

## The actual problem of magnetic compass at contemporary navigation

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### Abstract

In the paper the priority of technical means and methods of navigation at contemporary seagoing ship was discussed. The role of magnetically compass and gyrocompass at the condition of contemporary ship was described. Effectiveness of gyrocompass and magnetically compass from point of navigation and economy was analyzed. The result of analysis is reflected at the recommendation for navigators and managers of ship's company.

### Introduction

The requirements to magnetic compasses have been developed during all history of navigation. At the beginning of the XX century the requirements to compass had a little different from the modern requirement. By this time the theory and practice of magnetic compass were at very high level of development.

Gyrocompasses did the first steps at this time, and magnetic compasses undividedly dominated on fleet. The role of a magnetic compass on a vessel not having a gyrocompass hasn't changed for today. In second half of XX century the gyrocompass evaluated for the first roles and magnetic compasses began to play a role of reserve.

At the end of the XX century increase of reliability and accuracy of gyrocompasses took place. The satellite navigating systems GPS, DGPS and integrated navigating systems were introduced. The safety of navigation has essentially raised. The refusal of gyrocompass is not super important event at this condition. The indicator of risk is not so high at this situation.

### Contemporary equipment of navigation

At the condition of high-precision observations by systems GPS (DGPS) even the noncompensated magnetic compass allows to finish the voyage of

a vessel to port safely. At this situation that will do enough a constant basic direction (may be not so precision) which under any circumstances provides a magnetic compass [1].

It is obvious that the above reliability of a gyrocompass, the less considerable role are played by a magnetic compass.

Though the role of a magnetic compass lately decreased, it is impossible to tell about operational expenditure on its maintenance at level of demanded accuracy.

First of all there is a speech about annual expenses for carrying out of deviations works. Specifications on their carrying out have been developed in the middle of the XX century and, naturally, they don't consider possibilities of modern navigation. Conservation of inveterate requirements to service of magnetic compasses conducts to irrational expenses.

Many ship-owners and organizations, including the Coastguard of USA, the Ship's Register of Russia, Poland and the majority of the countries of participants IMO had not reaction in aspect of requirement to magnetic compass.

Rigid enough requirement of the resolution of IMO A-382/X about annual indemnification of deviation of a magnetic compass remains in these countries without alteration. All other requirements concerning indemnification of a magnetic compass

are preserved in an invariable [1] kind also. More low listed conditions of indemnification which are carried out in cases concern them:

- After periods of lay up;
- When a new compass is installed;
- When deviation exceeds 5 degrees;
- On a new vessel or in a new area of operation;
- After trauma, such as lightning strike, grounding, fire, etc.;
- When compass performance is unsatisfactory or unreliable;
- When a record of compass deviation has not been maintained;
- After alterations and additions to vessel's structure and equipment;
- After repairs involving welding, cutting, grinding, etc which may affect the compass;
- When electrical or magnetic equipment close to the compass is added, removed or altered;
- When compass deviation does not appear to correspond with that shown on deviation card.

From this list it is visible that any decrease of requirements to indemnification of a magnetic compass is not observed. There is the question about that why so occurs. After change of the status of the device the purposes and problems of this device must be changed. This situation take place for magnetic compass also. In normal current life it isn't already used for steering of a vessel or for positioning of a vessel.

Its main task is the indication of course at emergency situation (at gyrocompass refusal). However, to any devices of emergency appointment it is not accepted to make so rigid demands, as to the cores.

Emergency devices should provide the safety minimal requirements. It is allowed to provide the reasonable using of means which the ship-owner has.

The basic means should be used on daily (basic) safety, and reserve means should be used for prevention of heavier consequences of breakdown.

In the relation to magnetic compasses on modern ships having gyrocompasses there was no revision of requirements. The same requirement remain for the ships which were not equipped by the gyrokompasses. Such situation speaks that the bodies of rationing of requirements always had the overall objective increase of safety of navigation.

As a rule, the economy questions have less interest. However, it doesn't mean that economy questions are less essential, than safety issues. After

all, all activity of the person is motivated by economic interests. However, safety of navigation costs money and it can't be forgotten [2].

The unique requirement directly subject to control in port of departure is the actuality of the table of deviation.

Such control by ports administration is not so often, but hypothetical possibility of delay of a vessel in port from this reason is present. At the decision of such question the solution must be only especially formal. Thus, as arguments in the justification quality of equipment of a vessel other means of navigation can't be used.

In the light of technical progress some states have started to change standard requirements to frequency of indemnification of a magnetic compass.

So, for example, Sweden has increased the maximum period of validity of the table of deviation by persons under surveillance to its ships till 2 years [3].

Australia has increased as much as possible admissible period of validity of the table of deviation till 3 years [3].

The shy step to the same direction was made by Russia, having allowed captains of ships on the responsibility of prolongation the table of deviation for the term up to 3 months under a condition if the maximum excess of deviation from its tabular value doesn't exceed  $2^\circ$ .

## Conclusions

It is represented that these first steps of Australia, Sweden and timid steps of Russia are made to the necessary direction. They don't lead to decrease in safety of navigation, but will certainly remove unnecessary barriers in work of captains and will allow to solve more rationally questions entering into the captain's competence.

## References

1. LUSHNIKOV E.M.: Compensation of magnetic compass deviation at contemporary condition. International scientific conference "Innovation in scientific and education – 2008", KGTU, Kaliningrad 2008, 22–24.
2. LUSHNIKOV E.M.: The problem of magnetic compass deviation at contemporary condition. International Navigational Symposium "TransNav 09". Maritime University, Gdynia 2009, 219–224.
3. LUSHNIKOV E.M.: About the problem of magnetic compass at contemporary ships. 14<sup>th</sup> International scientific and technical conference "Marine Traffic Engineering", Szczecin 2011, 293–296.