

Comparative analysis of the industrial robot application in Europe and Asia

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Abstract— In this paper is analysed industrial robot application in the World by the continents: America, Europe, Asia-Australia and Africa. Comparative analysis and the cross section of industrial robot application in manufacturing processes in European and Asian countries were performed. Given analysis for these two continents was performed only for the developed countries of these continents. For Europe, analysis of industrial robot application was performed only for Germany and France, while for Asia analysis was performed for Japan and the Republic of Chorea. Estimation of the total and the annual industrial robot application is also presented in this analysis. Planned industrial robot application in the next two years is also given. Based on analysis it can be concluded why large discrepancies of industrial robot application in Europe and Asia exist.

Index Terms— robot, industrial robot, robot application, manufacturing process

I. INTRODUCTION

Application of the robots in industry, year after year is increased. The constant growth of the robot application is related for its functional justification. There are plenty reasons for it as worker's protection in bad working conditions and environments or worker's protection by hard works, time saving, higher quality, higher productivities, cost saving etc. Industrial robots are applied in all branches of the industries [3,4]. Their use is still the largest in the manufacturing of motor vehicles industry but other industry branches record increase of industrial robot implementation. Information technology development has a big influence on changes in robotics that lead to the new functional solutions and the robot capabilities. A variety of industrial robots are designed for performing special tasks. Industrial robot application in the world by the continents is a variable and for that exist a

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number of reasons. In this paper industrial robot application is analysed for the two continents Asia and Europe. Also comparative analysis by the countries of these continents will be presented [1,2,4,15].

II. INDUSTRIAL ROBOT APPLICATION IN ASIA AND EUROPE

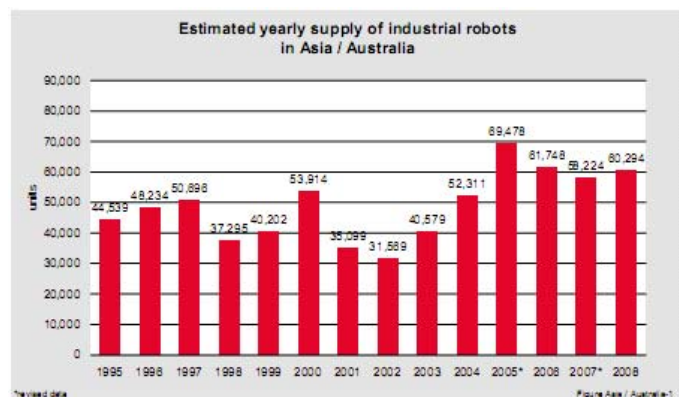
Number of units of supply and operational stock of multipurpose industrial robots in European Union, Rest of Europe, Asia-Australia is a given in Table 1 [1,2]. Source of data presented in tables and diagram figures are International Federation of Robotics (IFR), United Nations Economic Commission for Europe (UNECE) and Organisation for Economic Co-operation and Development (OECD). This analysis should point to a difference of industrial robot applications in production processes in Asia and Europe.

TABLE I

YEARLY SUPPLY AND TOTAL AMOUNT OF INDUSTRIAL ROBOTS IN PERIOD 2008/2009 AND FORECAST FOR PERIOD TO YEAR 2012. [1]

CONTINENT	Yearly supply of industrial robots			Total amount of industrial robots		
	2008	2009	2012	2008	2009	2012
ASIA-AUSTRALIA	60.294	35.900	54.000	514.914	509.000	523.000
EUROPE	35.066	22.600	34.200	343.700	346.100	357.300
TOTAL Σ	95.360	58.500	88.200	858.614	855.100	880.300

Asia/Australia



Europe

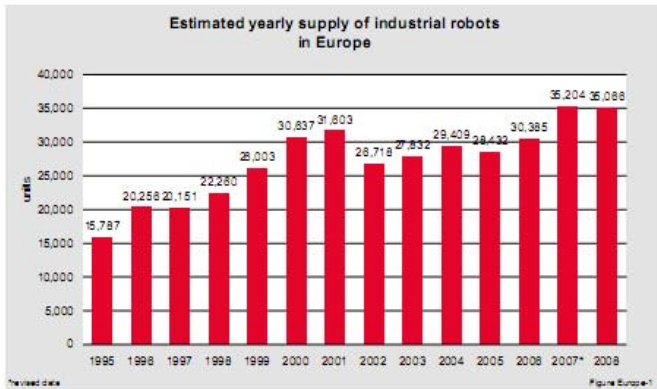
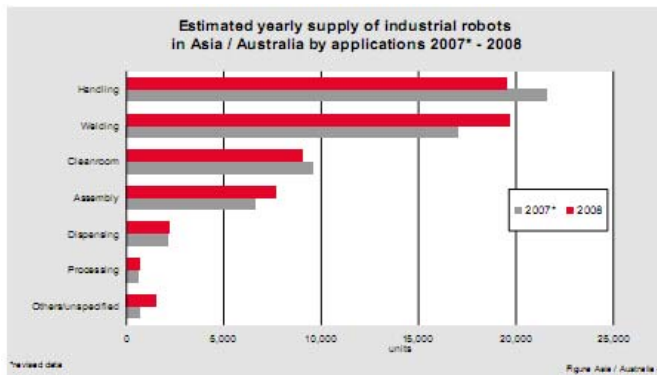


Fig. 1. Estimated yearly supply of industrial robots in Europe and Asia/Australia

Asia/Australia



Europe

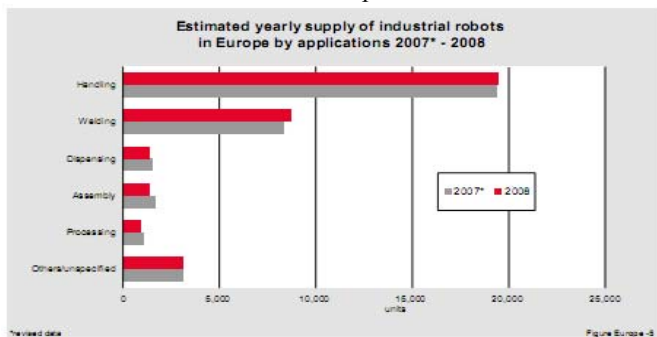


Fig. 2. Estimated yearly supply of industrial robots by application areas in Asia and Europe

Analysing previous Table 1, Figure 1 and Figure 2 shows increasing trends of applying of industrial robots in Asia in period of time 2001/2005. After 2005 trend were down in applying of industrial robots in Asia, but after 2008 number of units installed in Asia is constant. In Europe increasing trend in applying of industrial robots is evidenced to the 2001, and after that were stagnation. After 2008 slow increasing is evidenced [1,12,13,14]. Total amount of the industrial robot application in Asia is larger then in Europe for 50% as Table 1 shows.

III. INDUSTRIAL ROBOT APPLICATION IN CERTAIN COUNTRIES OF ASIA AND EUROPE

Analysis of application of the industrial robots in Asia and Europe has been performed only for certain countries in these two continents. Main criteria for electing certain countries were motor vehicles industry development. This industry branch has the greatest impact to industrial robot application. For analysis were elected followed countries: Japan, Republic of Chorea, Taiwan, Germany, France, Italy and Spain. Next figures show diagrams of application of the industrial robots in previously mentioned countries [1,2,4].

Japan

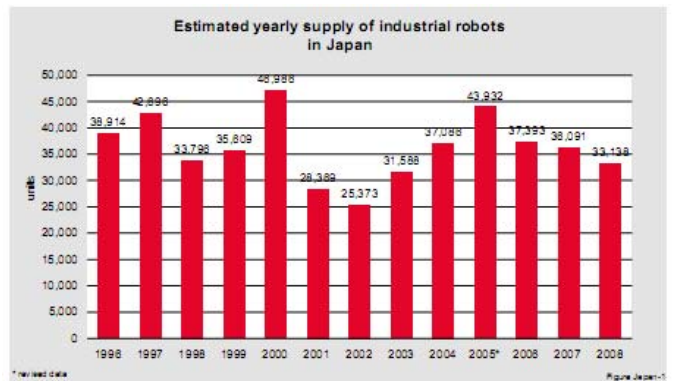
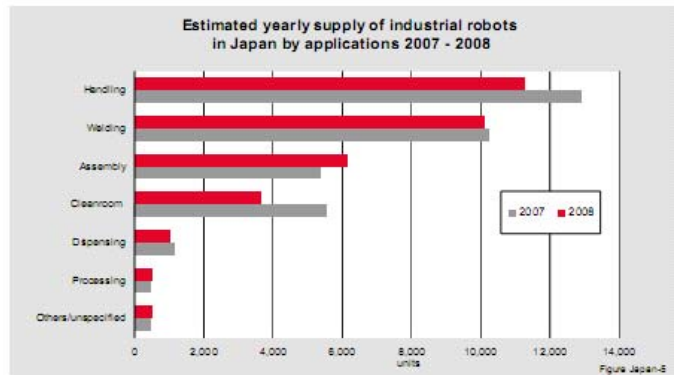
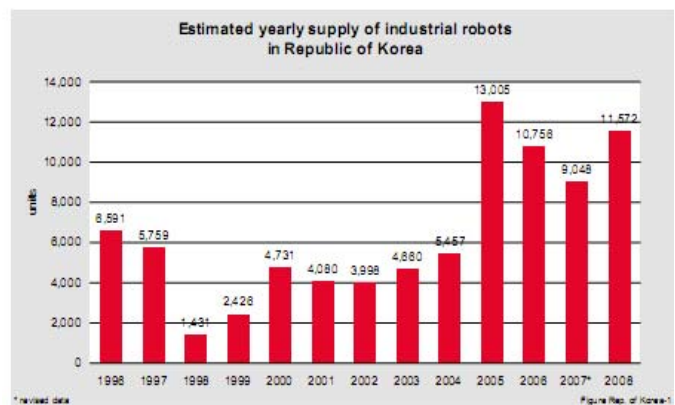


Fig. 3. Yearly supply of industrial robots in Japan

Republic of Chorea



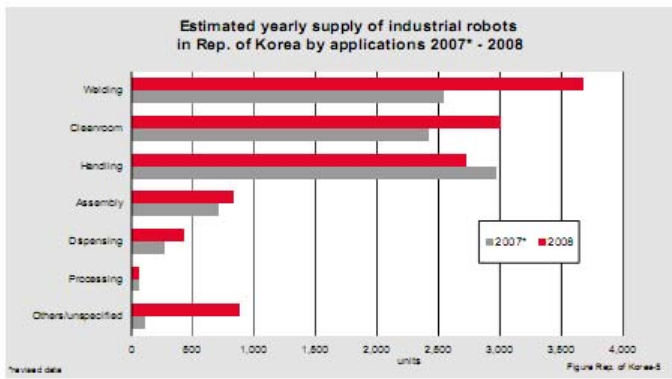


Fig. 4. Yearly supply of industrial robots in Republic of Chorea

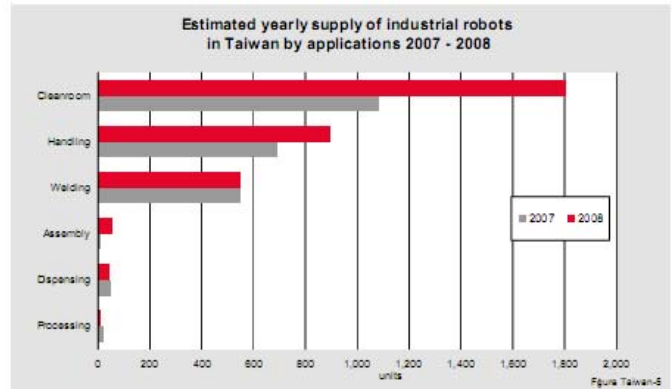


Fig. 6. Yearly supply of industrial robots in Taiwan

Malaysia

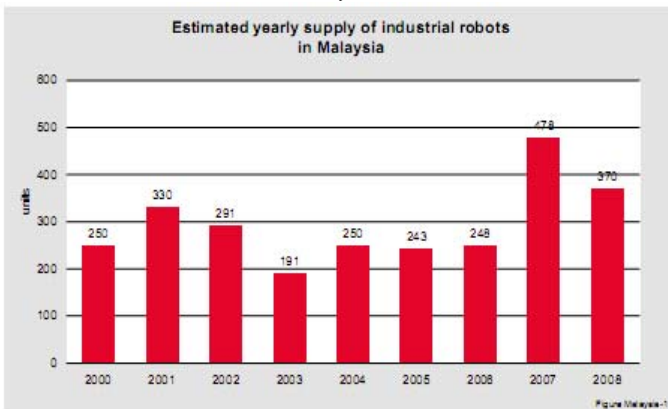


Fig. 5. Yearly supply of industrial robots in Malaysia

Germany

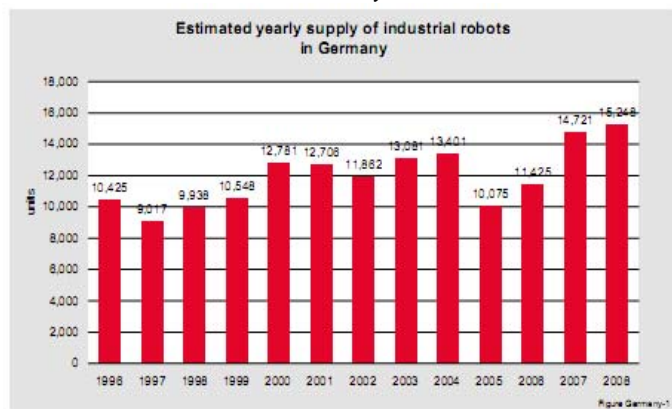
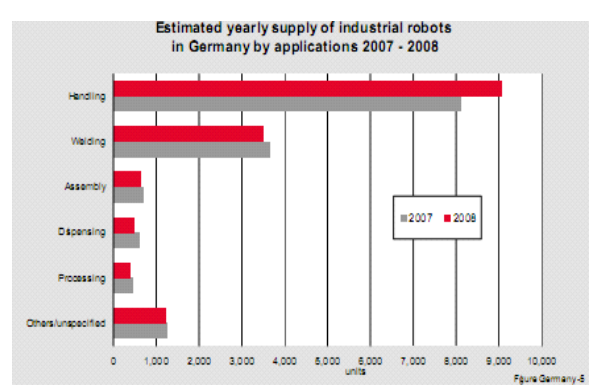
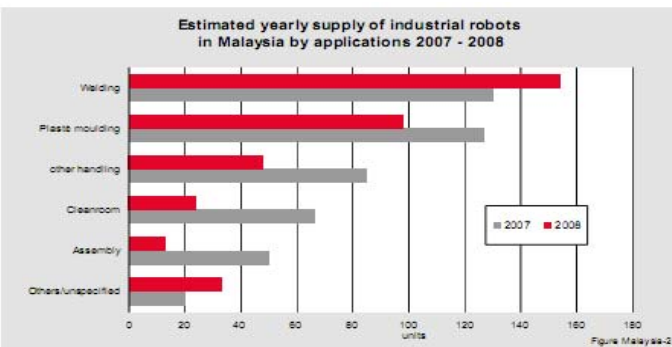
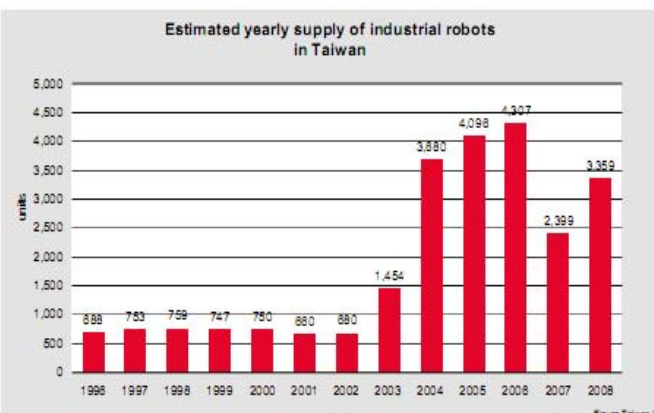


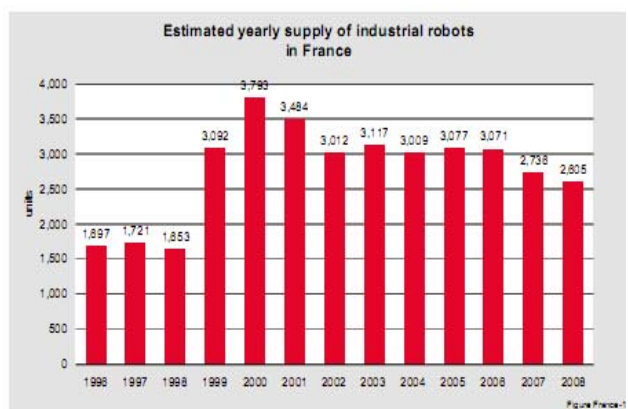
Fig. 7. Yearly supply of industrial robots in Germany



Taiwan



France



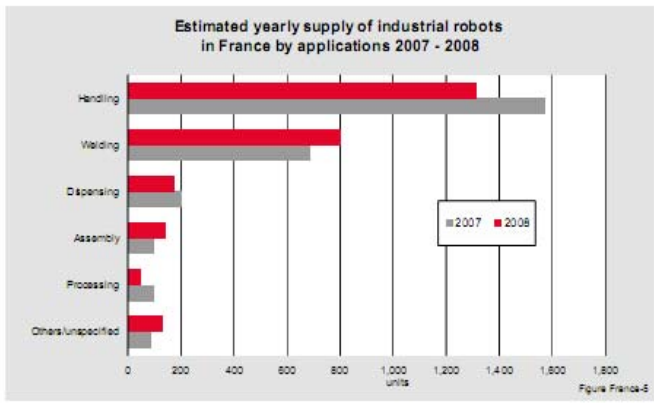
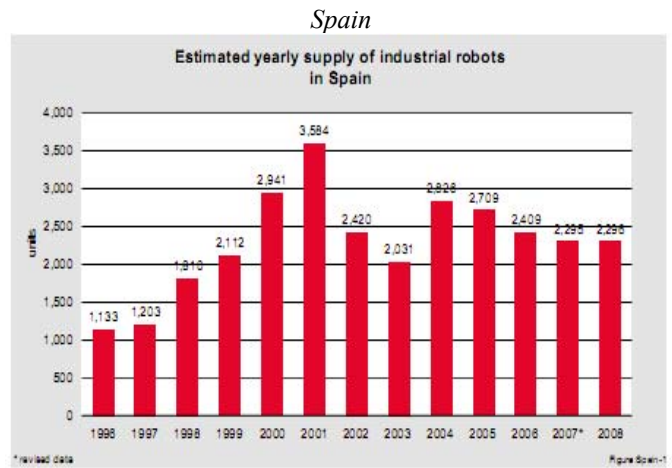


Fig. 8. Yearly supply of industrial robots in France



Italy

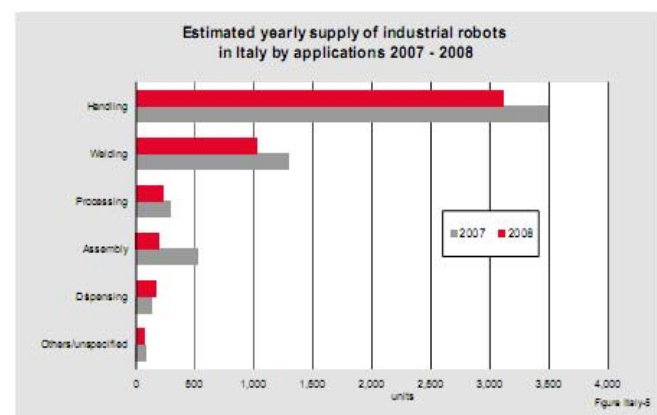
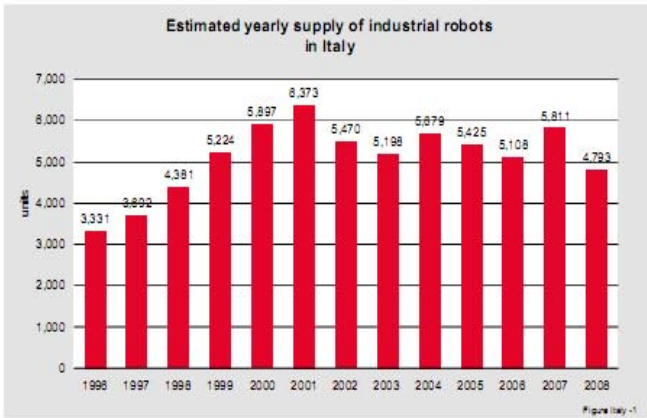


Fig. 9. Yearly supply of industrial robots in Italy

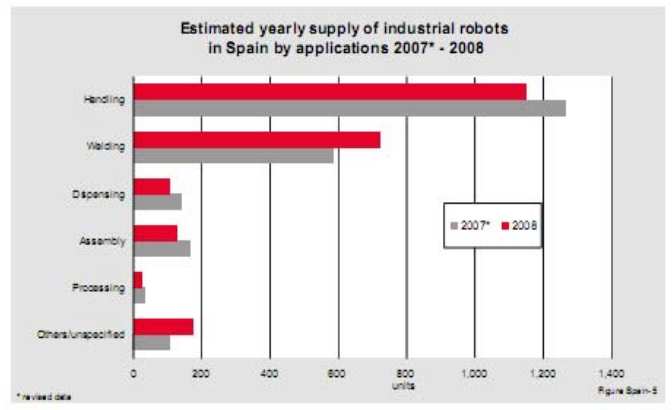


Fig. 10. Yearly supply of industrial robots in Spain [1,4]

As Figure 4, Figure 5, Figure 6 and Figure 7 show increasing trend of industrial robot applications only for Republic of Chorea and Taiwan in year 2008 comparing with year 2007, while Japan and Malaysia had down trend of industrial robot application in this period of time [1,2,4,11]. Concerning application of industrial robots in European countries, increasing trend of industrial robot application is evident for Germany and Spain, while France and Italy had down trend in industrial robot application for period of time 2007/2008.

IV. CONCLUSION

Analysis of the industrial robot application has been performed for two continents Asia and Europe. In Asia industrial robot application of Japan, Republic of Chorea, Malaysia and Taiwan was analysed. For European countries for analysis was elected Germany, France, Italy, and Spain. Estimation of the total and the annual industrial robot applications is also presented in this analysis. Planned industrial robot application in the next two years is also given. Based on analysis it can be concluded why large discrepancies of industrial robot application in Europe and Asia exist which shows Table 1, Figure 1 and Figure 2 and shows increasing trends of applying of industrial robots in Asia in period of time 2001/2005. After 2005 trend were down in applying of industrial robots in Asia, but after 2008 number of units installed in Asia is constant. In Europe increasing trend in

applying of industrial robots is evidenced to the 2001, and after that were stagnation. After 2008 slow increasing is evidenced. Total amount of industrial robot application in Asia is larger then in Europe for 50%.

Increasing trend of industrial robot applications had Republic of Chorea and Taiwan in year 2008 comparing with year 2007, while Japan and Malaysia had down trend of industrial robot application in this period of time. Concerning application of industrial robots in European countries, increasing trend of industrial robot application is evident for Germany and Spain, while France and Italy had down trend in industrial robot application for period of time 2007/2008. It can be concluded that stagnation of industrial robot application has been caused by world slump. Countries with strong increasing of motor vehicles industries have increasing trend of industrial robot application.

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