



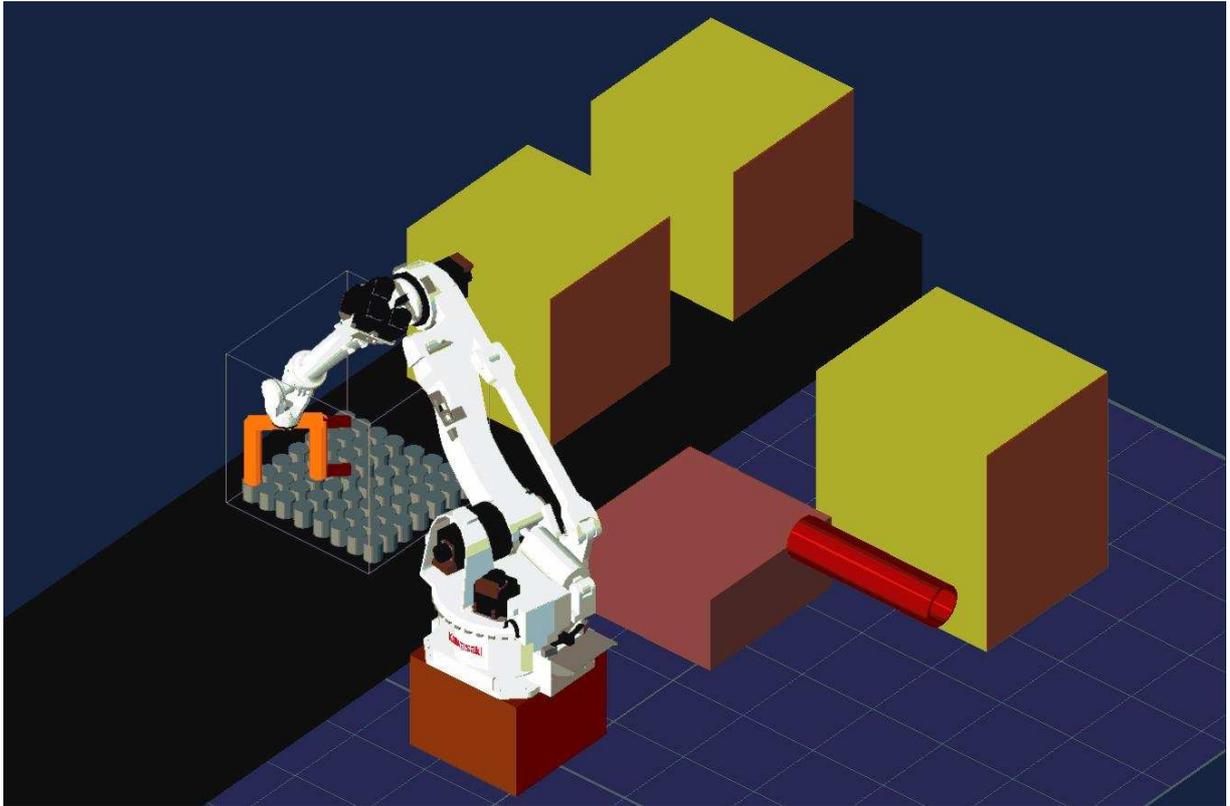
## Pipe Protector Robot Cells

### OVERVIEW

Pipes used in the drilling of oil wells range from 30 to 40 feet long and are threaded on the outside of one end and the inside of the other end. In order to protect these threads during shipping, pipe protectors must be installed on each end of the pipe. There are 15 standard sizes of pipe protectors. Below is a picture of one size protector.



Normally putting the protectors on the pipes is a labor intensive job, as a person must be stationed at each end of the pipe and install a protector on each end every 10 seconds. The Pipe Protector Robot Cell was designed to automate putting pipe protectors on the Outside Diameter (OD) and Inside Diameter (ID) of oil well pipes. The Pipe Protector Robot Cell consists of two robots, two cameras, a PLC, and a PC-based HMI. A model of the cell for one end of the pipe is shown below:



I<sup>2</sup>T's provided the complete robot cells for ID and OD protectors. Each robot, ID and OD were contained in a separate cell. We did all of the mechanical and electrical design. We provided both electrical and mechanical drawings and users manuals. This project was done as a complete turnkey robot cell.

## **TECHNICAL DETAILS**

We used two Kawasaki FS30L robots with Series D controllers. One robot applies the OD protector and one robot applies the ID protector. Each robot communicates to a DVT camera via Ethernet. The cameras look at the pipe to insure that the pipe is threaded and also provide the robot with the pipe position. The robot cannot try to install a protector on a pipe that is not threaded, so if the camera cannot detect threads, the pipe is rejected from the cell. The HMI is written in Visual Basic and it allows the operator to select the type of pipe being run and also provides feedback on cell and robot status to the operator. An Allen-Bradley ControlLogix PLC controls the cell,

positioning the pipe and controlling the robots. The PLC is connected to the robot via Remote I/O. The following picture shows one of the robots.



The end-of-arm tooling was designed so that both the ID robot and the OD robot tooling was the same with the exception of the grippers.

The following picture shows a close-up of the tooling.

