. Вместе с подлежащим оно дает законченное выражение мысли. Сказуемое обозначает действие или состояние подлежащего. Между подлежащим и сказуемым существует непосредственная синтаксическая связь, которая в английском языке выражается порядком членов предложения. Показателями начала группы сказуемого являются глагол-связка, вспомогательный глагол, модальный глагол или морфологический показатель личной формы смыслового глагола (суффиксы *-s, -es, -ed*). Например:

This company dominated the kerosene market until competitors appeared

OPEC started a new program for developing oil fields. It should be added that operation on oil and gas fields in Japan has its own very special characteristics.
A local structure can be characterized in several complementary ways. We can give you whatever extra help you need.
The book is organized into several chapters and in an appendix.

Из приведенных примеров видно, что большую помощь в определении группы сказуемого оказывают вспомогательный и модальный глаголы. Следует помнить, что эти глаголы всегда употребляются в сочетании с другими глаголами и образуют смысловую группу сказуемого, в которую, кроме глагольных форм, могут входить любые части речи. От сказуемого зависят другие члены предложения, без которых смысл сказуемого иногда бывает недостаточно полно выражен. В таких случаях сказуемое вместе с зависимыми от него членами предложения (дополнением, обстоятельством) составляет одну смысловую группу. Например:

The language barrier is a major obstacle to the speedy communication of new knowledge .
Modern man becomes increasingly dependent upon quick and easy access to information in all fields of knowledge.

В первом примере на начало группы сказуемого указывает вспомогательный глагол в личной форме is. Смысловая группа сказуемого включает совокупность слов *is a major obstacle to the speedy communication of new knowledge.* Во втором примере группа сказуемого начинается смысловым глаголом с окончанием *-s*.

3. ДОПОЛНЕНИЕ – второстепенный член предложения. В английском языке дополнение занимает третье место в предложении. Оно может быть прямым или косвенным.

Прямое дополнение обозначает лицо или предмет, на который распространяется действие сказуемого, выраженного переходным глаголом в

личной форме. Прямое дополнение неразрывно связано со сказуемым и образует единую с ним смысловую группу. Например:

Each issue of a periodical usually contains articles by several contributors.

Косвенное дополнение бывает беспредложным и предложным. Группа предложного дополнения связана со сказуемым с помощью предлога и входит в смысловую группу сказуемого. Например:

The federal government sets the guidelines for economic and commercial policy, but it does not engage in national planning . . .

4. ОБСТОЯТЕЛЬСТВО представляет собой второстепенный член предложения, характеризующий действие (где, когда, почему, каким образом оно происходит). Обычно обстоятельство относится к сказуемому, но иногда может относиться и к другим членам предложения; в этих случаях оно не выделяется в отдельную смысловую группу.

Группа обстоятельства занимает в предложении четвертое (в конце предложения) или нулевое (перед подлежащим) место и начинается со служебного слова, в качестве которого выступает предлог, наречие или союз. Например:

During the period 1961-1965. in the UK alone, the output of books was greater than in any comparable period in book trade history. In the manor book-producing countries a whole complex of bibliographies might be required to achieve this comprehensive coverage.

5. ОПРЕДЕЛЕНИЕ также относится к второстепенным членам предложения, но, в отличие от дополнения и обстоятельства, не имеет постоянного места в его структуре и не образует отдельной смысловой группы, а входит в группу определяемого члена предложения, составляя с ним одно целое.

Определение может располагаться до и после определяемого слова. Следующие за определяемыми словами определения образуют с этими словами предложные словосочетания. Определения, стоящие перед определяемыми словами, составляют с ними беспредложные словосочетания, в которых определяемые слова являются главными. Обычно определение относится к имени существительному и может быть выражено любой частью речи. Например:

в предложении *The field of computer science has...* группа подлежащего представляет собой предложное словосочетание, где главное слово – существительное *the field*; слова *computer science* являются определением.

Зная основные смысловые группы в предложении, а также их отличительные признаки, можно свободно провести грамматическое чтение любого сложного предложения, то есть выделить в нем основные смысловые группы.

При лексико-грамматическом анализе предложений, усложненных неличными глагольными формами, такими, как инфинитив, герундий или причастие, следует расчленить предложение по общему правилу, указанному выше, определить место и функции неличной глагольной формы в предложении, а затем приступить к переводу. Например:

Surprisingly, he also found that any one national library duplicated very few titles to be found in the other national libraries.

Before taking some secondary material you should apply to librarian of a reference library.

On wishing to consult a book from a glass fronted bookcase a reader must fill in request slip and give it to an assistant.

Training in other departments before coming to reference work is of great importance .

Алгоритм анализа предложения (*Sentence Analysis Algorithm*) можно представить следующим образом:

1. Определить, является ли данное предложение простым или сложным.

2. Разделить предложение на две части: на группу подлежащего и группу сказуемого. Если предложение сложное, произвести те же операции с каждым из составляющих его предложений.

3. Выделить глагол-сказуемое (установить наличие смысловых, вспомогательных и модальных глаголов, именной или глагольной части составного сказуемого).

4. Разделить группу сказуемого на глагол-сказуемое, дополнения и обстоятельства.

5. Определить подлежащее в группе подлежащего.

6. Выделить в группе подлежащего определения, стоящие до и после него.

7. Определить наличие оборотов (причастных, инфинитивных или герундиальных).

8. Соотнести подлежащее со сказуемым, объединить их в субъектно-предикатное единство (подлежащее – сказуемое) и определить суждение, выраженное данным предложением.

Аннотирование текстов
(***Annotation***)

Аннотирование – это лаконичное изложение содержания печатного произведения. Сущность аннотирования состоит в том, чтобы понять самое

главное в произведении, обобщить 2-3 основных положения и оформить полученные сведения в краткую справку о нем – аннотацию.

Аннотация отличается высокой степенью абстрагированности и обобщенности материала, излагаемого своими словами. Одной из задач составителя аннотации является отражение важности или незначительности воспринятой информации, поэтому аннотации присущ оценочный элемент, который отсутствует в реферате. Объем аннотации не зависит от объема аннотируемого произведения и не должен превышать 600 печатных знаков, то есть примерно 200 слов.

Реферативное изложение информации (***Precis Writing***)

По сравнению с аннотированием реферирование является более совершенным методом обработки источников информации. При реферировании происходит осмысление отдельных положений, представляющих суть оригинала, сокращение всех малозначительных сведений, не имеющих прямого отношения к теме, обобщение наиболее ценных данных и фиксирование их в конспективной форме.

Содержание работы излагается в реферате объективно, без критической оценки материала с позиции референта. Реферат состоит из трех основных частей: заголовочной, собственно реферативной и справочного аппарата. *В заголовочной части* приводится название реферируемого документа, фамилия автора, название издания (журнала и т.п.), если реферируемое произведение является его составной частью, и другие выходные сведения (место и год выпуска издания, номер, том, серия, количество страниц и т.п.).

Независимо от того, на каком языке пишется реферат иностранного источника, заголовочная часть составляется на языке оригинала. При

написании реферата на другом языке после названия произведения в скобках дается его перевод.

Собственно *реферативная часть* – концентрированная передача содержания реферируемого документа. В этой части в общем случае принято не выделять абзацы.

К *справочному аппарату* относятся сведения, дополнительно характеризующие документ (число иллюстраций и таблиц, наличие библиографического указателя или списка и т.п.), а также ссылки, примечания референта, его фамилия. Однако этот аппарат не всегда приводится в реферате.

Объем реферата варьируется в зависимости от объема оригинала, его научной ценности, от того, на каком языке он опубликован (работы на иностранных языках могут быть прореферированы подробнее). В большинстве исследований по проблемам компрессии текста предельным объемом реферата принято считать 1200 слов при сокращении текста оригинала в 3, 8 и даже 10 раз.

В процессе реферирования происходит не просто сжатие текста, а существенная переработка содержания, композиции и языка оригинала: выделяется главное и излагается в краткой форме, второстепенные факты, детальные описания, примеры, исторические экскурсы опускаются, однотипные факты группируются, им дается общая характеристика, цифровые данные систематизируются и обобщаются. Язык и стиль оригинала претерпевают изменения в сторону нормативности, нейтральности, простоты и лаконичности.

Реферат – это не простой набор ключевых фрагментов, на базе которых он строится, а новый, самостоятельный текст. Монтаж высказываний, полученных в результате свертывания текста оригинала, связан с двумя основными процессами смыслового сокращения – перефразом и обобщением.

Для логической связности изложения используются такие стереотипные выражения, как:

− "отмечено", "установили", "рассматриваются", "анализируются", "отмечается", "указывается", "показывает", "получило одобрение", "вызвало интерес" и т. д.,

− специальные клише, которые можно сгруппировать следующим образом:

1) *общая оценка источника*, его темы, содержания: "статья посвящена...", "целью статьи является...", "статья представляет собой..." и т.п.;

2) *задачи, поставленные и решаемые автором*: "в первой (второй и т. д.) главе автор описывает (отмечает, анализирует и т.п.)...";

3) *оценка полученных результатов исследования*, выводы: "результаты подтверждают...", "автор делает вывод, что..." и т. д.

Приводимое ниже клише поможет адекватно и без ошибок передать на английском языке содержание статьи из журнала, главы книги и т. п.

Some suggestions for making a summary
of a professionally oriented article more effective

The Times dated the 10th of May carries an article headlined...	В газете… от 10 мая помещена статья, озаглавленная…
The article deals with...	В статье говорится о...
Here is something about...	Вот некоторая информация о...
The article is devoted to the analysis of the situation in...	Статья посвящена анализу обстановки в…

The article discusses…	В статье обсуждается...
− points out...	– указывается на
− stresses that...	– подчеркивается, что...
− reveals...	– раскрывается...
− reviews...	– рассматривается
The article goes on to say...	Далее в статье говорится ...
It should be noted that...	Следует отметить, что...
In conclusion the article says...	В заключение в статье говорится
That's all about what I wanted to say.	Это все, о чем я хотел вам сообщить .

Irregular verbs

Verbs with the same infinitive, past simple and past participle

cost	cost	cost	стоить
cut	cut	cut	резать
hit	hit	hit	ударять
let	let	let	позволять
put	put	put	класть
read /ri:d/	read /red/	read /red/	читать
set	set	set	устанавливать
shut	shut	shut	закрывать

Verbs with the same past simple and past participle, but a different infinitive

bring	brought	brought	приносить
build	built	built	строить
burn	burnt/burned	burnt/burned	гореть, жечь
buy	bought	bought	покупать
catch	caught	caught	ловить
feel	felt	felt	чувствовать
find	found	found	находить
get	got	got	получать
have	had	had	иметь
hear	heard	heard	слышать
hold	held	held	держать
keep	kept	kept	хранить
learn	learnt/learned	learnt/learned	учить
leave	left	left	покидать
lend	lent	lent	одалживать
light	lit/lighted	lit/lighted	освещать, зажигать
lose	lost	lost	терять
make	made	made	делать
mean	meant	meant	значить
meet	met	met	встречать
pay	paid	paid	платить
say	said	said	говорить
sell	sold	sold	продавать
send	sent	sent	посылать
sit	sat	sat	сидеть
sleep	slept	slept	спать
smell	smelt/smelled	smelt/smelled	пахнуть
spell	spelt/spelled	spelt/spelled	произносить
spend	spent	spent	проводить

stand	stood	stood	стоять
teach	taught	taught	учить
understand	understood	understood	понимать
win	won	won	выигрывать

Verbs with the same infinitive and past participle but a different past simple

become	became	become	становиться
come	came	come	приходить
run	ran	run	бежать

Verbs with a different infinitive, past simple and past participle

be	was/were	been	быть
begin	began	begun	начинать
break	broke	broken	ломать
choose	chose	chosen	выбирать
do	did	done	делать
drink	drank	drunk	пить
drive	drove	driven	ездить
eat	ate	eaten	есть
fall	fell	fallen	падать
fly	flew	flown	летать
forget	forgot	forgotten	забывать
give	gave	given	давать
go	went	gone	идти
grow	grew	grown	расти
know	knew	known	знать
lie	lay	lain	лежать
ring	rang	rung	звонить
rise	rose	risen	подниматься

see	saw	seen	видеть
show	showed	shown	показывать
sing	sang	sung	петь
speak	spoke	spoken	говорить
swim	swam	swum	плавать
take	took	taken	брать
throw	threw	thrown	бросать
wake	woke	woken	будить, просыпаться
wear	wore	worn	носить
write	wrote	written	писать

PREPOSITIONS

Предлоги	Значение	Примеры	Перевод
а) ПРЕДЛОГИ ДВИЖЕНИЯ			
to	движение по направлению к предмету (лицу)	Let's go **to** the park. Come up **to** me. Go **to** the lecture now.	Пойдемте **в** парк. Пойдемте **ко** мне. Идите сейчас **на** лекцию.
from	движение от предмета (лица)	Step aside **from** the door. Take my book **from** me. When do you come home **from** the Institute?	Отойдите **от** двери. Возьмите книгу **у** меня. Когда вы приходите домой **из** института?
into	движение внутрь пространства	Come **into** the room.	Войдите **в** комнату.
out of	движение из пространства	Take your books **out of** your bags.	Выньте книги **из** портфелей.
on (**to**)	движение на поверхность	The passengers stepped **onto** the platform.	Пассажиры вышли **на** платформу.
б) ПРЕДЛОГИ МЕСТА			

at	местонахождение у предмета, а также там, где протекает процесс	I am sitting **at** the table. She is **at** her brother's. The children are **at** the lesson (theatre).	Я сижу **за** столом. Она **у** брата. Дети сейчас **на** уроке (в театре).
in	местонахождение внутри пространства	The student is **in** the class-room.	Студент **в** аудитории.
on	местонахождение на поверхности	The map is **on** the wall. A book is **on** the shelf.	Карта **на** стене. **На** полке лежит книга.
under	местонахождение под другим предметом	A box is **under** the bed.	**Под** кроватью − ящик.
across	через	A bridge lies **across** a river.	**Через** реку проложен мост.
over	местонахождение над другим предметом	The sky is **over** our heads.	**Над** нашими головами небо.
above	местонахождение над другим предметом	There is a picture **above** the table.	**Над** столом висит картина.
in front of	местонахождение предмета перед другим	I sit **in front of** the teacher's table.	Я сижу **перед** столом преподавателя.
behind	местонахождение предмета позади другого	The garden is **behind** the house.	Сад находится **позади** дома.
around	нахождение предмета вокруг другого	The guests were sitting **around** the table.	Гости сидели **вокруг** стола.

в) ПРЕДЛОГИ ВРЕМЕНИ

in	внутри временного отрезка	**in** September, **in** 1980	**в** сентябре, **в** 1980
in	через некоторое время	**in** two days	**через** 2 дня
at	в (точка во времени)	**at** 7 o'clock, **at** midnight	**в** 7 часов, **в** полночь
on	в (с днями недели, датами)	**on** Monday, **on** 1st of May	**в** понедельник, 1го Мая
by	к точному моменту	**by** 5 o'clock, **by** Friday	**к** 5 часам, **к** пятнице

from. till	от … до …	**from** 2 **till** 3 o'clock	**с** двух **до** трех
for	в течение времени	**for** an hour	**в** течение часа
during	во время (чего-либо)	**during** the meeting	**во** время собрания
after	после (чего-либо)	**after** classes	**после** занятий

Особые случаи употребления предлогов времени

IN (the)

Parts of the day (not night)	in the morning(s) in the evening (s) in the afternoon, etc
months	in February
seasons	in (the) summer
years	in 1998
decades	in the 1920s
centuries	in the 20th century

AT (the)

clock time	at 5 o'clock at 7.45 p.m.
night	at night
holiday periods	at Christmas at the weekend (BrE)

ON (the)

day of the week	on Saturday
dates	on (the) 20th (of) May
particular days	on Good Friday on New Year's Day on my birthday on the following day

Complex Sentences

Тип придаточного предложения	**Союзы, союзные слова**	**Примеры**
Подлежащее	союзы: that (что; то, что), whether, if (ли) союзные слова: whom, who, whose, what, which, when, where, how, why	That she has not come is strange. It is strange that she is here. Whether he will come is not known. What she says is not true. When we shall do it is not clear.
Предикативное	те же	The question is whether he can do it. The matter is that I am not ready yet.
Дополнительное	те же	He said that he was busy. He asked me if I studied Latin.
Определительное	относит, местоимения и наречия: who, whom, whose, which, that (который), how, why, when, where	The man whom you see there is my brother. This is the house in which I live (I live in). The letter that I got yesterday came too late. The place where I was born is far from here. I don't remember the day when he left.

Обстоятельст-венное времени	when (когда), while (пока, в то время как), as (когда, в то время как), till / until (пока, до тех пор, пока), after (после того как), before (перед тем как), since (с тех пор как), as soon as (как только)	When I come home, I take a rest. While I was reading the book, I learned many new words. I shall wait here until he comes. Before I leave I'll let you know. I haven't seen him since we finished school. I'll come to see you as soon as I have some spare time.
Обстоятельст-венное причины, места	because (потому что), as (так как), since (поскольку), where (где, куда)	I did not come yesterday because I was ill. As it was late, we returned home. Since you are free you will help us. They went where you sent them.
Обстоятельст-венное условия	if (если), in case (в случае если), unless (если не), provided (если только, при условии что)	If I am busy, I shall not do it. In case it rains, I'll stay here. I shall not finish this work unless you help me. We'll go to the theatre today provided we get tickets
Обстоятельст-венное цели	so that (для того, чтобы), in order that (чтобы)	The teacher spoke slowly so that the pupils could understand him.
Обстоятельст-венное уступки	though, although (хотя) , even if (даже если), whatever (что бы ни), whoever (кто бы ни), in spite of the fact (несмотря на то, что),however, no matter how (как бы ни)	Though he is old, he looks well. Whatever happens, don't change your plan. Whoever comes, tell him I am not in. The travelers went on climbing in spite of the fact that the weather was worsening. However tired I am (No matter how tired I am), I'll do it.

Обстоятельст-венное сравнения	than (чем), as ... as (так же как; такой как), not so ... as (не так/такой как), as if (как будто)	The concert lasted longer than I expected. This language is not so easy as you think. He speaks as fast as I do. She speaks French so fluently as if she had lived in France for a long time.

TRANSLATION APPENDIX

Translate into English short dialogues using correct tense-aspect forms of verbs and active professional vocabulary

− Ваша компания будет еще заключать контракты с зарубежными фирмами? - Конечно. Мы недавно заключили контракт на долевое участие в добыче нефти с Британской компанией. − Кто будет финансировать геофизические исследования? − Азербайджан будет полностью (100%) финансировать эту работу. − Будет ли еще кто-либо принимать участие в проекте ? − В контракте предусмотрено участие третьей стороны.

− Наконец главная Российская нефтяная компания и Финская Aker Rauma Offshore подписали контракт, на основании которого Финская фирма транспортирует буровую установку "Маравия" из Персидского залива в Каспийское море. Сегодня среда. В понедельник к нам приезжали заказчики из Финляндии. − Они заинтересованы в поставках нового оборудования? – Да, мы подписали документ о совместной разработке месторождений на Каспии и сейчас проводим сейсмические исследовательские работы на Каспийском шельфе.

− Чем сейчас занимается Ваша компания? − Компания уже давно разрабатывает месторождение на Каспийском побережье. Мы сейчас разрабатываем 2 площади, которые разведали 2 года тому назад. Мы разрабатываем их уже год. − Когда вы закончите разработку? − Я думаю, что к концу следующего года мы закончим разработку и начнем эксплуатацию месторождения.

− Чем занимается ваша дочерняя фирма? − Она проводит разведочное бурение, а затем будет разрабатывать и эксплуатировать месторождение. – Где расположено это месторождение? − Морское месторождение D-222

расположено в совершенно неизученном секторе Каспия и мы сейчас осуществляем обширную разведку этой площади.

− Кто демонтировал это оборудование? По договору его демонтировала Финская компания. − Кто транспортировал его и как? − Финская Aker Rauma Offshore погрузила оборудование на корабль река-море и отправила по Российским водным путям в Астрахань на судоремонтный завод.

− Когда вы начали монтажные работы? − 3 месяца тому назад. Оборудование прибыло в Астрахань и через неделю компания приступила к работе. Для монтажа мы использовали плавучий кран "Исполин".

− Каковы технические характеристики этой установки? − Эта трехопорная установка высотой 66 метров включает в себя новейшие достижения в технологии морского бурения. Там можно разместить 100 человек Она может бурить в течение длительного периода, даже когда невозможно осуществлять доставку необходимого оборудования и продуктов из-за погодных условий.

− Ваш поставщик отправил бурильные трубы ? − Да, мы получили их недавно. К концу года мы закончим разведку и начнем эксплуатировать месторождение. Нефтяники будут использовать полупогружную буровую установку, как только проведут монтажные работы − Кто по договору транспортирует нефть от устья скважины? − Мы отвечаем за транспортировку по нефтепроводу Баку − Тихорецк – Новороссийск.

− Недавно Британская компания сконструировала гигантскую плавучую установку, которая может бурить на глубину 5000 метров и выдерживать штормовую волну до 100 футов. − Вы видели эту установку? − Да. (Я видел ее), когда был в командировке 2 месяца тому назад.

− Ваша компания уже смонтировала плавучую самоприводную полупогружную буровую установку? −Да, демонтированное оборудование

прибыло 3 месяца назад из Финляндии. − Сколько месяцев вы ее собираете? − Мы собираем ее уже 2 месяца.

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