THE STUDY OF DEAD LOCK DETECTION AND PREVENTION IN FLEXIBLE MANUFACTURING SYSTEM BASED ON OBJECT ORIENTED PETRI NET GRAP

趙柏鴻、王中行

E-mail: 9018509@mail.dyu.edu.tw

ABSTRACT

PETRI NET (PN) THEORY WAS ORIGINALLY DEVELOPED BY DR.PETRI IN HIS PH.D.DISSERTATION IN 1962. BASICALLY , IT IS A GRAPHIC SOLUTION FOR DEALING SYSTEM OPERATION. THE PN EQUIPS BOTH FUNCTIONS OF ANALYSIS AND SIMULATION. PN IS ORIGINALLY USED IN COMPUTER SCIENCE FOR ANALYZING THE COMPLEX OPERATIONS IN COMPUTER. IN RECENT YEARS , PN IS USED IN FLEXIBLE MANUFACTURING SYSTEM, INFORMATION TRANSMISSION AND ELECTRONIC CIRCUITS…… ETC. IN THIS PAPER, PN GRAPH IS BUILT TO MODEL AND ANALYZE THE FLEXIBLE MANUFACTURING SYSTEM. FIVE GOALS ARE ACHIEVED. (1) TO DETECT THE DEAD LOCK PHENOMENON BY LIVENESS PROPERTY OF PN.(2) TO CHECK SYSTEM PROPERTY BY P-INVARIANT AND T-INVARIANT. (3) TO DETERMINE SYSTEM WHETHER THERE IS EXISTING CYCLE OR PARALLEL STRUCTURE. (4) TO BUILD A CYCLIC MANUFACTURING SYSTEM BY TIMED EVENT GRAPH FOR OPTIMAL LINEAR PROGRAMMING EFFICIENCY. (5)DIFFERENT TIMED PETRI NETS MAY HAVE ISOMORPHIC STATE GRAPHS, WHICH SIMPLIFY A HUGE AND COMPLICATED SYSTEM. BY USING PN TO ANALYZE AND VERIFY FLEXIBLE MANUFACTURING SYSTEM IS A SPECIFIC AND CONVENIENT METHOD.

Keywords : PETRI NET, LIVENESS, P-INVARIANT AND T-INVARIANT,FLEXIBLE MANUFACTURING SYSTEM

Table of Contents

REFERENCES

1 W.M.ZUBEREK AND W.KUBIAK,TIMED PETRI NETS IN MODELING AND ANALYSIS OF SIMPLE SCHEDULES FOR MANUFACTURING CELLS , COMPUTERS AND MATHEMATICS WITH APPLICATIONS 37(1999). 2 F.D.J.BOWDEN,A BRIEF SURVEY AND SYNTHESIS OF THE ROLES OF IN PETRI NETS , MATHEMATICAL AND COMPUTER MODELLING 31(2000). 3 JIE.WU AND HANQI ZHUANG,A PETRI NET BASED COLLISION AND DEAKLOCK AVOIDANCE SCHEME FOR FMS,1995.IEEE. 4 KELWYN A.D'SOUZA AND SURESH K.KHATOR , SYSTEM RECONFIGURATION TO AVOID DEADLOCKS IN AUTOMATED MANUFACTURING SYSTEMS,COMPUTERS IND.ENGNG VOL. 32.NO.2.PP.455-465.1997. 5 ALAN A.DESROCHERS AND ROBERT Y.AL-JAAR, APPLICATIONS OF PETRI NETS IN MANUFACTURING SYSTEMS,1994. 6 M.AJMONE MARSAN ,G.BALBO , G.CONETE , MODELLING WITH GENERALIZED STOCHASTIC PETRI NETS,1992. 7 JEAN-MARIE PROTH AND XIAOLAN XIE,PETRI NETS,A TOOL FOR DESIGN AND MANAGEMENT OF MANUFACTURING SYSTEMS.1996. 8 F.DICESARE,G.HARHLAKIS,J.M.PROTJH ,MSILVA.F.B.VERNADAT, PRATICE OF PETRI NETS IN MANUFACTURING.1993. 9 ENESTO LOPEZ-MELLADO , SIMULATION OF TIMED PETRI NET MODELS.1995 IEEE. 10 YIGANG CAI, TAKASHI SEKIGCHI , A METHOD FOR STRUCRAL ANALYSIS OF PETRI NET.1993IEEE. 11 PARTHA RAMACHANDRAN AND MANJUNATH KAMATH, ON PLACE INVARIANT SETS AND THE RANK OF THE INCIDENCE MATRI OF PETRI NETS,1998 IEE. 12

N.VSWANADHM AND Y.NARAHARI, DEADLOCK PREVENTION AND AVOIDANCE IN FLEXIBLE MANUFACTURING SYSTEMS USING PETRI NET MODELS,1990 IEEE. 13 JENSEN.KURT,COLOURED PETRI NETS:BASIC COMCEPTS.ANALYSIS METHODS AND PRACTICAL USE,1995. 14 吳豐誠，PTRI NET之研究及其在彈性製造系統設計上之應 用，國立清華大學，工業工程所，1991。 15 邱萬德，以派屈網路結構及經驗搜尋法則應用於彈性製造系 統之死鎖避免的生產排程，國立海洋大學，電機工程所,1998。 16 李柏成，以硬體方式輔助派翠網之執行作業，大葉大學，電 機工程所，民國八十八年。 17 林維新、林勝賢，彈性製造系統，全華科技圖書股份有限公司民國78年。