

Postgraduate Master Study Program – N2301 Mechanical Engineering

Branch of study: Manufacturing systems and processes Specialisation: Manufacturing systems

Manufacturing systems

Topics of professional debate for state final exam

1. Output characteristics of the manufacturing systems (ROI, VAindex, Throughput, lead production time, OEE etc.)
2. The modern principles of manufacturing systems management and differences between them (Pull systems, Lean, Theory of Constraints)
3. The Concurrent engineering - purpose and basic principles, Problems to be solved by each method (QFD, FMEA, Reverse engineering etc.).
4. Design of the manufacturing systems – the principles of material and information flow design, difference between technology, product and production cells organization of workplaces, Theory of supplies, Theory of queues, Motion studies MTM and MOST. Work Ergonomic, Triangle and Craft layout planning. The use of capacity equations for design of manufacturing systems.
5. Tools of the project management – DMAIC, SMART, SIPOC, VOC – Kano model, , Ishikawa Diagram, Brainstorming a Brainwriting, Critical path method (CPM a PERT)
6. Tools of the manufacturing systems analysis – Pareto analysis, ABC and YXZ analysis, VSM, Spagetty diagram, Sankey diagram, Workday timesheet, Momentary observation, Stop watch method, Multi-criteria decision making and variant evaluation (qualitative and quantitative).
7. Tools of improving manufacturing systems – 5S, SMED, POKA-YOKE, 8 types of waste, Visualization (Andon).
8. Computer simulation – The Simulation project work steps, discrete and continues simulation, benefits and expenses of computer simulation, Validation and verification of simulation project, DOE, basic elements of manufacturing systems simulation models.
9. The planning of manufacturing systems – Technical preparation of manufacturing (Technological procedures, Bill of material processing, Enterprise resource planning (ERP), Due date planning (MRP-I, MPS, product costs), Capacity planning (Capacity equations and MPR- II), Shot term planning and scheduling.
10. Management of the manufacturing systems – MES and WMS systems, automatic identification systems, Kanban, Drumm-buffer-rope, Shopfloor management (manufacturing indicators)
11. The application of artificial intelligence in the manufacturing systems – Neural Networks, Evolution algorithms, Robot movement control and path finding methods, Image and sound recognition. Speech Synthesis.
12. Trends in the field of manufacturing systems– CIM – Cax (CAD, CAM, CAQ, CAPP, CAE aj.), Industry 4.0, Virtual nad agumented reality, real time simulations etc.