

UDC 331.45

**THE HEALTH STATUS EVALUATION OF EMPLOYEES
OF THE ADMINISTRATIVE DEPARTMENT IN A PETROCHEMICAL COMPANY**

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The structure and dynamics of illnesses with a temporary loss of working ability have been analyzed in the current article. The research refers to the employees of the main office of the plant «Polymir» JSC «Naftan». It has been revealed that in the research period in the main office no professional diseases were registered. It has been discovered that the long-term average annual morbidity rate for the employees is close to the average morbidity rate with a temporary loss of working ability (further referred to as TLWA).

At present a lot of attention is given to the active investigation and forecasting of the level of professional risks of the workers in oil refineries. The main group is formed by the employees of the chief production and the auxiliary units of oil refineries, and the control group is formed by the administrative departments of the enterprise (the main office), more rarely the control group can be formed by other service personnel.

When discussing the results of the research in regard to the dynamics of the professional and occupational pathology in the above mentioned control groups, the authors are confined to the statistics on the general structure and morbidity dynamics with the aim of comparing it with the key figures for the main professional groups without specifying the morbidity structure and morbidity dynamics within certain medical entities.

The studying of morbidity with a temporary loss of working ability of the employees in the main office has been carried out by analyzing the statistics data of annual reports on the employees' temporary incapacity to work (form f16-u). The data on general sickness rate were taken into consideration. The data on the number of sickness cases per 100 workers on average and per each medical entity were also considered. Apart from that, the average length of 1 disability case specifying the number of days, the wastage indicator as a result of temporary inability to work specifying calendar days per 100 employees, as well as the dynamics of the number and gender composition of the studied groups of employees in the period from 2003 to 2011 were considered.

In the course of the research it has been revealed that in the specified period the number of employees of the main office stayed nearly the same, however in the years 2010 – 2011 the number of women in the working team sharply declined: in 2003 women accounted for 73,28 % of the team, in 2011 the figure went down to 41,05 %. On average within the period from 2003 to 2011 women accounted for 63,5 % of the team in the main office.

The fact that women prevail over men in the team composition of the main office, suggests a higher rate of endocrine diseases, genitourinary diseases and tumours, when compared to the other departments [1, 2]. At the same time due to the decreasing number of women in the team of the main office in 2010 – 2011, a decrease in morbidity rate of endocrine diseases, genitourinary diseases and tumours is expected. In table 1 you can see the data on the temporary dynamics of disease for the employees of the main office of the studied petrochemical company.

Table 1 – Morbidity with temporary loss of working ability in the main office of the oil refinery

Year	Number of cases per 100 employees	Number of calendar days per 100 employees	Average length of 1 case of TLWA, days
2003	94,28	797,08	8,45
2004	84,20	714,30	8,48
2005	94,09	795,96	8,46
2006	96,75	836,14	8,64
2007	95,40	865,99	9,08
2008	91,88	928,11	10,10
2009	99,98	890,89	8,91
2010	63,74	597,53	9,37
2011	38,87	349,17	8,98
<i>Average</i>	84,35	752,80	8,94

According to the evaluation scale of the TLWA indicators, which was suggested by Y.L. Notkin in 1977, the morbidity level of the main office employees can be estimated as close to the average. In particular – the TLWA frequency index is average, the temporary loss of working ability rate is lower than average. At the same time from 2006 to 2009 the morbidity level in the main office remained average, in 2010–2011 – it was lower than average, in 2003 and 2005 – the morbidity level in the main office was transitional.

From the data in table 2 it is clear that the qualitative structure of TLWA of the main office employees in the petrochemical company, which is identical to the standard for the given industry, covers 16 medical entities.

Table 2 – The structure of TLWA in the main office of the petrochemical company

Medical entity	Average number of cases per 100 employees, per year год	Average number of days of disability per 100 employees, per year	Average length of 1 case, days per year
Respiratory diseases	52,32	362,96	6,94
Musculoskeletal diseases	7,66	71,42	9,33
Poisoning and injuries in the workplace	3,05	69,81	22,93
Disease of blood-circulatory and cardio-vascular systems	4,24	39,72	9,37
Diseases of digestive organs	2,22	24,41	11,02
Genitourinary diseases	3,87	40,87	10,57
Skin diseases and subcutaneous tissue	1,43	13,82	9,68
Diseases of the eye and the appendages of the eye	1,66	14,31	8,63
Diseases of the ear and the adnexum mastoideum	0,63	5,55	8,83
Tumours	2,06	36,94	17,92
Infectious and parasitic diseases	0,31	4,13	13,18
Mental diseases and disorders	0,22	2,13	9,49
Nervous system diseases	0,43	5,37	12,47
Endocrine diseases	0,37	7,04	18,87
Blood diseases and blood-forming organ diseases	0,06	1,28	22,12
Reproductive disorders among women	3,84	53,04	13,81
<i>Total</i>	84,35	752,80	8,94

The percentage ratio of the groups in the general structure of TLWA for the main office of the studied petrochemical company is slightly different from the analogous data for the chief industries and for the enterprise as a whole. The first rank place in the structure of TLWA in the main office is occupied by respiratory organ diseases (63,49 % of all the cases of TLWA), the second place – pathology of the musculoskeletal system (9,3 %), the third place – diseases of blood-circulatory and cardio-vascular systems (5,04 %). Further we see genitourinary diseases (3,96 %), poisoning and injuries in the workplace (3,71 %), the sixth place belongs to reproductive disorders among women (3 %), the seventh place is taken by diseases of digestive organs (2,69 %). There exists a rather high level of tumours (2,51 %, 8th rank place), also a high level of diseases of the eye and the appendages of the eye (2,01 %, 9th place). There is a low level of diseases such as skin diseases and subcutaneous tissue (1,73 %, 10th place), diseases of the ear and the adnexum mastoideum (0,78 %, 11th rank place), as well as endocrine system diseases (0,46 %, 13th place). Nervous system diseases occupy the 12th rank place (0,53 %). Infectious and parasitic diseases (0,39 %) occupy the 14th place, mental disorders (0,28 %) occupy the 15th place. Blood diseases and blood-forming organ diseases are the rarest (0,07 %, 16th place).

It must be noted that the 1st and the 2nd rank places of respiratory organ diseases and the pathology of the musculoskeletal system in the structure of TLWA are typical of petrochemical companies. As a rule, the third medical entity, which is typical of the chief industries of the petrochemical enterprises, is the group of poisoning and injuries. It is characteristic of the employees of administrative services that the personnel carry out their professional duties in comfortable environment, which excludes the necessity of climbing to great heights from the floor (ground). It also excludes the possibility of industrial injuries as a result of contacting the technological equipment. Due to this, the indexes are lower compared to the indexes of the chief industries in the group of poisoning and injuries in the main office of the petrochemical company.

At the same time the percentage of respiratory organ diseases in the structure of TLWA, in terms of the number of cases per 100 persons, and in terms of the number of days of disability is maximum – 63,49 and 48,21 % respectively. Consequently, the pathology of respiratory organs is leading for the petrochemical company, which includes also the employees of the administrative department. The respiratory organ diseases are represented by acute respiratory infections (91,70 % of the level, 88,90 % days of inability to work), flu (5,68 %; 6,06 %), pneumonia (0,30 %; 1,01 %), and other diseases of upper respiratory passages (1,27 %; 1,77 %), chronic bronchitis (0,48 %; 1,18 %) and bronchial asthma (0,57 %; 1,08 %).

In the group of poisoning and injuries there are mainly individual injuries of soft tissues in different parts of the body (41,16 % of cases), individual fractures of upper limbs and lower limbs (34,85 %), burns and freezing injuries as well as other cases (11,08 %), multiple and combined injuries (5,55 %). Next to this there are intracranial injuries (5,21 %),

dislocations (1,50 %). Other nervous system injuries (0,65 %) are the rarest in this group. During the whole period of study there were no cases of poisoning. No consequences of toxic impact, of injuries, burns, freezing or any consequences of head injuries were detected. On the whole in the period from 2003 to 2011 the level of occurrence of poisoning and injuries in the main office team changed very little. Since 2009 there has been a tendency to the level decreasing, however at the same time the index of temporary inability to work among the employees has been increasing.

Based on the results of the work, the following conclusions have been drawn:

1. The long-term average annual morbidity rate is 84,35 cases of TLWA and 752,80 days of loss of working ability per 100 employees, and in accordance with Y.L. Notkin's scale dated 1977 is close to the average level of TLWA.

2. Respiratory diseases are the leading pathology of the main office of the studied petrochemical company. They account for 63,49 % cases of TLWA and 48,21 % of total disability. The second rank place is occupied by musculoskeletal diseases, their percentage in the total structure of TLWA on the basis of the number of cases per 100 employees and on the basis of the number of disability days is 9,3 и 9,74 % respectively.

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UDC 621.91.01/02

MINIMIZATION OF BACKLASH IN THE THREADED CONNECTIONS IN BORING CUTTING TOOLS

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The article is devoted to modeling of precision treaded connections in SolidWorks software. Experiments were carried out to reduce the backlash in threaded connections of boring tools.

In metalworking boring heads are widely used for making precise holes. They allow to set the size of the tool with high precision and to achieve high-precision machining and quality. The possibility to control the size of the tool can improve processing efficiency by reducing tooling costs and improve performance through the use of modern tool materials as cutting teeth such as hard metal, mineral ceramics and superhard materials that allow the use at higher cutting mode [1].

Progressive tools are adjustable single-blade boring prefabricated heads, equipped with replaceable indexable carbide inserts.

Figure 1 shows an example of a structure of a typical single-tooth boring head for boring holes in the range 30 ... 150 mm.

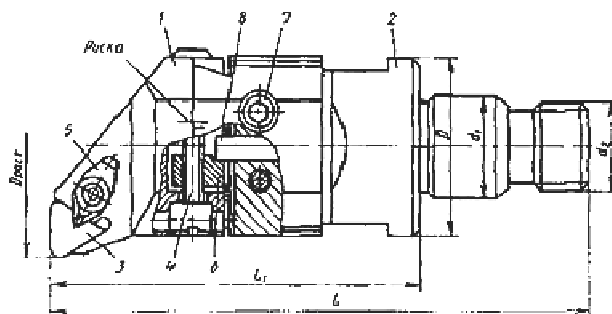


Fig. 1. Single-tooth boring head for boring holes with a diameter of 30 ... 150 mm

These heads consist of a head body 2 on the front side of which there is a corner recess of the «dovetail». In the recess a tool holder 1 is accurately placed, it has a possibility of radial displacement. In based tool holder a