

## The Cutting Edge in Western Europe

Martin-Christoph Wanner, Group Manager  
Robotics and Assembly Systems  
IPA - Stuttgart

Nobelstraße 12  
7000 Stuttgart 80  
Federal Republic of Germany

### A B S T R A C T

Within Western Europe we do not have a general approach from manufacturers and end users comparable to the approach in Japan. We do have some quite remarkable individual efforts. Furthermore national and multinational organizations have realized the importance of robotics in construction. More structured efforts and stronger market demands might had to a more powerful drive for "Robotics in Construction" within Western Europe.

#### 1. General Conditions

Currently the European construction industry is in a upward trend caused by the shortage of private and domestic buildings and necessary investments to keep the high standard of the existing infrastructure. These facts combined with the shortage of skilled labourers and difficult working conditions in the construction industry are positive indicators for robotics and automation.

Good R & D infrastructure is existing within Europe in various locations from industry to research institutes. Within the manufacturers and end-users however we have conservative trends not to go too far ahead. In general the scope of new developments are therefore restricted to step by step procedures.

National and multinational organizations have realized the importance of "Robotics in Construction!" Within France we have strong initiatives from the ministry of building for national and Eureka projects. In the UK we have the "advanced robotics" approach from the DTI which covers something of our area, furthermore some UK companies are involved in Eureka projects. In Germany we have the initiative for advanced robotics on a small scale (e. g. Putzmeister-project) and now also larger scaled projects to improve the quality of work in construction by using advanced machinery.

The European community has two sections were bigger joint projects are planned for the future. Within DG XII we have "Teleman" (Robotics in hazardous nuclear environment) which has not yet started and DG XIII we have "Engineering Applications in IT" which might be started in the next three years. The European programmes are large and very well organized - they will help to bring the things ahead for sure.

Individual companies started with their own developments without funding from any national or international sources. In this case the approaches are either limited or restricted to large sized companies like Liebherr.

It is interesting to note that the construction companies, at least in the Federal Republic, do think about developing some specialized machinery by themselves - a trend we have seen last year in Japan.

## 2. Status of Automation and Robotics

Here we have to distinguish between increased automation of existing machinery up to robotics and new construction methods created by automated machinery and robotics.

The current state of the art within Europe was presented at the BAUMA fair in Munich in April '89. For the preparation of this paper this "cutting edge" information could not be included, but will be presented at the conference. Therefore here only few remarks.

### Civil engineering

Programmable excavators, mobile or fixed cranes with CNC-controllers, large sized manipulators for various applications are now coming from the technical success to economic applications. Within these machines the additional electronic equipment is not such an important cost factor. With smaller devices we have some approaches for erecting bricks and material handling with small sized manipulators.

## Mechanical engineering

Considerable efforts should be noted in the area of robotic systems in steel framework construction. Steel framework handling and assembly in coal mines are topics of major robotics projects in the Federal Republic.

## Others

Tunneling, tunnel inspection and repair is an important area where several economic applications were realized. Another very important topic for the future is related to the scrapping of nuclear power plants. Here a sophisticated large sized gantry robot system was developed by Noell, Würzburg for nuclear reactor in Niederaichbach.

### 3. Opportunities for economic benefits

High promise for economic benefits can be expected where humans or conventional machinery can not compete because of physical limitations and for hazards to the operator. Typical examples are scrapping of nuclear power plants, specific workplaces in tunneling and mining.

Other systems like programmable excavators or concrete distribution equipment need a check of the individual tasks to be performed.

We can see already the market implementation of robotics and automation via high valued conventional machinery. With high numbers of sales in this area the new technology can be spread for other applications in the construction industry.