

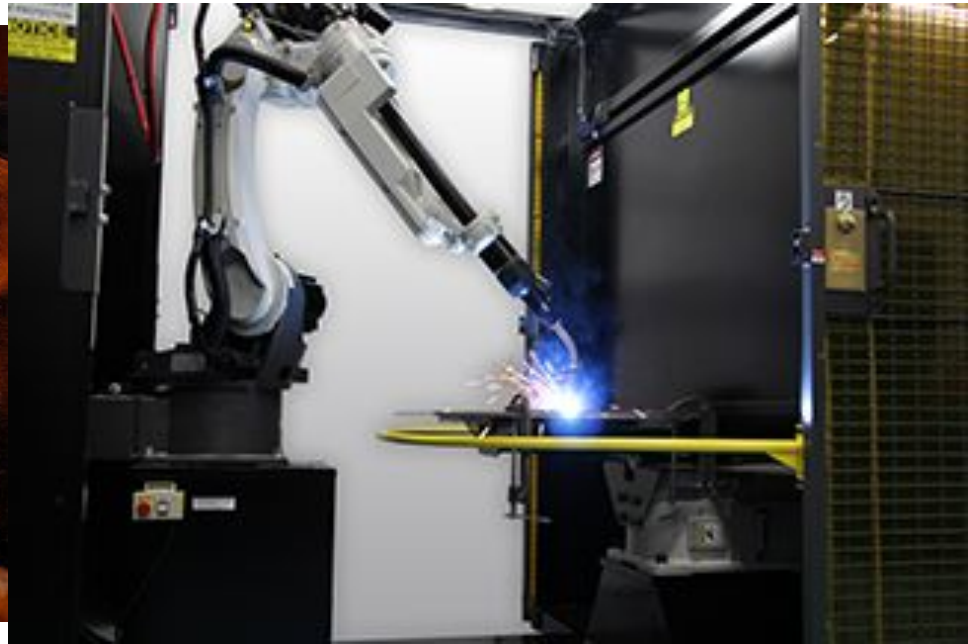
# HYDRAULIC ROBOTIC ARM

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DEFINE THE PROBLEM

# WHAT IS THE PROBLEM?

- Many companies had to figure out a way to built large objects such as cars, building parts, do welding, and much more at a constant, efficient speed.
- High temperatures from welding and thermal sprays, and chemicals from painting are harmful to workers.
- Companies needed something that could handle high heat, harmful chemicals, and more dangerous tasks.



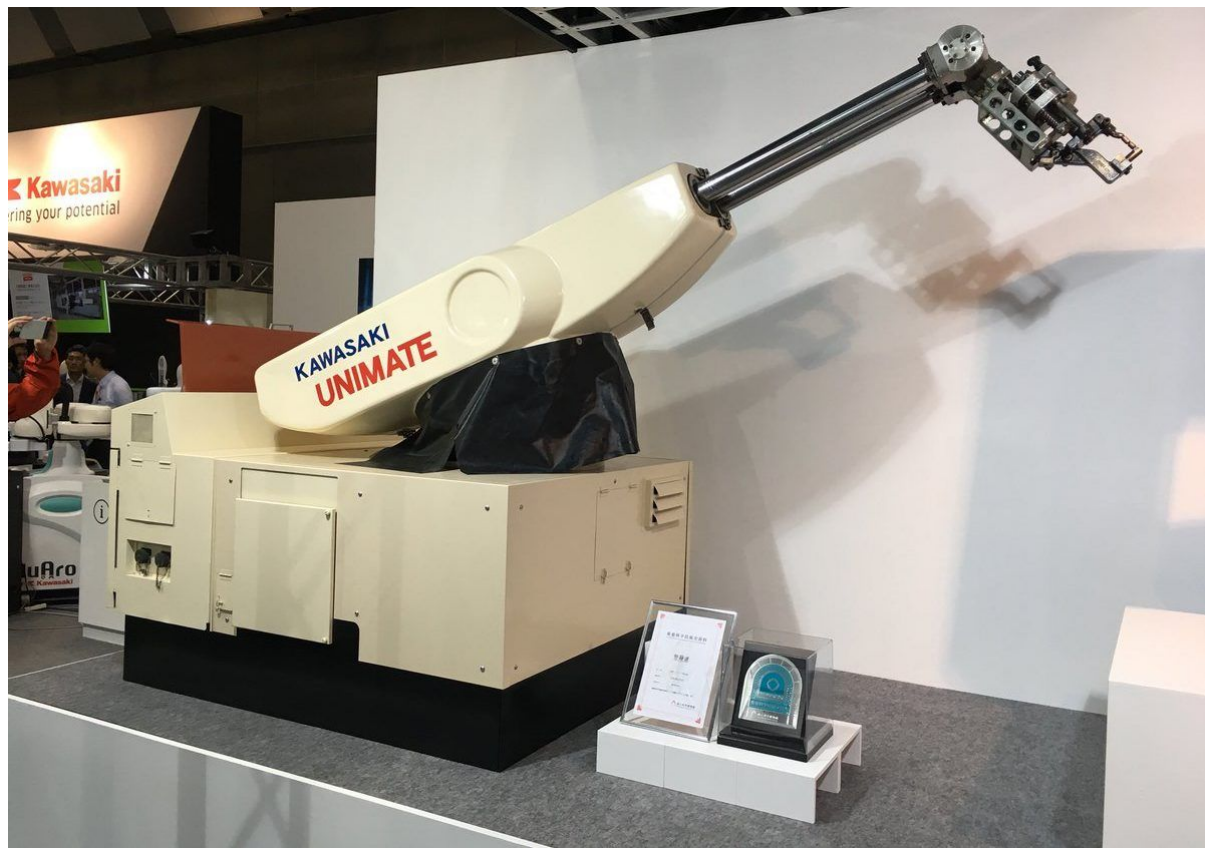
HERE, A ROBOTIC ARM IS USED FOR WELDING, WHICH WOULD USUALLY BE DANGEROUS WHEN HANDLED BY HUMANS.

SCIENTIST AND MECHANICS HAD THE  
QUESTION: WHAT WAS AS ACCURATE AS  
A HUMAN, BUT COULD WITHSTAND  
DANGEROUS CIRCUMSTANCES?

# BACKGROUND RESEARCH

# THE FIRST ROBOTIC ARM

- George Devol had patented and created the first robotic arm called Unimate.
- It was installed at the General Motors plant in Ewing Township, New Jersey in 1962.
- It was build to lift and stack hot metal parts.
- This robot was the kickstarter for the use of robotic arms in manufacturing and labor.



THIS IS THE ORIGINAL UNIMATE.

# HISTORY OF THE ROBOTIC ARM

- The use of the robotic arm in the building of cars is the most common, but this did not start until the 1980's.
- They were first used to do precise welding work
- It replaced humans in work that was usually found boring, monotonous, and dangerous.



SPECIFY  
REQUIREMENTS

# MATERIALS

- Cardboard (about 4 sq. meters)
- Tape
- 10 ml syringes x 8
- 2m tube
- Toothpicks/skewers x 20
- Small cylindrical object w diameter 1 cm
- Zip ties x 8

# BRAINSTORM SOLUTIONS

# PROBLEMS WHEN BUILDING THE HYDRAULIC ARM

- Many times in my building there were problems in the support system, since it was made out of cardboard.
- The rotating base was a problem as well because of the long cylindrical piece used for rotating
- Many joints of the arm kept on coming off or breaking

CHOOSE THE BEST  
SOLUTION

# HOW DID I SOLVE THE PROBLEMS?

- For support, I used skewers that were stuck into the base and taped it to the sides of the arm for support. This also got rid of the problem with the joints due to the extra support.
- I increased the depth of the base by adding more cardboard layers to the bottom to offset the long cylindrical rotating piece in the base.

DEVELOPMENT WORK



THE CYLINDRICAL ROTATING PIECE WAS STICKING OUT DUE TO THIN BASE (RIGHT). EXTRA CARDBOARD WAS ADDED TO OFFSET THIS (LEFT)



THE TOOTHPICKS KEPT ON COMING OUT OF PLACE (RIGHT), SO THICKER SKEWERS WERE USED TO FIX THIS.



THE ARM KEPT WOBBLING OUT OF PLACE, SO SKEWERS WERE ADDED TO THE SIDES FOR EXTRA SUPPORT AND STRENGTH.

BUILD A PROTOTYPE



IN THIS MODEL, THE BASE WAS UNBALANCED, AND THE TAPE WAS NOT STRONG ENOUGH TO HOLD EVERYTHING TOGETHER. THE CRANE PART WAS NOT STRONG EITHER

TEST AND REDESIGN

