CAD IN DESIGN OF ELECTRIC DRIVE

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At the beginning we would like to ask a question – what is the most important thing for you? Time! Time which is not enough for work and rest! It is required in contemporary life practically for all things. But, automatization offers the possibility to save time. We will show you how to do it.

Examples of time saving

In our days, calculative programs are used for reducing time for design. We would like to make an advice for you to use at the beginning of the design and creation of math models, some calculative programs (for example MathCAD). It can help us to generate calculative procedure; there we can obtain optimal results by changing some parameters. Results can be got practically instantly instead of handmade calculations. MathCAD helps us to eliminate huge amounts of calculations. We would like to show statistic data obtained from course project (electric drive AIR IP23).

Table1. Time - needed for calculations.

Type of calculation	Time in hours for calculation (%), approximately in group depending from difficulty of course project.			
	25	50	75	100
Hand made	1,5	3,5	6	9
MathCAD	0,5	1	2,5	4
	Time in hours for recomputation (%), approximately in group depending from difficulty of course project.			
	75	50	25	
Hand made	0,5	1	3	
MathCAD	0,00018	0,00037	0,00056	

Time for recomputation
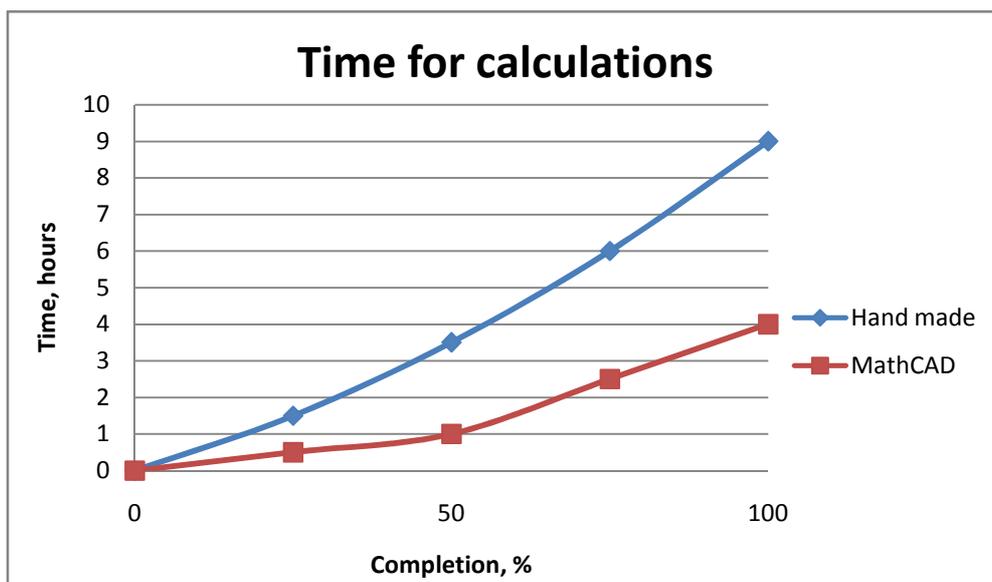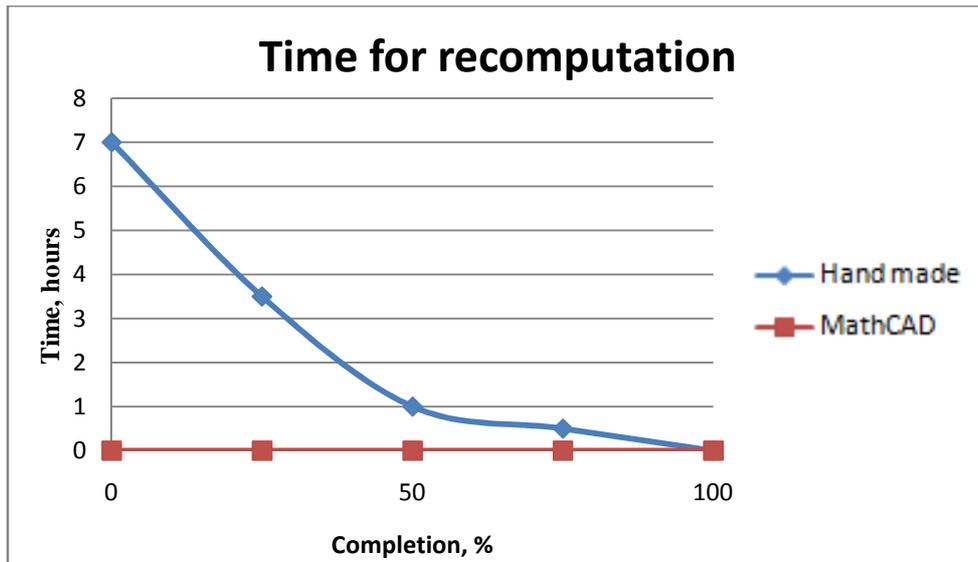
MathCAD greatly reduces calculation time and can reduce recomputation time greatly!

First, we design model with obtained calculation data. Model helps us to check data and steady-state/dynamic parameters. Mat Lab is used for simulation. For simulation Mat Lab are needed one and the same measuring units. Second step, all model parameters are evaluated. It should be noted that all drive models are well known and widely used. We haven`t got any problems while simulation is proceeding. We can obtain the optimal result changing one parameter, whole block or part (mechanical part, energy transformer like a PWM or ordinary thyristor switch). Simulation offers the possibility which greatly reduces fixed costs and time for design.

We would like to show another example of using CAD systems. When we design executive part we design control system. Now MCU systems are widely used for electric drives control. It is mounted on one or more plates. It is known that plate design demand great quantity of time. CAD system "TopoR" (**Topo**logical **R**outer) gives the possibility to reduce design time.
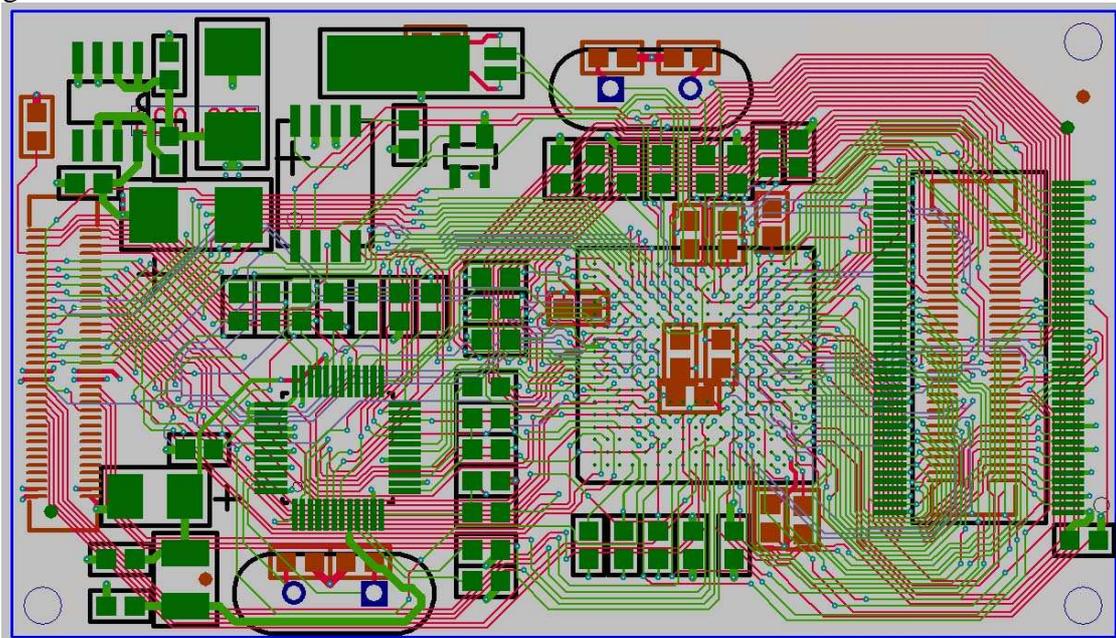

Fig. 1 Plate is routed by hand for 2 weeks. Quantity of sockets equals 510; routes length is 6.5 meters.
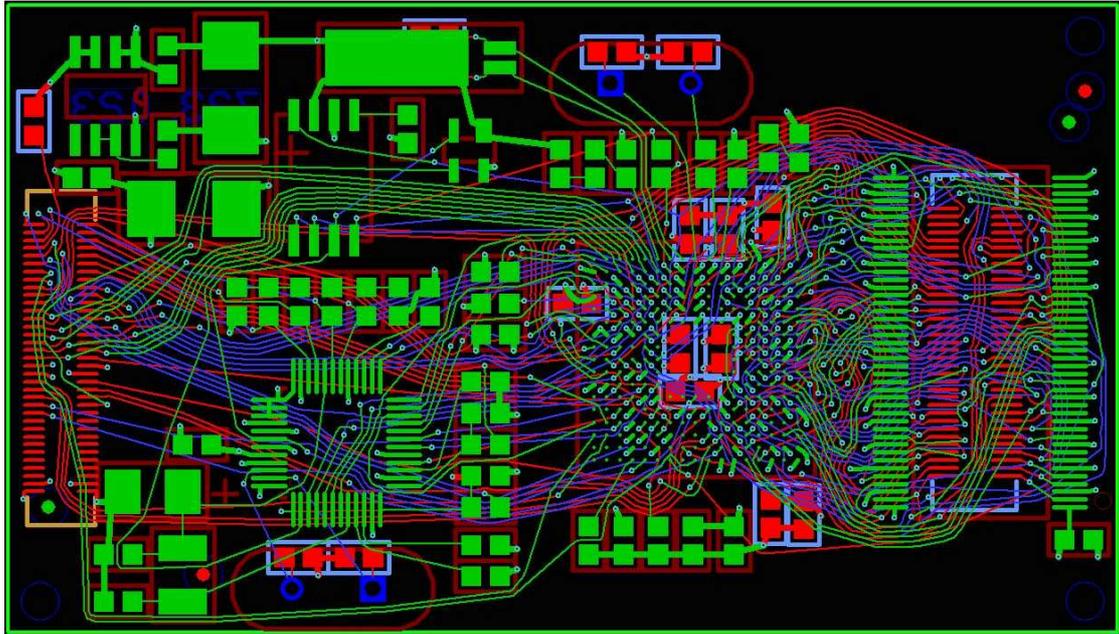
Fig. 2 Plate is routed by CAD "TopoR" for 1 hour (20 min is auto routing and 40 min is hand editing). Quantity of sockets equals 432; routes length is 5.11 meters.

One hour and two weeks – difference is great!

But all this CAD systems have one disadvantage – it is cost.

Conclusion

It goes without saying future of design is in using CAD systems. One can reduce all types of costs by developing these systems further. Time is economized with CAD, automatization can be used for rest or work.