1000°C, 4 hour) showed significant improvements in oxidation resistance (the best score in carbide inserts subjected chromium-titanium).

When oxidized carbide alloy, then cross-section of the oxidized sample in the plane, parallel to the original surface has the shape of a Maltese cross. Appearance of such a sample with outgoing angles at the edges is a typical sign of easily oxidation on the surface of the section metal-oxide [1]. Porosity of scale explained volatility resulting oxide $W0_3$. Tungsten carbide is susceptible to oxidation to a greater extent than titanium carbide.

When happen combined saturation with forming in diffusion layer a titanium and niobium carbides, heat resistance curve has a smooth appearance, that can indirectly serve as proof of the formation of mixture carbides in layer.

Differents in heat resistance of carbides can be explained as follows. When oxidized carbides side by side oxidation of metals, then form gaseous oxides of carbon and nitrogen, that loosen the oxide film. Protective ability of oxides can be roughly estimated by relation Pilling-Berdvards:

$$\alpha = \frac{M \cdot d}{m \cdot D}, \tag{2}$$

where M – molecular weight of the oxide, resulting in the oxidation of 1 mol of a compound; m – molecular weight of the oxidized compound; D, d – density of the oxide and compound.

This relation shows how the specific volume formed by the interaction with the external environment of the oxide is more or less than the specific volume of the oxidized compounds. If the value is $\alpha < 1$ oxide film formed is not solid, that causes a continuous oxidation; if the value $\alpha > 1$ forms a protective oxide layer, hindering the access of oxygen to the compound. For large values of the oxide layer, it receives large internal stresses, has brittleness and loses its protective properties. The greatest protective properties have oxide layers, which somewhat greater than 1. Pilling-Berdvards values for some carbides are given in table 3.

Table 3 – Values of the Pilling-Berdvards' criterion

	T_iC	Z_rC	N_bC	T_aC	Cr_3C_2	Mo_2C	WC	VC
Relation of Pilling-Berdvards	1,53	1,42	2,22	1,91	1,17	3,56	2,72	3,45
$t°$ of active oxidation, °C	1100 – 1200	1100 – 1200	900 – 1000	900 – 1000	1100 – 1200	500 – 800	500 – 800	800 – 900

1. It is revealed that roughness of surface of carbide cutter insert after thermochemical processes increases, excluding the diffusion of chromium plating, after which roughness is stagnant or even falling.
2. After thermochemical treatment of solid sintered alloys, increased their heat resistance and microhardness of the surface layer. Better heat resistance have hard alloys with application of chromium carbide layers, which is consistent with the data obtained by Pilling-Berdvards' criterion.

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UDC 656.051

CROSSROADS

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Traffic on roads may consist of pedestrians, ridden or herded animals, vehicles, streetcars and other conveyances, either singly or together, while using the public way for purposes of travel.

A road junction is a location where vehicular traffic can change between different routes or directions of travel.

Roads were initially built as rights of way to link locations of interest: towns, forts and geographic features like fords. As a result, many such locations formed the meeting point of such roads and they became the first road junctions. Where roads met outside of town, these junctions provided an attractive point to build a new settlement, such that they could receive passing trade from both directions. Scotch Corner is an example of such a location.

In the United Kingdom and other countries there is a practice of giving names to junctions to help travellers find their way. On older rights of way it was often the practice for a pub to be located at the Junction to maximise passing trade, and the junction has since become known by the name of the pub (even in cases where the pub has since been demolished). Other junctions may be named after local natural or man-made features.

However, with the 20th century advent of road traffic, roads became much busier and junctions became clogged with vehicles unable to cross each other's paths. In modern practice, bypasses and ring roads are used to keep through traffic out of major population centres.

Intersections are classified as 3-way, 4-way, 5-way, 6-way, etc. depending on the number of road segments (arms) that come together at the intersection.

– 3-way intersection – A junction between three road segments (arms) is a T junction (two arms form one road) or a Y junction.

– 4-way intersections usually involve a crossing over of two streets or roads. In areas where there are blocks and in some other cases, the crossing streets or roads are perpendicular to each other. However, two roads may cross at a different angle. In a few cases, the junction of two road segments may be offset from each when reaching an intersection, even though both ends may be considered the same street.

– 5-way intersections are less common but still exist, especially in urban areas with non-rectangular blocks.

– 6-way intersections usually involve a crossing of three streets at one junction; for example, a crossing of two perpendicular streets and a diagonal street is a rather common type of 6-way intersection.

– Seven or more approaches to a single intersection, such as at Seven Dials (London) are rare.

– Another way of classifying intersections is by traffic control:

– Uncontrolled intersections, without signs or signals (or sometimes with a warning sign). Priority (right-of-way) rules may vary by country: on a 4-way intersection traffic from the right often has priority; on a 3-way intersection either traffic from the right has priority again, or traffic on the continuing road. For traffic coming from the same or opposite direction, that which goes straight has priority over that which turns off.

– Yield-controlled intersections may or may not have specific "YIELD" signs (known as "GIVE WAY" signs in some countries).

– Stop-controlled intersections have one or more "STOP" signs. Two-way stops are common, while some countries also employ four-way stops.

– Signal-controlled intersections depend on traffic signals, usually electric, which indicate which traffic is allowed to proceed at any particular time.

– A traffic circle is a type of intersection at which traffic streams are directed around a circle. Types of traffic circles includeroundabouts, 'mini-roundabouts', 'rotaries', "STOP"-controlled circles, and signal-controlled circles. Some people consider roundabouts to be a distinct type of intersection from traffic circles (with the distinction based on certain differences in size and engineering).

– A box junction can be added to an intersection, generally prohibiting entry to the intersection unless the exit is clear.

– Some intersections employ indirect left turns to increase capacity and reduce delays. The Michigan left combines a right turn and a U-turn. Jughandle lefts diverge to the right, then curve to the left, converting a left turn to a crossing maneuver. These techniques are generally used in conjunction with signal-controlled intersections, although they may also be used at stop-controlled intersections.

A fork (literally "fork in the road") is a type of intersection. When a road splits, the main road steers to the left or right, depending of what side you drive on, and the smaller road heads straight. It is common for 2 lane roads. Heading toward the main road, the traveler must turn left or right. If a road has a curb that sticks out, it is not classified as a fork.

In some places, wider white stop lines (see preceding diagram) indicate where vehicles should stop at an intersection when there is a stop sign or a red light in a traffic signal facing them. Some intersections have pedestrian crosswalks designated on the street pavement. Some possible markings for crosswalks are shown as examples. Note that the stop line is positioned to not allow stopped vehicles to block the crosswalk.

Ghost Island priority junctions are sometimes used in the United Kingdom to provide safer turning areas, which separate turning traffic from through traffic in a similar way to turn lanes (see above).

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UDC 614.8.086:331.453:665.6:681.3.06

FUZZY MODEL OF THE EXPERT ASSESSMENT OF OCCUPATIONAL RISKS ON THE EXAMPLE OF THE WORKING CONDITIONS OF EMPLOYEES AT THE OIL REFINERY PLANTS

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Fuzzy model of the expert assessment of occupational risks to employees' health at oil refineries is presented in the article.

At the present stage of development of socio-technical systems, a convenient instrument of the modeling of complex dynamical processes under conditions of uncertainty and multicriteriality is the application of the fuzzy sets and fuzzy inference theory [1 – 3].

Impact of production factors on oil refinery employees is difficult to predict and depends on various circumstances and conditions. Therefore, the decision making procedure to determine the professional risks level is a complex of variables of different nature. For this reason it is expedient to use fuzzy model for occupational risk assessment.

This paper presents fuzzy model and results of using fuzzy model for occupational risks assessment of the employees' health at oil refineries.

The fuzzy model includes three fuzzy inference system FS_1, FS_2 and FS_3 (Figure 1) [4 – 5]. Input variables of the first fuzzy inference system are the probability (frequency) of hazard (P_i), which considers prescription of accident (K_i), severity of the consequences of hazards influence (S_i), and the duration of hazards exposure (D_i). An output variable of the first fuzzy inference system is occupational risks level ($R_{ОПФi}$), which caused by unsafe hazard. The occupational risks level is used as a basis for making a decision about the necessity of risk management actions.

Two variables are accepted in second fuzzy inference system: class of working conditions – ($КУТ_i$) and relative risks ($ОР_j$) for a certain class of diseases. The result of the fuzzy inference of the second system is a linguistic variable – "professional risks of occupational hazard effect "($R_{ВПФi}$).

The first variable of the third fuzzy inference system – is hazard index ($ИВ_k$) for a certain profession or a structural subdivision. The second variable ($FS_{3)}$ is a number of temporary disability cases due to all illnesses per 100 employees ($ЗВУТ_k$). An output variable of the third fuzzy inference system is "occupational risks of complex effect of production hazards" ($R_{ВПФk}$).

One of the steps of fuzzy inference is a development of rule base by expert. There are 125 rules for FS_1, and 25 rules each for FS_2 and FS_3.

On the basis of expert assessment and the principle of linguistic pattern recognition, it is determined that the changes of input variables can be most thoroughly described by terms, which have triangular membership functions (except the input variables $ОР_f$ and $ИВ_k$ and output variables $R_{ОПФi}$, $R_{ВПФi}$, $R_{ВПФk}$, which are characterized by trapezoidal membership functions).

As an algorithm for fuzzy inference algorithm Mamdani is adopted. Assessment of the professional risks level to employees of oil refineries caused by *i*-th hazard (for the *k*-th profession) consists of the following steps:

1) identify input parameters $FS_{1–3}$ by recognized expert and statistical methods;

2) perform fuzzification of input parameters values by finding appropriate graphic framework of the membership function terms ($X_{1j} – X_{7j}$) on the basis of the values of quantitative or qualitative criteria in step 1 (i.e, the values of P_i, S_i, D_i, $КУТ_i$, $ИВ_k$, $ОР_f$, $ЗВУТ_k$);

3) determine the degree of validity conditions for each of the fuzzy rules productions;

4) construct the resulting membership function for the output parameters ($R_{ОПФi}$, $R_{ВПФi}$, $R_{ВПФk}$) in relation to the degree of the validity of all production rules;