
ABSTRACT

Based on the analysis of the results of activities aimed at the development of three-dimensional printing in Kazakhstan, highlighted the alleged problems of the successful implementation of additive technologies in the economy and in education particularly. In article the scheme of the existence and development of new technologies and the role of government's support in the process is given.

KEYWORDS: additive technology, three-dimensional printing, innovation in technical education.

INTRODUCTION

At the moment there is an active implementation in all areas of new equipment, working on additive technologies. Additive Fabrication (AF) or Additive Manufacturing (AM) denotes the additive, i.e. produced by the addition. This technology, based on a constant build of three-dimensional digital model obtained by modeling or scanning. In past years, often used the term rapid prototyping (Rapid Prototyping) or RP-technology. [1]

Since 1995, appeared the term «3D-printing." The realities of our time is the widespread three-dimensional printing. Household 3D-printers became a part of everyday life. If to believe short messages in the media, the printing of shoes, clothes, whole houses and even human organs is not particularly difficult. Soon, this type of equipment can go into the category of household appliances and there will be a deficit of service specialists. And the main value will be a digital model for printing.

The main goal of the research is the issue of considering the possibility of introduction of additive technologies in industrial production, the study of features in process of layered synthesis in the manufacture of prototypes and models and the definition of the main parameters affecting the quality of the produced parts. Scientific novelty and practical importance of the research of additive technologies to Kazakhstan's obvious. First of all, is the creation of a new area of technological knowledge for industrial production. In addition to the economic efficiency of the implementation of additive technologies in production, it has a high social value. Additive technology - a completely new technology for Kazakhstan, for which there are no books and methodical recommendations. [7] The research results can be the basis for a new branch. This, in turn, will not only speed up the introduction of new technologies, but also to raise the level of preparation of graduates of technical specialties, and successfully adapt them to the world technological space.

REVIEW OF THE RELEVANT LITERATURE

Analysis of the situation regarding the implementation of additive technologies can be made on the base of 3D Print Conference, held in the territory of the CIS and Kazakhstan. Specifically, in the Republic of Kazakhstan held two events in Almaty, the events names were - advanced technology conference of three-dimensional printing and scanning - 3D Print Conference. They were held by the initiative of an international company - organizer of events Smile-Expo. First of all, it should be noted that all ongoing activities focused on businessmen and entrepreneurs in Kazakhstan. 3D printing and scanning- is recognized as one of the most promising technological directions.

If you trace the development of new technology in Russia, it is possible to detect similar problems and proposed solutions.

According to GC "Russian Nanotechnologies", the lack of technological equipment for prototyping and creating samples is one of the main barriers to technology commercialization. The known facts from the history of the development of additive technology in Russia:

St. Petersburg National Research University implements the concept of advanced training of teachers and targeted training of specialists in the system "university - Engineering Center - the enterprise." Since 2009, has been established the center of prototyping. The key part in the project creation of the prototyping Center took the Instrumentation technologies chair of SPbSU ITMO, led by E.I. Yablochnikov. [3]

In 2012, there were Experimental Design Bureau of Vyatka State University within its structure research and production division - the center of prototyping Vyatka State University (FabLab Vyatka State University), head Lyangasov I.V. [10]

It is inherent the presence of three-dimensional printing lab in Skolkovo. Latest news –till the end of 2015 22 million rubles will be allocated from the regional budget for equipping the laboratory complex of prototyping Center of Techno park Novosibirsk Academicals city. [4]

According to the latest information can be denoted especially the city of Voronezh. On the base of the plant - "Voronezhselmash" established the Center of additive technologies. The center offers services in manufacturing prototypes of parts for industry, medicine, the creation of exhibition samples, architectural models and models, all this based on 3D-printing technology.

Not only did the company collected the experimental samples, and began mass production of three-dimensional printers, it also created Training Center training to work on 3-D printers. The training center, in cooperation with the Department of Computer Science of Voronezh Pedagogical University, started to develop methodological recommendations for the training of children working with 3D printers.

In addition, the Director of the Department of State policy in the sphere of education of the Russian Federation Ministry of Education Anastasia Zyryanova, in plans of department by 2017 will be prepared the concept of teaching in Russian schools, the subject entitled "Technology", where the students will be taught working on the 3D-printer. [10]

METHOD

In the article to identify the major challenges of new technologies was used the method of empirical research. In accordance to the procedure observations were made of presentations at conferences, comparison of statistical data on the results of the three-dimensional equipment sales, showed the number of scientific publications on additive technologies in Russian. All this led to the conclusion that the introduction and development of new technology competence, knowledge and skills are necessary.

RESULTS

Knowledge of new technology should be based on scientific research and after the main provisions and the basic sciences will be formulated. To create layered details need to know all the about the material how to set the equipment on effective modes of operation, accuracy and quality of the process parameters. Skills in new technologies is possible to obtain under the direction of specialists who know these skills. To acquire high-quality skills are needed equipped workshops and advanced equipment.

You can make the conclusion about the need to introduce a new educational program or as it was called in the last century, a new specialty - additive technology. [10]

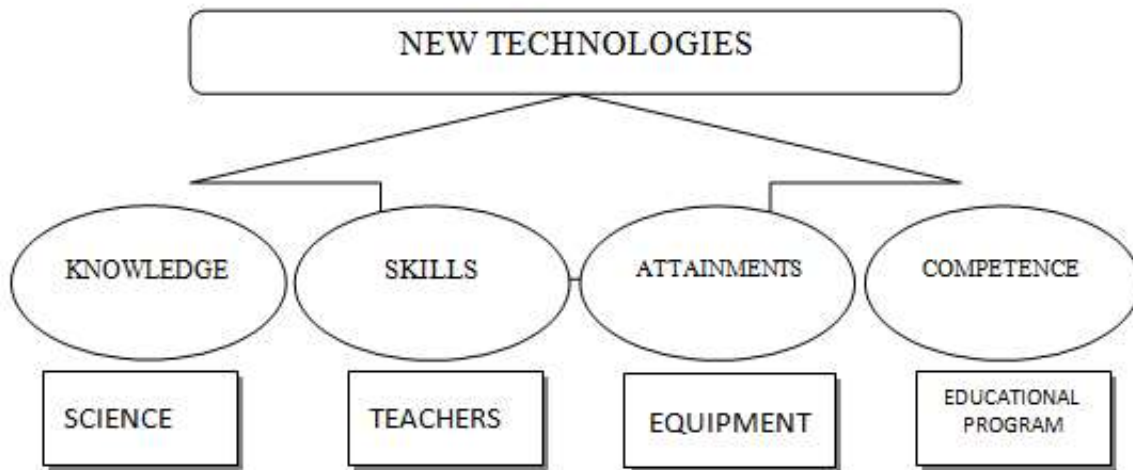


Figure 1 - The Basics of existence and development of new technologies

As for Kazakhstan, we must take into account the Russian experience and move on our own directions. The Decree of the President of the Republic of Kazakhstan dated June 4, 2013 № 579, said: "We need to focus resources to meet the requirements of engineering and technical personnel with the relevant expertise of international level..." [8]

For the proposed scheme, as a confirmatory factor can give an example of the Swiss Federal Institute of Technology Zurich (ETH Zürich). An investment of financial resources in technology of 3D-printing institute guide explains the brewing needs to improve educational programs of the engineering direction. The acquisition of a number of 3D printers will improve the level of teaching, including courses from CAD systems and engineering graphics. Thus, the European Institute of ETH Zurich, promotes rapprochement between educational institutions and industry, and focused on the European Employers who need specialists in the three-dimensional printing. [6,9]

Quite interesting the state's position in the organization to support new technologies. In the Russian Federation on 10th of February 2015, the All-Russian Scientific Research Institute of Aviation Materials (VIAM) hosted a scientific-practical conference "The additive technology in the Russian industry". It was noted, that the world market of these technologies has reached a volume of \$ 3 billion, and today, the most important task is to develop a plan of action for the creation of a new industry and determine ways of its further development. Experts, specialized research and educational institutions and industrial enterprises attended the conference. [2]

The result was the release of the main tasks for the near future on the development of additive technology in the Russian Federation:

- organization of working group on the creation of the design industry, the definition of the main participants, sources of financing, range of consumers of developed products;
- create a new model of introduction of perspective technologies in the additive industry by organizing a consortium of different sectors of the industry, as part of which can be represented as manufacturers and consumers of technological solutions, including large companies with state participation;
- The establishment within the Foundation of perspective researches (FPR) for the organization of the laboratory breakthrough research;
- Creation of a unified coordination mechanism - a single center of competence on additive technologies;
- preparations for the new academic year, proposals on development of the system through the training of specialists in the field bases of intellectual and information technology, computer simulation, robotics and additive technologies;
- Creation of a system of national standards for additive manufacturing, including:
 - general and special qualification of materials (source and synthetic);

- standardization of designs, technologies and equipment;
- The development and certification of quality control methods and properties of synthesized materials and products;
- rules of applying additive manufacturing products (assessment of safety, forecasting term).

Based on the above we can suggest that the successful development of new technologies requires the support of the state.

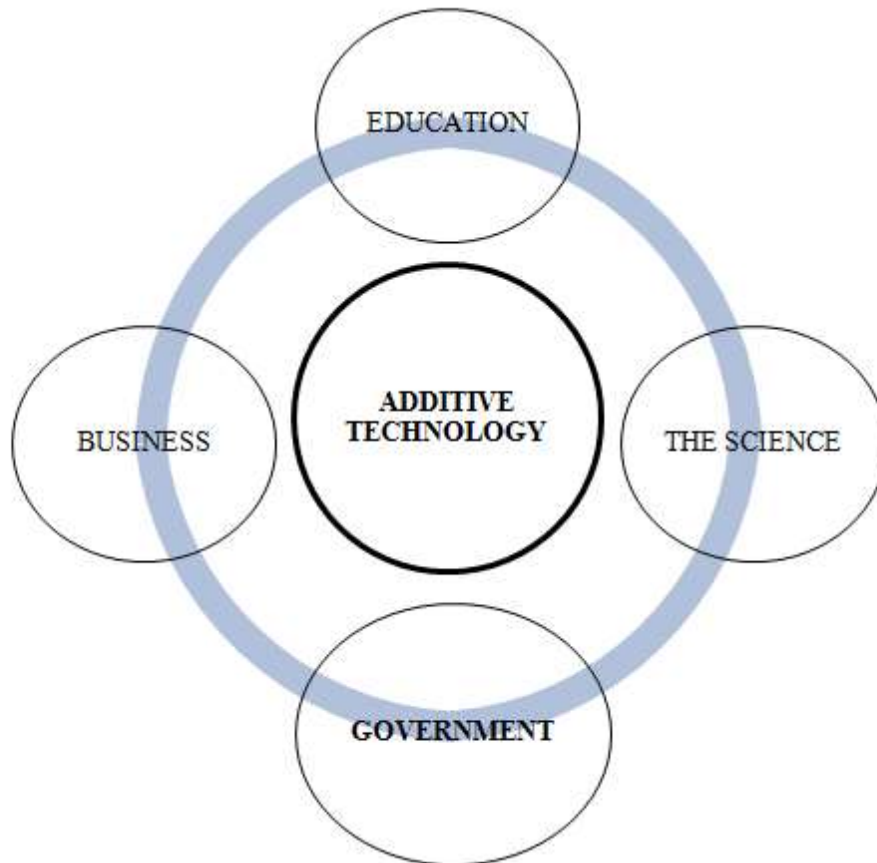


Figure 2 - The State should become a participant of the process of introducing new technologies

From the report research company Gartner - a global provider of 3D-printers in 2015 will amount to 217.3 thousand units compared to 108.1 thousand units in 2014. Starting in 2015, the supply of such devices will increase annually more than doubled and in 2018, it will reach a level of 2.3 million units. [6]

DISCUSSION

In the three-dimensional printing activities are regularly exposed Russian production printers PICASO 3D, differing worthy relation "quality-price". However, in view the fact that now on the market of equipment appeared not only Russian, but also Kazakh producers, solution of the problem of implementation in the educational process and the study of new technologies, require a speedy solution. In 2015, the model of Kazakhstan's printer 3D LAB Prusawas demonstrated, which indicates the rate of advancement of additive technology in Kazakhstan. [10,11]

CONCLUSIONS

Thus, in accordance with the scheme composed for implementation of additive technologies are necessary:

- Fundamental knowledge based on scientific principles;
- Specialists teachers to transfer skills;
- Equipped workshops and laboratories for the acquisition of skills;
- A new specialty in high school.

And most importantly, to accelerate the process government support is necessary. [10]

The possibility of qualitative development and implementation in production, and most importantly in the educational process of new additive technologies will help to boost industrial-innovative development of Kazakhstan, and will enable young professionals feel more confident in the international market. [9]

REFERENCES

- [1] Muhamadeyeva R.M. Prototyping Technology transfer in Kazakhstan. Germany: European Applied Sciences. 2013; 79: 15-17 [in Russian].
- [2] http://3dtoday.ru/wiki/3D_print_technology/ (the date appeal: 07.22.2014).
- [3] Kozemchuk K. Dovbish B. Additive technologies in Russian industry. Scientific and technical statements of St. Petersburg State Polytechnic University. 2013, 4, S. 183
- [4] <http://www.foto-business.ru/istoriya-i-perspektivy-i-additivnoy-promyishlennosti.html> (date of appeal: 02.08.2015)
- [5] <http://www.up-pro.ru/library/innovations/niokr/additive-3d.html> (date of appeal: 08.28.2014)
- [6] Report Wohlers. Additive technology and 3D printing. Dynamics of development of industry. 2012. S.189
- [7] Muhamadeyeva R.M. The parameters of additive technology in 3D printing, the Eurasian Union of Scientists (EUS). 2014, IV:118-119
- [8] Materials 3D Print Conference, news@3dprintconf.com.ua
- [9] Muhamadeyeva R.M. Computer aided design system in the education process of competitive professionals, USA. Chicago: Global Science and Innovation, materials of the V international scientific conference. 2015. 5: 353-355
- [10] Muhamadeyeva R.M. Additive technologies in Kazakhstan. Sheffield: Materials of the XI international scientific and practical conference «Scientific horizons». 2015; 11: 29-35
- [11] Muhamadeyeva R.M., Muhamadeyeva T.M. Muhamadeyeva I.A. Structural and Logical Approach to the Introduction of Dual Training in Vocational and Technical Education System of the Republic of Kazakhstan.