



UNIVERSITATEA DIN ORADEA
FACULTATEA DE INGINERIE MANAGERIALĂ ȘI
TEHNOLOGICĂ

Str. Universității, nr. 1, pavilion B, cod poștal 410087, Oradea, jud. Bihor, România
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Departamentul de Mecatronică

Contest topics
Position no. 7 -Associate Professor

1.FLEXIBLE MANUFACTURING SYSTEMS

1. General structure of manufacturing systems
2. Concept of 'system'.
3. Mathematical model of a system.
4. Coupling matrix. Structure matrix.
5. Material, energy and technological information flows.
6. Mechanical transmissions used to drive robots
7. Development of the overall design of the SFF
8. Choice of the processing subsystem
9. Choice of handling subsystem.
- 10.** Control system architecture of a flexible manufacturing system.

References:

1. Tarca R., Sisteme de fabricație flexibilă, Lito Universitatea din Oradea, 2010
2. Cojocaru G; Kovacs Fr – Roboți în acțiune – Ed. Facla, Timișoara, 1986.
3. Abrudan, I., Sisteme flexibile de fabricatie, Ed. Dacia, Cluj-Napoca, 1995.
4. D. Catrina, G. Carutasu, N. Carutasu, A. Totu, C. Cotet, A. Dorin, S. Velicu, Sisteme flexibile de productie, Universitatea Politehnica Bucuresti, 2008
5. S. Viorel, Roboti industriali. Aplicatii. Volumul I, Editura: Editura Universitaria, 2003
6. N. Jha, Handbook of Flexible Manufacturing Systems, Editor: Academic Press, 2012
7. Hasan M.A, Sarkis J, Shankar R. Agility and production flow layouts: an analytical decision analysis. Computers and Industrial Engineering 62(4):898–907, 2012;
8. Raouf A., Ben-Daya M., Flexible Manufacturing Systems: Recent Developments, Elsevier, 1995
9. Tollio Tolio (editor), Design of Flexible Production Systems, Methodologies and Tools, Springer-Verlag Berlin Heidelberg 2009

2. PROGRAMMABLE LOGIC CONTROLLERS

1. Structure of programmable controllers
2. Input modules
3. Output modules
4. Programming languages for Programmable Logic Controllers
5. Data and variable types
6. Ladder diagram (LD) language
7. Counters and timers
8. Instruction List Language (IL)
9. Structured Text (ST) language
10. Sequential function chart language



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References:

1. Adrian Moise - Automate programabile de tip industrial, Editura Matrix Rom, 2010, ISBN 978-973-755-622-6
2. Daniel Popescu - Automate programabile: construcție, funcționare, programare și aplicații, Editura MatrixRom, 2005, ISBN 973-685-942-8
3. Karl-Heinz John, Michael Tiegelkamp, IEC61131-3: Programming Industrial Automation Systems, Springer Verlag Berlin Heidelberg, ISBN 3540677526
4. Mărgineanu Ion - Automate vectoriale - curs, Universitatea Transilvania din Brașov, 2007
5. Hugh Jack - Automating Manufacturing Systems with PLCs - Version 4.7, April 14, 2005) Copyright (c) 1993-2005 Hugh Jack
6. R. W Lewis (2001) Modelling Distributed Control Systems Using IEC 61499.

3. SENSORS AND SENSOR SYSTEMS

1. Classification of sensors
2. Sensor characteristics and performance
3. Signal acquisition and processing systems
4. Inductive and magnetic sensors
5. Resistive sensors
6. Optical and visual sensors
7. Optical encoders
8. Fibre optic sensors
9. Bimetallic, thermoelectric and piezoelectric sensors.

References:

1. Borenstein J., s.a. – Sensors and methods for mobile robot positioning, Univ. Michigan, 1996, <http://www.iau.dtu.dk/ancona/385partwhereami.pdf> .
2. Peter Corke, Robotics, Vision and Control, Fundamental Algorithms in MATLAB®, ISBN 978-3-642-20143-1, Springer-Verlag Berlin Heidelberg 2011.
3. Costin Cepișcă, Nicolae Jula – Traductoare și senzori, Editura ICPE, București 1998, ISBN 973-98322-5-3
4. Ciobanu Lucian – Tratat de inginerie electrica: senzori si traductoare, Editura Matrix Rom Bucuresti, 2006 ISBN 987-983-755-125-2
5. Florin Mihai Tufescu - Dispozitive și circuite electronice (II), Editura Universității "Al.I.Cuza ", 2002
6. Adriana Teodora Manea, Laurențiu Claudiu Manea – Mecatronica automobilului modern, vol.2, Editura Matrix Rom București, 2000 ISBN 973-685-097-8
7. Nicolae Marius Bârlea – Fizica senzorilor, Editura Albastră Cluj-Napoca, 2000, ISBN 973-9443-42-7



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4. FLEXIBLE PROCESSING SYSTEMS

1. General structure of processing systems
2. Conditions of serial processing
3. Flexible processing conditions
4. Suitability of means of production for flexible series processing
5. Conditions for automatic operation
6. Robotics concepts for flexible machining systems
7. Typical layout solutions of flexible machining systems in which the robot manipulates OL
8. Typical layout solutions of flexible machining systems where the robot manipulates the tool or tool-head
9. Layout of a system for palletising/depalletising operations
10. Layout synthesis.

References:

1. M. Ganea, I. Mihaila, C. Ganea, O. Gane- Prelucrarea flexibila a pieselor prismatice pe masini unelte si sisteme flexibile de productie : Vol. 1 : Modulul de baza si organologia specifica masinilor unelte din categoria flexibila (2000)
2. M.Ganea, I. Mihaila, C. Ganea, O. Prelucrarea flexibila a pieselor prismatice pe masini unelte si sisteme flexibile de productie (2000)
3. Walter Terkaj, Tullio Tolio, Anna Valente (auth.), Tullio Tolio (eds.), Design of Flexible Production Systems: Methodologies and Tools, Springer-Verlag Berlin Heidelberg, Year: 2009, ISBN: 3540854134,9783540854135
4. Professor Dr. Tadeusz Sawik (auth.) Production Planning and Scheduling in Flexible Assembly Systems, Springer-Verlag Berlin Heidelberg, 1999,ISBN: 978-3-642-63666-0,978-3-642-58614-9
5. Tarca R., Sisteme de fabricație flexibilă, Lito Universitatea din Oradea, 2010
6. N. Jha, Handbook of Flexible Manufacturing Systems, Editor: Academic Press, 2012
7. Hasan M.A, Sarkis J, Shankar R. Agility and production flow layouts: an analyticaldecision analysis. Computers and Industrial Engineering 62(4):898–907, 2012

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