



**Physics-technological institute of metals and alloys
NAN Of Ukraine**

**Casting construction high-module aluminium alloy with
the promoted prochnostnimi descriptions.**

Scientific leader

corresponding member of NAN of Ukraine of V.P.Gavrilyuk

Responsible performer

Dr.Ph. s.n.s Loktionov-Remizovskiy V.A.

Purpose of work:

**To develop a new casting visokoprochniy aluminium alloy with the
promoted module of resiliency**



**The used principles of consolidating of alloy:
composition consolidating, due to forming of structure of
eutectiki:**

- forming of the monopure state of anchorwomen of the phase Mg_2Si , within the limits of eutektik colonies;
- dispergirovane structures in poured are the states by modification;
- dispersion consolidating, due to forming the Gine-Prestona (nanostrukturnie educations) areas in the process of heat treatment.

**Base system of the alloying
Al-Si-Mg**



Type of functions of concentration dependences descriptions and properties of alloys of the eutectic systems

Diagram composition of alloy – casting property

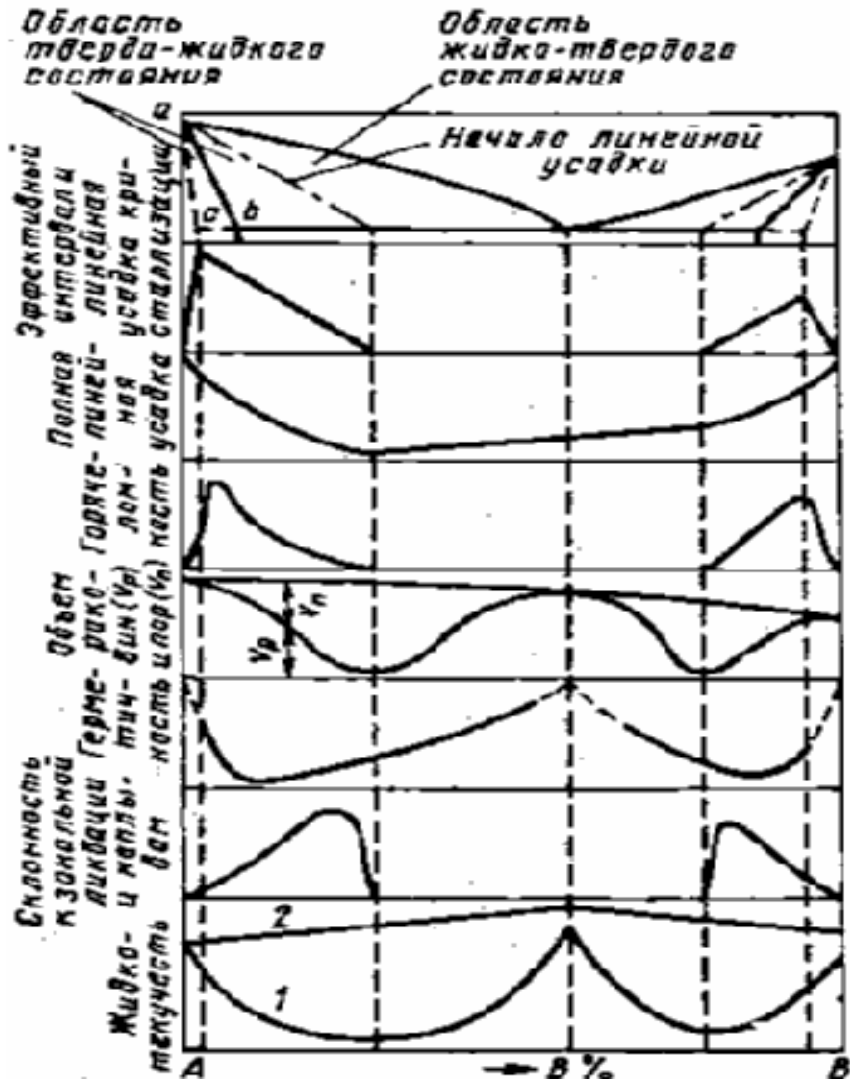
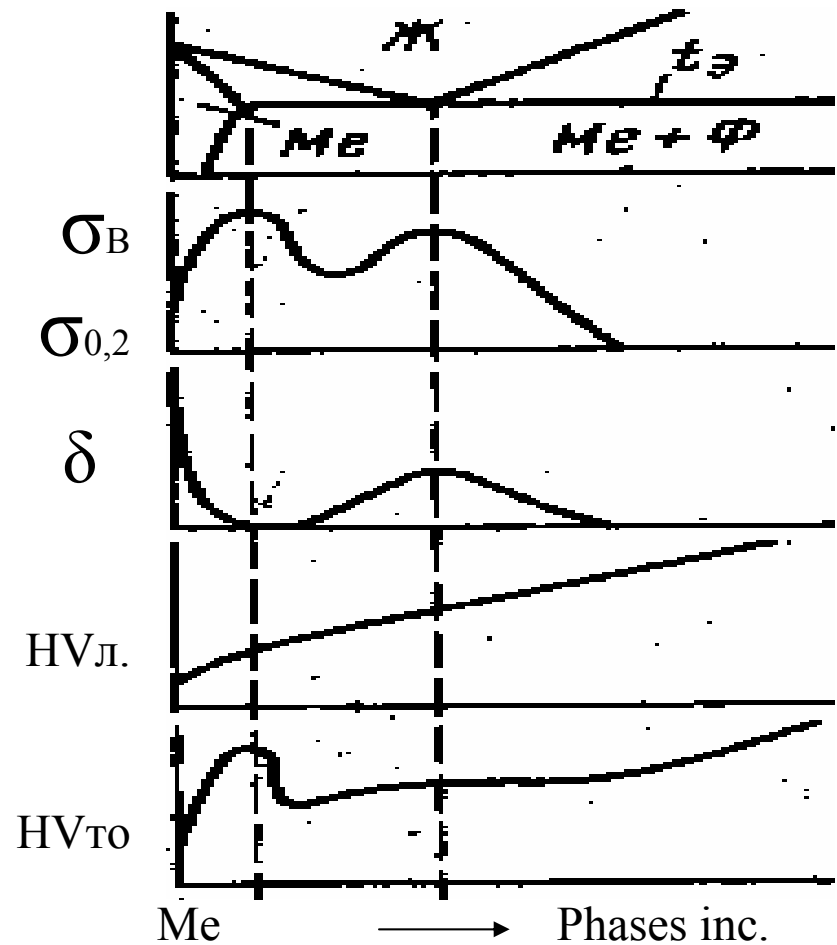
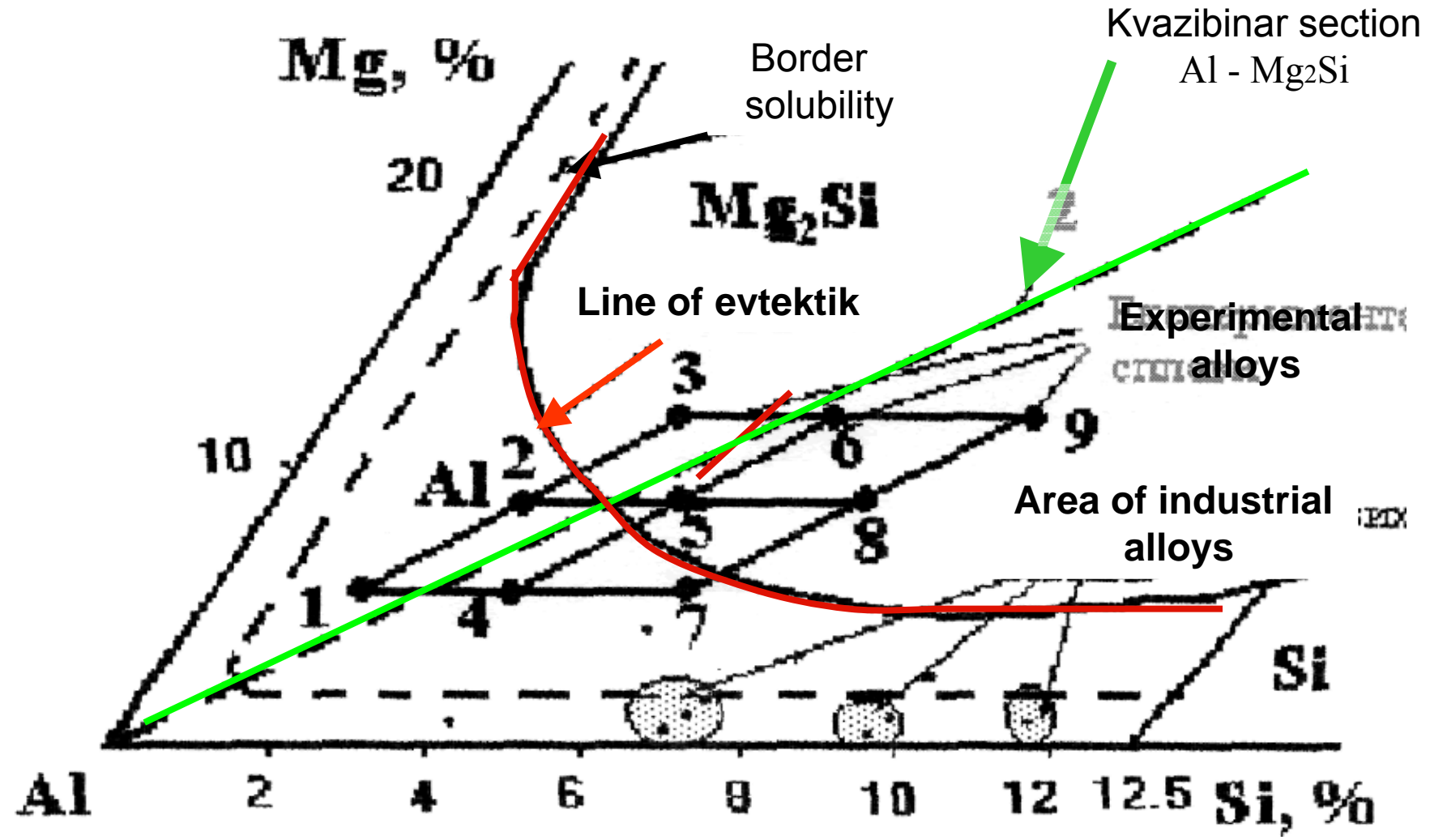


Chart of dependence of mechanical properties from concentration of alloys of kvazibinarne sections of the eutektic systems



Layout chart of standard and experimental alloys on concentration triangles

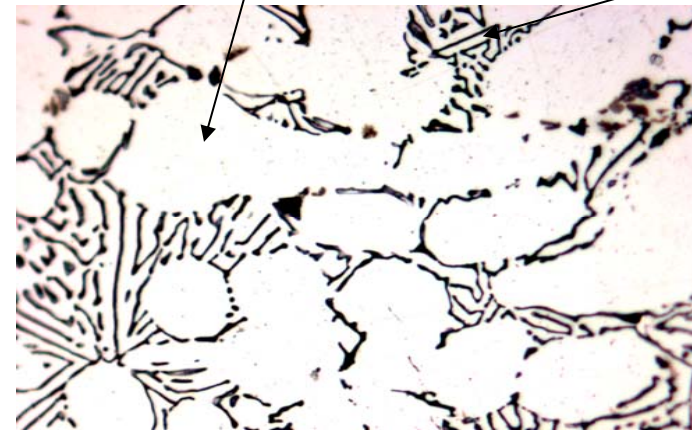




Types of structures of experimental alloys in the poured state

α -Al

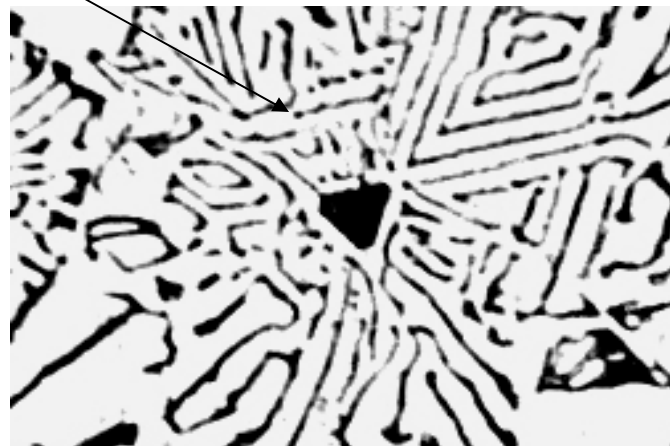
Eutektik Al+ Mg₂Si



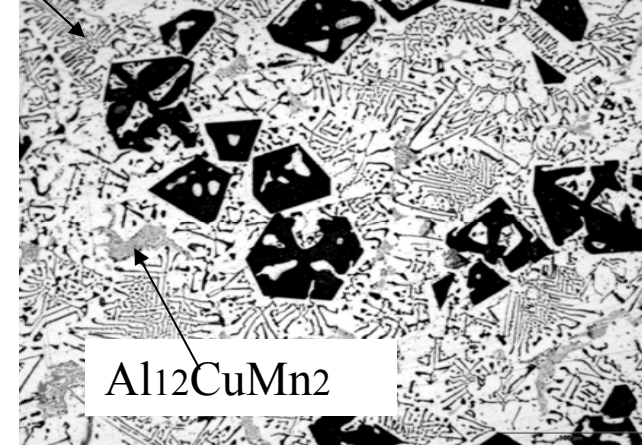
Si - 1,63% Mg - 6,30%, x100

Eutektik Al+ Mg₂Si

Mg₂Si



Si - 5,68% Mg - 6,24%, x400



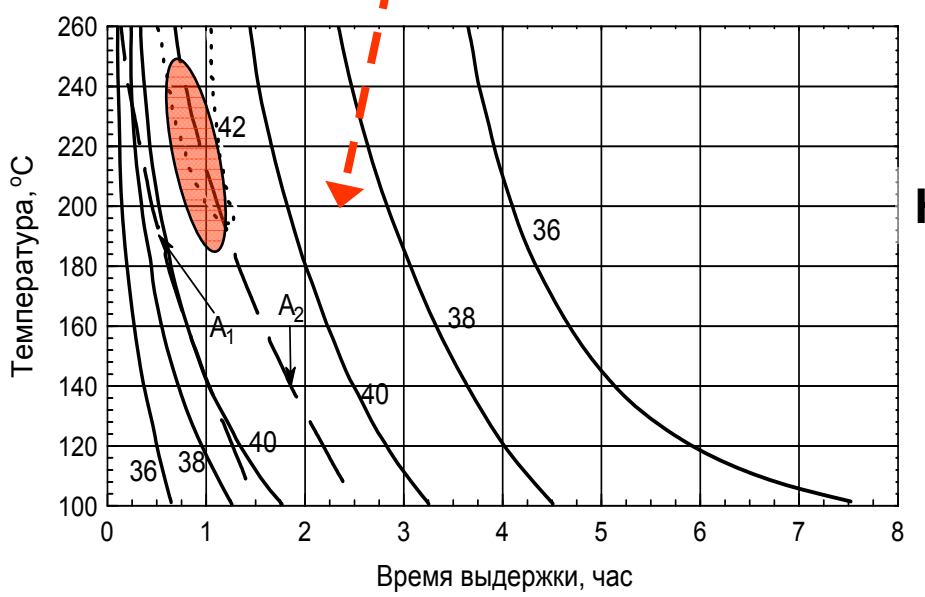
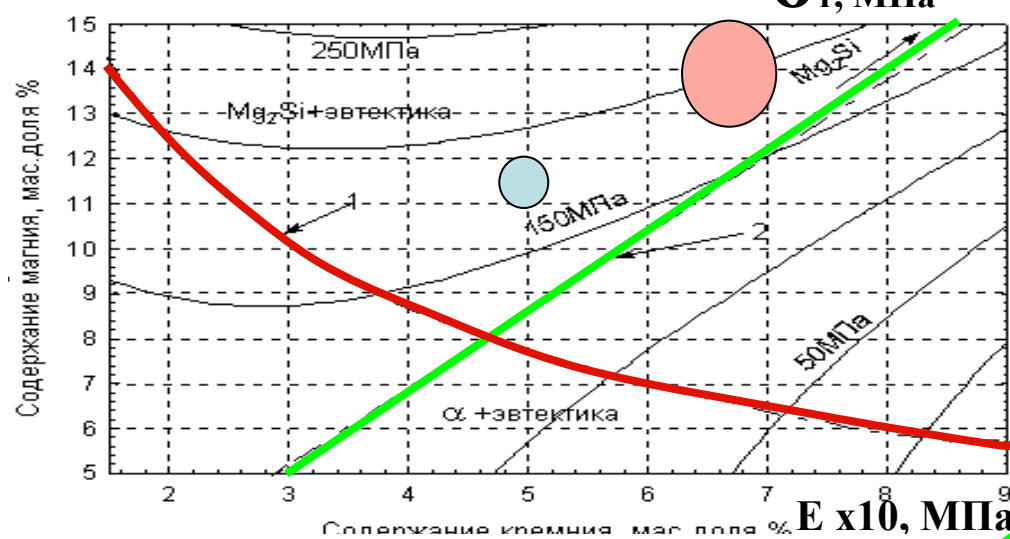
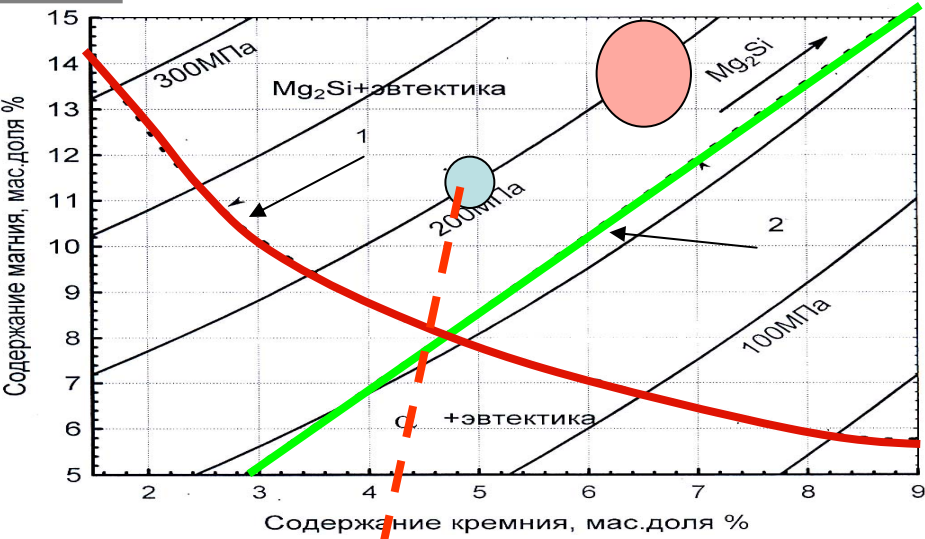
Si - 4,63% Mg - 11,44%, x100



Diagrams the composition – structure - property of alloys of the base system Al – Si – Mg (the heat treatment T6)

σ_B , МПа

σ_T , МПа



HRB

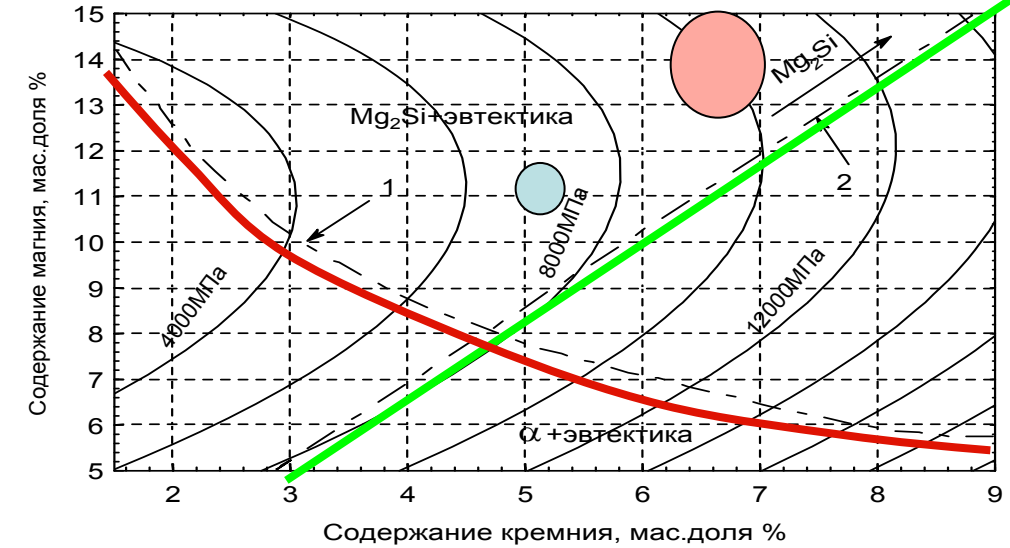


Diagram of disintegration of hard solution

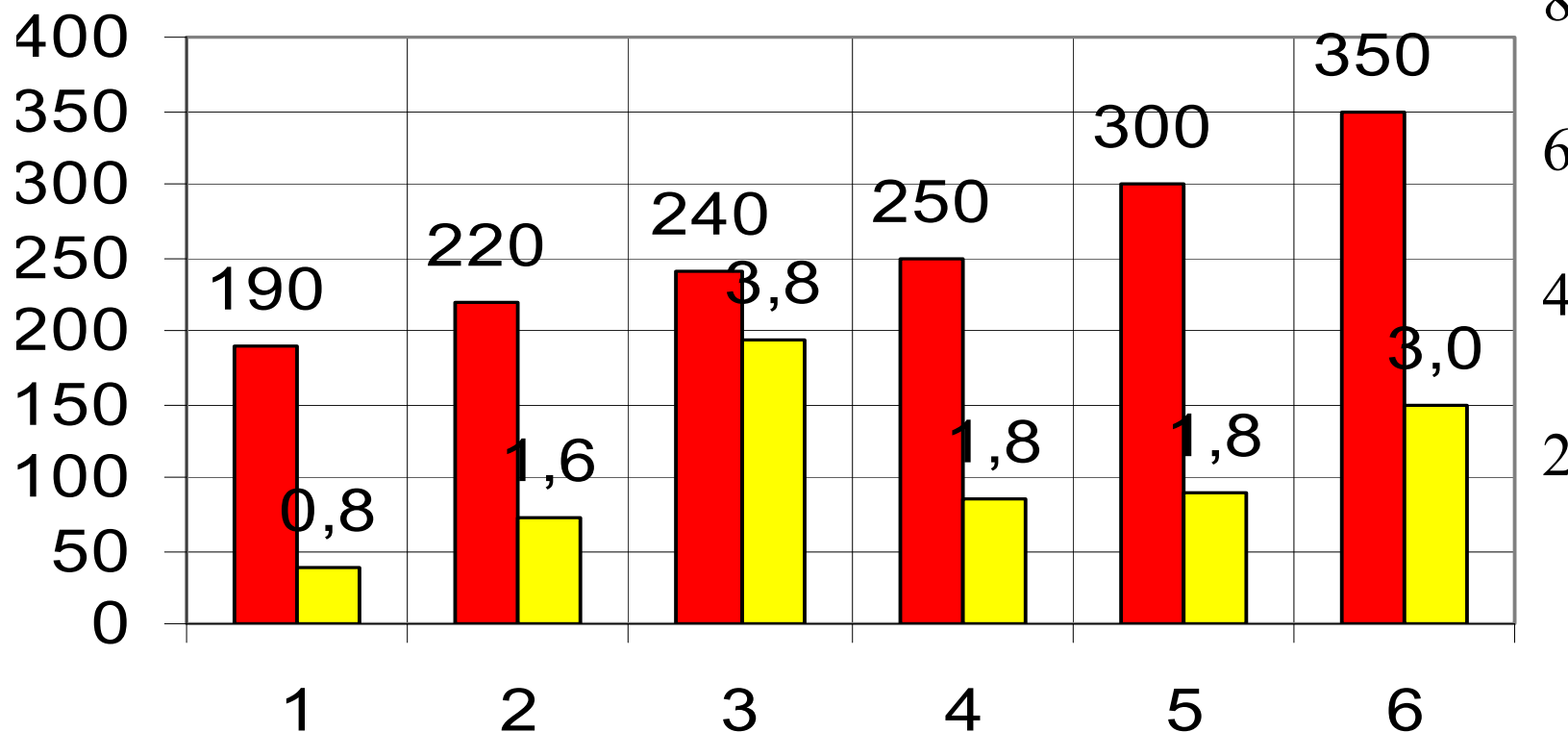
1 - Line of evtektik,
2 - line of kvazibinar section α -Al - Mg_2Si



Properties of a new aluminium alloy after different methods of treatment

σ, MPa

$\delta, \%$



1- casting in kokil;

2- casting in kokil+vodorodnaya is treatment;

3- casting in kokil+reguliruemoje pressure;

4- casting in kokil+ vibration-gidro-circulation is treatment;

5- casting in kokil+T/O on the mode of incomplete senescence;

6- casting in kokil+vibrogidrotsirkulyatsionnaya obrabotka+T/O on the mode of incomplete senescence



The poured purveyance of corps of block of cylinders from a new aluminium alloy





Conclusions on results the researches

1. Correlations of properties of alloys with the lines of diagram of the state are set.
2. In the range of the explored concentrations (Si–2÷ 6%;Mg–5÷ 15%) regions are set with the level of durability to 300 MPa and level of the module of resiliency 120000 MPa.
3. Diagrams are built composition - structure - property of alloys of the base system Al – Si – Mg with the additional complex of alloying and modification.
4. The diagrams of disintegration of hard solution on the basis of aluminium for experimental alloys are built
5. После heat treatment on the mode T6 durability of alloy arrives at 300 MPa, at lengthening 1,8%.
6. At the use of external power influence on the crystallized fusion durability of alloy arrives at 350 MPa, at lengthening 3,0%.
7. Casting properties of alloy provide the high-quality founding of corps of block of the combustion engine cylinders.