

General System of Forensic Engineering Tasks

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Active development of forensic sciences in recent years (in accordance with the laws and principles of the genesis of forensic expertise) growing demand for their conduct and the urgent need for the emergence of new types of research make it necessary to systematize general tasks of forensic science in general and engineering in particular. This article purpose: to conduct an analysis of tasks solved by performing engineering and technical types of forensic science; determine the general principles of their formation; organize (unify) these tasks into a general (generic) system; to form a theoretical basis for improving the list of issues to be resolved while forensic engineering and technical researches (with the aim of modernizing Chapter II “Research guidelines concerning preparation and appointment of forensic examinations and researches”, that should be made the basic for new species(subspecies) of forensic engineering. In order to achieve the goal, methods of scientific knowledge were used: observation, comparison, abstraction, analysis, synthesis, modeling, etc. It is proposed to differentiate the tasks of engineering and technical research according to four groups that define the system as general (generic): 1) research of the state of objects; 2) establishment of conformity / non-conformity of the state of the object with certain requirements; 3) mechanism determination of investigated situation occurrence ; 4) clarification of cause-and-effect relationships in the situation under research.

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Research Problem Formulation

Research guidelines on preparation and appointment of forensic examinations and forensic researches¹ (hereinafter referred to as RG) contain the main lists of tasks and indicative lists of issues to be resolved in forensic researches according to relevant forensic specializations. The analysis of solved tasks in specific forensic researches of engineering and technical types of forensic examinations, their relative and cross-comparison make it possible to assert that the general features characteristic of forensic engineering and technical examination in general and reflected in the relevant sections of these RGs are somewhat unclear due to the fact that these tasks relate exclusively to the applied plane of a specific type of forensic engineering. In case that court or pretrial investigation bodies appoint multidisciplinary forensic engineering and technical expert researches, there is a need to holistically imagine the task to be solved in while research, otherwise this task is difficult to implement during preparation of questions for a court decision on of a forensic examination appointment or in the case of drawing up a corresponding resolution of the investigator. In addition to such cases, the general list of tasks of engineering

and technical forensic examinations will also be useful for starting new types of engineering and technical and engineering and technological examinations.

Article Purpose

In order to analyze the tasks solved by performing engineering and examinations; determine the general principles of their formation; organize (unify) these tasks into a general (generic) system; form a theoretical basis for improving the list of issues solved during the execution of forensic engineering and technical studies (in order to modernize sections II *Forensic Engineering examinations* of RG) which should be made the basis for new types (subspecies) of forensic engineering.

Research methods

In order to achieve this goal, methods of scientific cognition were used: observation, comparison, abstraction, analysis, synthesis, modeling, etc.

Analysis of Essential Researches and Publications

Emergence and development of legal sciences and practical developments in

1 Е.г. розд. II «Інженерно-технічні експертизи» Науково-методичних рекомендацій з питань підготовки та призначення судових експертиз та експертних досліджень : затв. наказом Мін'юсту України від 08.10.1998 р. № 53/5 (зі змін. та допов.). URL: <https://zakon.rada.gov.ua/laws/show/z0705-98#Text> (date accessed: 09.11.2022).

forensic engineering contributed to the initiation of forensic expertise – the science of the general theory of forensic expertise. Currently, a lot of special literature is devoted to issues of forensic expertise. Scientists and researchers, including V. K. Lysychenko, A. V. Ishchenko, I. M. Aliiev, M. Ya. Sehai, N. I. Klymenko, V. H. Honcharenko, and F. M. Dzhavadov, made significant efforts for its formation and development. Historical aspects of emergence and development of forensic science and its issues are elaborated in detail in research papers and textbooks on forensic sciences by N. I. Klymenko and M. Ya. Sehai² which many researchers call fundamental. Development of separate directions by species (subspecies) of forensic science led to development of legal, organizational and methodological principles in appointment and execution of forensic examinations by generic and species division. Subsequently, scientists and jurists identified common features for certain types of forensic research. Currently, a significant number of theoretical and applied research papers (at the level of monographs, articles, educational and methodical literature) are devoted to the general problems of forensic expertise, as well as the genesis of certain areas of forensic science. Today (in accordance with laws and principles of forensic expertology genesis) there is an active demand for the emergence of

new types of forensic engineering. Rapid development of this area of forensic examination contributed to initiation of new forensic expert specializations that requires development of a special methodological base for conducting research and specifying the tasks of new types of forensic engineering. At the same time, generic tasks of forensic engineering (as opposed to specific lists of tasks by separate species) have not been generalized yet. General tasks of forensic engineering, as stated above, are somewhat unclear due to their specification exclusively in the applied plane, i.e., for a separate species of forensic engineering.

Given the classification division of forensic examinations in domestic regulations, their practical application may be limited. In the aspect of the subject and purpose of this study, the works of A. A. Krupka, L. Ye. Duz, M. O. Kraliuk and Ye. O. Yakovleva³, as well as H. M. Honcharuk⁴, which can be considered fundamental on the way to introducing new forensic specializations, namely, forensic engineering and forensic examination of unmanned aerial vehicle (hereinafter referred to as UAVs). Taking into account the narrowly specialized direction of these studies, their general use is impossible. Thus, the systematization of the tasks of forensic engineering and technical types of examinations, synthesizing generalization is relevant.

- 2 Серай М. Я. Судебная экспертология: объект, предмет, природа и система науки. *Теорія та практика судової експертизи і криміналістики*. 2003. Вип. 3. С. 25–32. URL: <http://revopravo.kiev.ua/sl.html> (date accessed: 09.11.2022).
- 3 Крупка А. А., Дузь Л. Є., Крالیук М. О., Яковлева Є. О. Судова інженерно-механічна експертиза: праксеологічний підхід. *Вісник НТУУ «КПІ». Політологія. Соціологія. Право*. 2020. Вип. 3 (47). С. 80–85. DOI: [10.20535/2308-5053.2020.3\(47\).229484](https://doi.org/10.20535/2308-5053.2020.3(47).229484) (date accessed: 09.11.2022).
- 4 Гончарук Г. М. Запровадження та становлення судової експертизи безпілотних літальних апаратів. *Вчені записки ТНУ імені В. І. Вернадського. Серія: юридичні науки*. 2021. Т. 32 (71). № 2. С. 70–75. DOI: [10.32838/TNU-2707-0581/2021.2/012](https://doi.org/10.32838/TNU-2707-0581/2021.2/012) (date accessed: 09.11.2022).

Main Content Presentation

Domestic forensic scientists, in particular from the Kyiv and Kharkiv schools (M. Ya. Sehai ⁵, P. D. Bilenchuk ⁶, A. V. Ishchenko, N. I. Klymenko ⁷, H. V. Prokhorov-Lukin ⁸, M. G. Shcherbakovskyi ⁹ etc.) consider forensic expertise to be an independent branch of legal science. At the end of the 20th century, practical forensic activity accumulated a significant number of empirical materials within specific genera (types) of forensic examinations, making them the basis of a number of separate theories (concepts) in certain areas of forensic examinations. In the opinion of the author, one of the many interpretations reflecting the essence of the subject of forensic expertise can be considered the definition given by M. G. Shcherbakovskyi: *“The subject of forensic expertology as a science of one of the sides of forensic expertise, the methodological basis of forensic research includes patterns of genesis and development of genera, types of forensic examinations; scientific apparatus, including the concept of objects, methods, problems of expert research, separate teachings; the regularities of the formation of the qualities of the objects of examination*

*and the selection of relevant evidentiary and indicative information from them, which are used to solve the problems of the judiciary”*¹⁰. Emergence and development of engineering and technical expertise in the general structure of forensic science can be considered quite indicative.

Topic and object specification of forensic engineering is an urgent issue at the current stage of this area development while implementation of such research is conditioned by the need to their conducting that affects increase in the number of forensic expert specializations of engineering and technical types forensic examinations at request of investigative and judicial practice. In general, forensic examination as a science is developing and requires solution of many debatable issues that arise in practical forensic science. Further development of existing trends in certain species(subspecies) of forensic examinations contributed to the development of legal, organizational and methodological bases for the appointment and direct execution of forensic examinations by generic and species division. Subsequently, scientists and jurists identified common features characteristic of these forensic studies for certain genera. It is worth noting that

- 5 Сегай М. Я. Судова експертологія — наука про судово-експертну діяльність. *Вісник Академії правових наук України*. 2003. № 2—3 (33—34). С. 740—742.
- 6 Біленчук П. Д. Засоби пізнання у сфері кримінального судочинства: наукові засади систематизації та особливості використання. Кн. 1 : Загальнотеоретична характеристика засобів пізнання у сфері кримінального судочинства: проблеми методології, системології, праксеології : монографія. Хмельницький, 2012. 372 с.
- 7 Клименко Н. І. Поняття та завдання загальної теорії судової експертології в системі юридичних наук. *Криміналістика і судова експертиза*. 2019. Вип. 64. С. 48—57. DOI: 10.33994/kndise.2019.64.02 (date accessed: 09.11.2022).
- 8 Прохоров-Лукин Г. В. Теоретические и методические основы судебно-экспертной ситуации : дис. ... канд. юрид. наук. Киев, 1993. 217 с.
- 9 Щербаківський М. Г. О предмете судебной экспертологии. *Актуальні питання судової експертизи і криміналістики* : мат-ли Міжнар. наук.-практ. конф., присвяч. 150-річ. з дня народж. Засл. проф. М. С. Бокаріуса (Харків, 18—19.04.2019). Харків, 2019. С. 38—40. URL: <http://dspace.univd.edu.ua/xmlui/handle/123456789/9008> (date accessed: 09.11.2022).
- 10 Ibidem.

the development of all types and types of forensic examinations (in particular, engineering and technical) takes place on the basis of praxeology, i.e., a path that can be considered as classical and is overcome by genesis of new types of forensic science:

- a) first, investigator / court draws up a decision/ resolution on appointment of forensic examinations / involvement of forensic experts;
- b) in the decision / resolution, investigator / court forms a range of issues that need to be resolved within framework of forensic examinations;
- c) forensic experts of various specializations conduct a number of examinations, often multidisciplinary ones;
- d) scientists generalize expert practice which results in a proposal to initiate new species of forensic examination at regulatory level.

By analyzing and summarizing the by-laws, we have identified engineering and technological forensic expert specializations (code 10):

- 10.1 Forensic research on circumstances and mechanism of traffic collisions;
- 10.2 Forensic technical condition research on vehicles;
- 10.3 Forensic research on vehicle components;
- 10.4 Forensic transport and trace evidence analysis;
- 10.5 Forensic research on causes and consequences of violation of life safety and labor protection requirements;
- 10.6 Forensic research on real estate objects, building materials, structures and relevant documents;
- 10.7 Forensic land distribution of and determination of the use order of land plots;
- 10.8 Forensic research on circumstances of occurrence and spread of fires and compliance with fire safety requirements;
- 10.9 Forensic research on hardware and software;
- 10.10 Forensic determination of estimated value of construction objects and structures;
- 10.11 Research on circumstances and mechanism of train accident;
- 10.12 Forensic research on technical condition of rolling stock of rail transport;
- 10.13.1 Forensic research on engineering equipment of permanent way;
- 10.13.2 Forensic research on engineering equipment of ballastless track;
- 10.14 Forensic valuation of land plots;
- 10.15 Forensic research on causes and consequences of emergency events in mining industry and in underground conditions;
- 10.16 Forensic road engineering research;
- 10.17 Forensic research on telecommunication systems (equipment) and means;
- 10.18 Forensic research on technical operation of electrical equipment;
- 10.19 Forensic research on circumstances, organizational and technical causes and consequences of influence of technogenic sources on environmental objects;
- 10.20 Forensic research on land management;
- 10.21 Forensic research on urban electric vehicle;
- 10.22 Forensic research on technical condition of elevators and conditions for their safe operation;
- 10.23 Forensic research on technical condition and operating conditions of machines and mechanisms;

- 10.24 Forensic research on events on waterborne transport;
 - 10.25 Forensic research on aviation events and incidents;
 - 10.26 Forensic research on unmanned aerial vehicles (UAVs) intended for radio control and interception of mobile communication systems, photo and video control of objects on the ground;
 - 10.27 Forensic research on radio-electronic equipment for receiving, processing and transmitting information;
 - 10.28 Forensic research on special purpose robotic systems;
 - 10.29 Forensic engineering and technological examination of critical infrastructure objects;
 - 10.29.1 Forensic research on critical infrastructure objects of power engineering;
 - 10.29.2 Forensic research on critical infrastructure objects of petroleum industry;
 - 10.29.3 Forensic research on critical infrastructure objects of gas industry;
 - 10.29.4 Forensic research on critical infrastructure objects of nuclear power;
 - 10.29.5 Forensic research on critical infrastructure objects of urban engineering;
 - 10.29.6 Forensic research on critical infrastructure objects of industrial agriculture and food industry;
 - 10.29.7 Forensic research on critical infrastructure objects of aviation;
 - 10.29.8 Forensic research on critical infrastructure of road transport;
 - 10.29.9 Forensic research on critical infrastructure of rail transport;
 - 10.29.10 Forensic research on critical infrastructure of waterborne transport;
 - 10.29.11 Forensic research on critical infrastructure of postal communication;
 - 10.29.12 Forensic research on critical infrastructure of chemical industry;
 - 10.29.13 Forensic research on critical infrastructure of metallurgy;
 - 10.29.14 Forensic research on critical infrastructure of defense industry;
 - 10.29.15 Forensic research on critical infrastructure of space industry;
 - 10.29.16 Forensic research on critical infrastructure of aviation;
 - 10.29.17 Forensic research on critical infrastructure of the shipbuilding;
 - 10.30 Thermal engineering researches¹¹.
- Retrospective appearance analysis of new species of forensic examinations indicates rapid development of class of forensic engineering and technological examinations. In the last 2 years alone, 24 new forensic specializations have been launched, initiated by the FSI of Ministry of Justice of Ukraine (in particular, *Forensic research on technical condition and operating conditions of machines and mechanisms*, *Forensic research on events on waterborne transport*, *Forensic research on events and incidents* and *Thermal engineering*

11 Див.: дод. 5 до Положення про Центральну експертно-кваліфікаційну комісію при Міністерстві юстиції України та атестацію судових експертів : затв. наказом Мін'юсту України від 03.03.2015 р. № 301/5 (зі змін. та допов.). URL: <https://zakon.rada.gov.ua/laws/show/z0249-15#Text> (date accessed: 09.11.2022) ; дод. 4 до Положення про експертно-кваліфікаційну комісію Служби безпеки України та атестацію судових експертів : затв. наказом Центр. упр. СБУ від 15.09.2021 р. № 321 (зі змін. та допов.). URL: <https://zakon.rada.gov.ua/laws/show/z0044-15#Text> (date accessed: 09.11.2022).

research)¹² and Ukrainian Research Institute of Special Equipment and Forensic Science of the Security Service of Ukraine (*Forensic research on unmanned aerial vehicles (UAVs) intended for radio control and interception of mobile communication systems, photo, video control for objects in the area, Forensic research on radio-electronic equipment for reception, processing and transmission of information, Special purpose forensic research on robotic systems and Forensic Engineering and technological examination of critical infrastructure objects*)¹³.

Establishment of modern species of forensic examinations and new forensic expert specializations is due to the emergence of new research objects. Proliferation of UAVs (in particular, their interest in representatives of criminal world) required the regulatory and legal regulation of their use, therefore conducting an engineering assessment of their safety / danger, etc., and this contributed to the formation of a new type of engineering examination: 10.26 *Forensic research on unmanned aerial vehicles (UAVs) intended for radio control and interception of mobile communication systems, photo and video control of objects on the ground*. Such spread of innovative objects is due to the emergence of another new type of forensic expert specialization: 10.28 *Forensic research on special purpose robotic systems*.

In domestic development of forensic engineering, it is worth noting emergence

of a new direction, due to interpretation expansion of research topic, 10.29 *Forensic engineering and technological examination of critical infrastructure objects*, initiated by Ukrainian Research Institute of Special Equipment and Forensic Science of the Security Service of Ukraine. Until recently, there were no engineering and technological types of forensic examinations in domestic classification at all. Appearance of forensic engineering and technological examinations, according to the author of this research paper does not exclude possibility of separating this area of research into an independent kind of engineering and technological forensic examinations and in the future (together with forensic engineering ones); form a separate class of forensic engineering examinations.

The following example of emergence of new forensic engineering examination illustrates another reason for the genesis of forensic science activity. Increase in the number of violations of regulatory requirements and crimes committed in relation to objects of heat engineering purpose has led to the need for special knowledge (in the field of research of thermal networks, thermal energy metering devices, thermal energy sources, verification of calculations and substantiation of thermal load and consumption standards, etc.) and formation of a new direction: *Thermal engineering researches* (code 10.30). The rise in demand for conducting new research

12 Див.: Зміни до Положення про Центральну експертно-кваліфікаційну комісію при Міністерстві юстиції України та атестацію судових експертів : затв. наказом Мін'юсту України від 28.04.2020 р. № 1540/5 (зі змін. та допов.). URL: <https://zakon.rada.gov.ua/laws/show/z0389-20#Text> (date accessed: 09.11.2022) ; Зміни до деяких нормативно-правових актів з питань судово-експертної діяльності : наказ Мін'юсту України від 15.08.2022 р. № 3430/5. URL: <https://zakon.rada.gov.ua/laws/show/z0922-22#n73> (date accessed: 09.11.2022).

13 Зміни до Положення про експертно-кваліфікаційну комісію Служби безпеки України та атестацію судових експертів : затв. наказом Центр. упр. СБУ від 15.09.2021 р. № 321. URL: <https://zakon.rada.gov.ua/laws/show/z1258-21#n61> (date accessed: 09.11.2022).

types on machines and mechanisms, events and incidents on water and air transport is due to the emergence of new forensic specializations: 10.23 *Forensic research on technical condition and operating conditions of machines and mechanisms*, 10.24 *Forensic research on events on waterborne transport* and 10.25 *Forensic research on aviation events and incidents*.

At the same time, general tasks of forensic engineering are somewhat unclear due to the fact that these tasks relate exclusively to the applied plane of a specific type of forensic engineering and technical expertise. A detailed outline of the tasks for individual forensic specializations will contribute to the analysis of these tasks, the determination of their common features and (on this basis) their synthesizing generalization. Such a generalization will make it possible to systematize tasks, organize (unify) existing types and algorithmize the introduction of new types (subspecies) of forensic engineering that means solve this issue in the reverse way, namely: from the tasks already established in the RG to the development of a general system tasks of forensic engineering examinations and forensic expert researches. However, in order to achieve this goal, definitions of the concepts: *topic of forensic engineering examination* and *task of forensic engineering examination* should first be specified.

While considering the topic of forensic examination in general and engineering examinations in particular, this concept should be correlated with the field of scientific knowledge and practical activity. In scientific aspect,

the topic of forensic examination is a group of objective laws that are studied in this field of scientific knowledge. In this case, we should talk about the field topic of knowledge, that is the scientific basis of the examination of a particular kind and type, and not about the procedural and applied value of the subject of examination. Regarding this, M. G. Shcherbakovskiy cites the following topic division of forensic examination as a field of knowledge and distinguishes two species of regularities:

“1. Regularities determining emergence of properties of objects of forensic expert research:

- *formation of properties of objects as elements of a crime event;*
- *Functioning and interaction of objects in the circumstances of investigated event;*
- *displaying the properties of objects in the surrounding material environment;*
- *spatial-temporal and causal relationships and relationships of objects arising before, at the moment and after crime.*

2. Research regularities of forensic examination objects:

- *search, detection and recording objects, their properties and signs;*
- *obtaining from the objects of potential criminal-relevant information, factual data on the crime under investigation“¹⁴.*

The authors of the textbook: *Fundamentals of Forensic Science...* (2016) claim that the intensification of the process of differentiation (distribution) of fields of knowledge led to the need to

14 Щербаковский М. Г. Судебные экспертизы: назначение, производство, использование : учеб.-практ. пособ. Харьков, 2005. 544 с. URL: https://library.nlu.edu.ua/POLN_TEXT/UP/SHERBAKOVSKIY_2005.pdf (date accessed: 09.11.2022).

grant expertise the status of a means of proof¹⁵. In this area, the statement of the famous lawyer V. D. Spasovych is still relevant: “*There is a limitless sea of human knowledge and the correct division of labor is necessary. A separate head, a separate mind is not able to contain even a thousandth part of the experience accumulated over centuries. Each specialty was refined to special laws. If... the court or an individual needs... to turn to another specialty, then instead of starting to study this specialty and, so to speak, go to discover America, it possible to turn directly to a specialist in a certain specialization and take a ready-made formula*”¹⁶. The above directly applies also to engineering and technical examinations. Engineering and technical expertise is singled out as an independent class or genus of forensic expertise in the works of M. G. Shcherbakovskyi and other researchers. At the same time, the subject, tasks, and typical issues of forensic engineering and technical expertise are only generally indicated in the scientific literature. In addition, specialists understand the task of forensic engineering and technical expertise in different ways. Some of forensic engineering and technological examinations distinguish technological and materials science, designed to determine the state of technology, product quality and their compliance with state standards and technical conditions and commodity science, which is conducted on industrial and food products. Currently, forensic commodity examinations are an independent genus

including determination of compliance of product quality with standards and regulations¹⁷.

Other researchers call the subject of forensic engineering and technological examination to determine the causes of accidents while operating machines and equipment, as well as violations of production technology and safety rules in industrial and agricultural production. Forensic labor safety examination is rightly considered one of the types of forensic engineering and technological examination. Modern generic division of forensic examinations in Ukraine corresponds to another name: *forensic engineering*.

According to numerous studies of many scientists who developed the theoretical foundations of forensic expertology, the *subject* is the most significant, main aspects, properties of the object (phenomenon) under research which the process of cognition is aimed at. The concept of the topic and tasks of forensic examination (if the task is understood not in a broad sense — as specific questions posed to forensic expert by the person or body that appointed the forensic examination, and in a narrow sense — as the achievement of what the cognitive activity of the expert is aimed at) are identical. In view of this, it can be argued that the subject of examination is conditioned by its tasks, objects and methods of cognition. In this case, the methodology of forensic examination becomes important, because a correct understanding methodology essence

15 Головченко Л. М., Лозовий А. І., Сімакова-Єфремян Е. Б. та ін. Основи судової експертизи: навчальний посібник для фахівців, які мають намір отримати або підтвердити кваліфікацію судового експерта. Харків, 2016. 928 с. URL: <https://expertize-journal.org.ua/attachments/article/924/ose.pdf> (date accessed: 09.11.2022).

16 Спасович В. Д. Сочинения : в 10 т. Санкт-Петербург, 1889—1902. Т. 5. 1895. С. 286.

17 Науково-методичні рекомендації ... URL: <https://zakon.rada.gov.ua/laws/show/z0705-98#Text> (date accessed: 09.11.2022).

requires consideration of general scientific methodology is theoretic knowledge system in another words the concept system and not only research means. There is a trend to designate the methodology as integral concept uniting several components: conception of the world and fundamental theoretical concepts, dialectical categories and laws, general, specific scientific methods. In another words the methods of knowledge of objects of forensic examination should be understood as a set of general scientific research methods, general and special forensic methods. Therefore, the methods of knowledge in forensic engineering examinations should be understood primarily as special forensic methods.

Regarding generic division of forensic examination objects (taking into account the defining relationship between the subject, object and special research methods), the opinion of the authors of the manual *Fundamentals of forensic examination...* (2016) is appropriate: “Object of forensic examination is material (materialized) sources of information (objects, formations, etc.) that are investigated (known) by forensic expert on the basis of the application of specific expertise, within the topic of forensic research by certain methods and means in order to solve the tasks (issues) posed by authorized person (body)”¹⁸.

Thus, the topic of forensic engineering examination is determined by the tasks solved by forensic engineering examinations, special forensic expert methods aimed at solving these issues and objects of forensic engineering examinations. The above proves the existence of a close connection of the

topic with the objects and methods of forensic engineering and examination determining its essence.

Based on the results of the analysis of the tasks solved in specific forensic expert studies of engineering and technical forensic examinations and indicated in the *RG*, general characteristic features are identified and on this basis a synthesizing generalization of the tasks of engineering and technical examinations is performed, as well as the tasks of engineering and technical expert researches are classified in directions of the tasks of forensic science, namely: identification, diagnostic (first and second group) and situational. The last (situational) tasks in forensic engineering research are additionally combined into two separate groups (third and fourth): while research, one of them determines occurrence mechanism of the situation under research and the other: causal relationships.

Thus, we propose to differentiate the tasks of forensic engineering researches into four groups defining the system as general (generic):

- *first group*: research on the state of objects;
- *second group* is establishment of compliance / non-compliance of the state of the object with certain requirements;
- *third group*: determination of occurrence mechanism of investigated situation;
- *fourth group*: clarification of causal relationships in the situation under research.

The general system of tasks of forensic engineering covers all the signs that

18 Головченко Л. М., Лозовий А. І., Сімакова-Єфремян Е. Б. та ін. Оп. cit. С. 27. URL: <https://expertize-journal.org.ua/attachments/article/924/ose.pdf> (date accessed: 09.11.2022).

cause these tasks. In the future, the list of tasks of a new species (subspecies) of engineering and technical forensic examinations can be formed on the basis of the general system of tasks given by us.

According to the author, it is advisable to state the tasks of forensic engineering and in the following wording:

1. Investigation of the state of objects with the definition of:
 - 1.1. Purpose of the object with the identification of functions performed, identification of the object (type, brand, model, design, modification, etc.);
 - 1.2. Characteristic parameters:
 - a) physical quantities (length, mass, time, electric current, etc.);
 - b) technical and operational indicators (pressure, concentration, voltage, temperature, tension, density, speed, acceleration, current, flow, etc.);
 - c) technical indicators (level, group, complexity, configuration, boundaries, etc.);
 - 1.3. Actual condition:
 - a) integrity (complete, partial, set of fragments, fragment);
 - b) functionality (functional / inoperative, critical / limiting condition, etc.);
 - c) list of actual defects with their identification and establishment of the type of malfunction of the object (partial, complete, critical, etc.) by the defects recorded in the research;
 - d) type of malfunction by method of detection (obvious / hidden one);
 - 1.4. Operating mode / process mode (change of mode in time);
 - 1.5. Identification of operating mode (normal / abnormal / emergency);
 - 1.6. State identification with determination of the type of the studied state (primary / changed);
 - 1.7. Type (nature) of malfunctions (loss of integrity; wear; destruction; thermal, mechanical damage, etc.) of the object as a whole or its individual parts, elements, fragments;
 - 1.8. Estimated scope of works on restoration, repair, elimination of consequences.
2. Establishment of conformity or non-compliance with the object state:
 - 2.1. Requirements of technical and regulatory documents (technical requirements; technical specifications; technical conditions; terms of the contract of sale / provision of services / supply / storage / property management/ lease / accession; easements, etc.);
 - 2.2. Requirements of regulatory and technical documents (rules, instructions, guidelines) regarding the actions of certain persons;
 - 2.3. Scope of work performed (manufacturing, construction, installation, other work, including modernization, repair, restoration) to requirements of regulatory and technical and regulatory documents, contracts, project documentation, estimates.
3. Investigation of objects with establishment of the occurrence mechanism of studied:
 - 3.1. Events, incidents, situations, accidents, etc.;
 - 3.2. Actual mode of operation, actual technological process;
 - 3.3. Actual condition, existing defects, malfunctions with determination

of mechanism occurrence of type malfunction due to:

- a) inept object handling;
- b) improper and improper operation (maintenance), installation, storage;
- c) overload;
- d) fragility;
- e) deterioration
- f) aging, degradation;
- g) coincidence of operational resource;
- h) constructive failure;
- i) production or technological malfunction.

4. Establishment of causal and conditionality relations:

- 4.1. Actual state acquisition;
- 4.2. Events, incidents, situations, accidents;
- 4.3. Improper operation, improper use;
- 4.4. Accident.

Conclusions

This research identified general (generic) specifics and characteristic features of forensic examinations on the basis of the tasks enshrined in the relevant sections of RG, in accordance with the principles and laws of forensic examination; analyzed the main lists of tasks and indicative lists of issues solved by forensic expert researches of engineering and technological direction; generalized and developed a general (generic) system of tasks of forensic engineering, differentiated into four groups, namely:

- *first group*: research on the state of objects;
- *second group* is establishment of compliance / non-compliance of the state of the object with certain requirements;

- *third group*: determination of occurrence mechanism of investigated situation;
- *fourth group*: clarification of causal relationships in the situation under research.

The proposed general (generic) system of tasks of forensic engineering and technical expertise and the general list of tasks of forensic engineering created on this basis will further contribute to:

- unification and modernization of the adjustment of the relevant sections of the RG from the main lists of tasks and indicative lists of issues solved while forensic expert researches in all specializations of forensic engineering and technical types of forensic examinations;
- introduction of new types (subspecies) of forensic engineering and technical expertise. The system of proposed tasks of forensic engineering formalizes and algorithmizes the indicative list of issues solved in accordance with Section II *Forensic engineering examinations* RG, for any new type of forensic engineering.

Загальна система завдань інженерно-технічних судових експертиз

Ігор Богданюк

Активний розвиток судових експертиз останніми роками (відповідно до закономірностей і принципів генезису судової експертології), зростання попиту на їх проведення й нагальна потреба в появі нових видів досліджень зумовлюють необхідність систематизувати загальні завдання судової експертизи загалом й інженерно-технічної зокрема. Мета статті: провести аналіз завдань, розв'язуваних шляхом виконання інженерно-технічних

видів судових експертиз; визначити загальні засади їх формування; упорядкувати (уніфікувати) ці завдання в загальну (родову) систему; сформувати теоретичне підґрунтя для вдосконалення переліку питань, вирішуваних під час виконання судових інженерно-технічних досліджень (із метою осучаснення розд. II «Інженерно-технічні експертизи» Науково-методичних рекомендацій з питань підготовки та призначення судових експертиз та експертних досліджень), який доцільно зробити базовим для нових видів (підвидів) судових інженерно-технічних та інженерно-технологічних експертиз. Для досягнення поставленої мети використано методи наукового пізнання: спостереження, порівняння, абстрагування, аналіз, синтез, моделювання тощо. Запропоновано диференціювати завдання інженерно-технічних досліджень за чотирма групами, що визначають систему як загальну (родову): 1) дослідження стану об'єктів; 2) установлення відповідності / невідповідності стану об'єкта певним вимогам; 3) визначення механізму виникнення досліджуваної ситуації; 4) з'ясування причиново-наслідкових зв'язків у досліджуваній ситуації.

Ключові слова: судова експертиза; предмет та об'єкт дослідження; завдання судової експертизи; експертологія; рід, вид, підвид судової експертизи; інженерно-технічна експертиза; інженерно-технологічна експертиза.

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