Materials of Conferences

THE LOADING – TRANSPORT COMPLEXES FOR THE UPLAND OPEN CUTS OPTIMAL AND EFFICIENT TYPES CHOICE

Volkov E.C., Plyutov Yu.A.
The Siberian Federal University

At present, the road transport in complex with the excavators or the bucket loaders are being used mainly on the world's upland open cuts. Its exploitation is being characterized by the high level energy content (e.g. by the large fuel consumption), by the cargo transportation considerable prime cost, by the difficult routes, and by the environmental pollution. The aerial cable – aerostat transport systems, which will be able to be provided the complete energy autonomy of the work by the shortest way over the surface, are suggested to be used by us, as the alternative. For all this, the high work standards and the good performance by the energy efficiency and the transport works ecology will be achieved.

The existing and the suggested upland open cuts' transport systems comparison is being carried out by the efficiency measures and the performance criteria, which are being defined during the mathematical – economically modeling on the PC. The cargo transportation prime cost, the energy specific consumption, the efficiency, the reliability indices and also the ecological qualities and characteristics are being related to all these criteria. The already developed mathematical – economically model is being provided, as the optimal (e.g. by one efficiency criterion), well as the rational (e.g. by efficiency measures and the performance criteria aggregate) versions. So, the preliminary calculations and the pre-designs have been shown, that the aerial cable – aerostat transport plants, in comparison with the motor transport have, in general, less its prime cost and the energy specific consumption, but and they have less efficiency, and also the low level technical availability for the service coefficient. The loading – transport complex with the aerial cable – aerostat gravitational plant (e.g. the cargo transportation distance has been varied from 1,5 up to 8 km in the different transport schemes) is the efficient one for the upland open cuts, having had the annual production rate from 0,2 up to 2,5 mln. tons and the transported cargoes apparent density from 1,5 up to 2,5 t/m^3. The upland open cuts' efficient transport scheme choice methods are being developed on the basis of the received and the final results.

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THE NEW WAY OF DIRECION OF THE COMPLETES OF REVERSIBLE GATED TRANSFORMER

Magazinnik L.T.
Ulianovsk state technical university
Ulianovsk, Russia

Nowadays the way of combined direction of gated completes of m-phase reversible transformers at the IGBT, MOSFET transistors and thyristors with an artificial commutation is widely used at the transforming technics. The realization of idea of combined conformed direction is possible without revealing of not only average, but also momentary components of tension and current at the equalizing circuit, which includes the necessity at the equalizing reactors both in statistic and dynamic modes of working of transformer. But it should be recognized that this result is observed only in condition of momentary commutation of phase currents. At the real schemes of transformers of such type owing to final duration of commutations at the equalizing circuits there can develop commutative equalizing currents, the limitation of which requires saving at the mentioned circuits the current-limiting reactors, but with rather less inductance. Therefore, the carrying out of these transformers at the general case can be carried out not only by counter-parallel, but also by other known schemes of connection of gated completes, which are used while the combined direction for decrease of quantity of mentioned reactors.

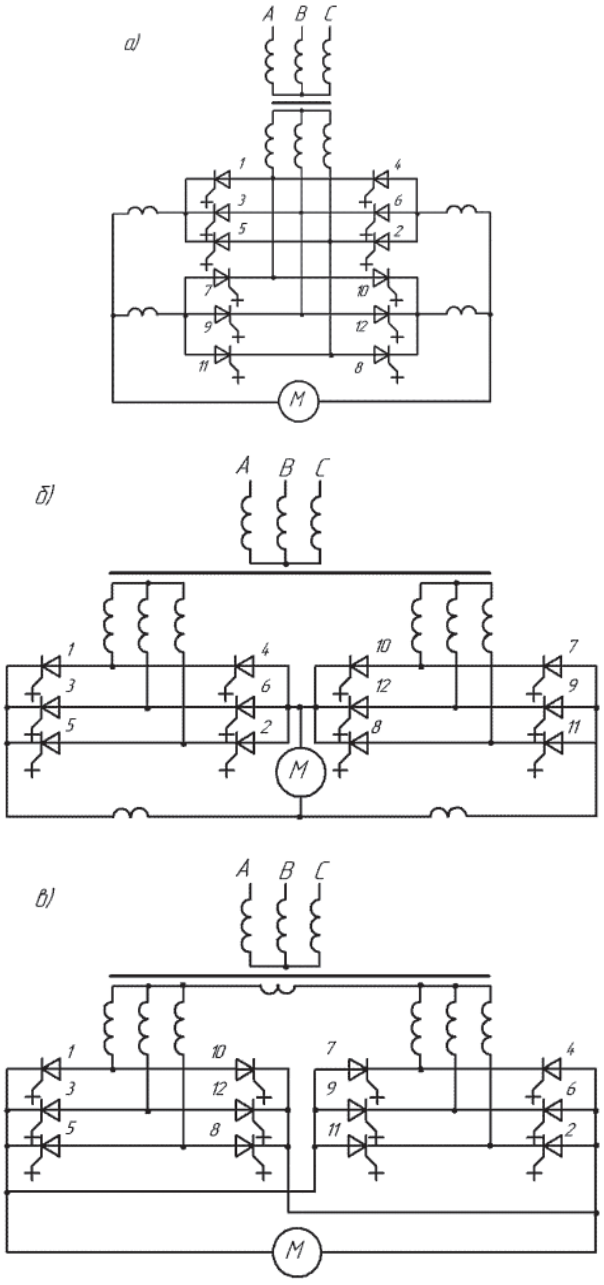
And with it at the transformers of this type for improvement of dynamic and energetic indicators more often use there are ways of regulation at the base of high-frequency methods of modulation with repeated switching of each valve at the period of network tension begun to receive. While this, the carrying out of two-completed transformer is possible not only by counter-parallel, but also by cross and as it's called N-scheme of straightening [1]. Therefore it's reasonable to spread the idea of combined direction of gated completes without equalizing currents at the rest of known variants of carrying out of two-completed reversible transformers at two-operating valves independently from the force scheme and accepted law of modulation.

For it at the general case there is supposed simultaneous giving of unlocking impulses to next

valves of both of completes, switching of which leads to the connection of the circuit of load with the same phases of circuit or repeated winding of strengthening conforming transformer in the sequence, which is depend on accepted ways of modulation while the regulation and number of switching the valve at the period of line voltage.

The realization of this way is possible only in three variants, subject to the connection of valve completes at the strength scheme of reversible transformer (picture).

The first variant is intended for the use at the transformers, which were carried out at the base of counter-parallel connection of two valve completes, one of which has depending on accepted scheme of straightening one or several cathodic or anodic valve groups, which let go pass the current of load at the positive direction, and other complete has equal number of antiphased to the mentioned valve groups, which let go pass the current of load at the negative direction. The way is differ by its simultaneous independent from the direction of the current load giving of unlock impulses to the next valves of first complete and antiphased to the mentioned valves of second complete, which are connected to the same phases of net of second winding of two-winding conforming transformer.



The second variant is intended for the use at the reversible transformers, which were carried out by the cross scheme of connecting of two valve completes, every of which consist in valve groups, which let go pass the current of load at one direction with the use of three-winding matching transformer, which contains two repeated windings, voltage in which depending on direction of winding can be at the phase of at the antiphase to each other. This way is differ by simultaneous giving of unlock impulses to next valves in composition of valve groups of first complete, which are connected to the lead of one of the repeated winding, and also depending on the scheme of connection of repeated windings of transformer or to the antiphased to the mentioned valve groups of second complete, which are connected to the leads of other repeated winding of transformer, the voltages in which change in phase to the mentioned or at the of the same name of mentioned valve groups of second complete, which are connected to the leads of other repeated winding, voltages in which change in antiphase to the voltage of mentioned winding.

Third variant is invented for use in N-scheme, which contains three-winding transformer with combined with the help of reactor average points of two similar repeated windings and two valve completes, the half of valve group of each of which is connected to the leads of one, and other half to the lead of other of mentioned windings. This way is differ by simultaneous giving of unlock impulses to the next valves in the composition of dissimilar valve groups of first complete, which are connected to the leads of different repeated windings, and also to the valves of second complete, which are in the composition of antiphase to the mentioned valve groups, which are connected into a parallel to the same repeated windings of transformers.

Therefore, offered way of direction in all mentioned variants of carrying out of strength scheme leads to the similar positive result – the full removal in conditions of momentary commutation of equalizing voltage and current in static and dynamical modes of work of transformer. This behavior allows to guarantee the combination of qualities of combined and separate direction, and more exactly to except from the composition of transformer the equalizing reactors while the saving of momentary readiness to the change of mode of work, which removes the possibility of appearance the interrupted current of load.

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OVERALL INDUSTRIAL EQUIPMENT EFFECTIVENESS

Matyukhin P.V., Markov V.O., Rabunets P.V.
Belgorod state technological university by V.G. Shukhov Belgorod, Russia

Overall Equipment Effectiveness (OEE) is one of the most important indices reflecting a degree of equipment maintenance effectiveness in industrial enterprises.

Most industrial enterprises despite of a character of their production have a problem of low effectiveness of equipment operation. The problem is characterized by occurrence of everyday losses resulting from downtime and unforeseen stoppages of equipment, speed decrease of product treatment and faulty units manufacture.

There is a technique of overall equipment effectiveness assessment which is considering the influence of the above mentioned losses and allowing to fully analyze equipment operation both at particular procedures and within a framework of the whole production cycle [1].

The overall equipment effectiveness is calculated by the following technique:

OEE= readiness × output × quality × 100%,

where: readiness – is a ratio of net production time of the item by an equipment to a total time of production cycle;

output – is a ratio of actual output to a scheduled production output;

quality – is a ratio of number of quality products to a total quantity of manufactured goods.

The analysis of overall equipment effectiveness assumes that factory personnel are involved in a permanent monitoring and registration of indices which reflect current equipment condition and production process. Overall equipment effectiveness is a balanced index which allows to optimize production process resulting in optimal output capacity of the equipment and high quality of the manufactured goods that is, to our opinion, of necessity to many industrial enterprises.

References

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