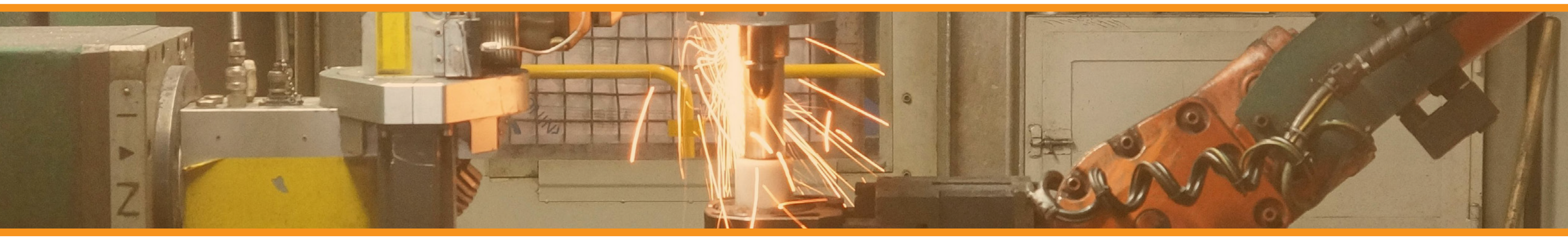
Illuminate NEBRASKA
POWERED BY NEBRASKA PUBLIC POWER DISTRICT

MECHANICS

FABRICATION FOUNDATIONS

CONCEPT Fabrication foundations are the fundamental concepts, materials, and processes used to design, manufacture, and assemble robotic systems. This includes a range of techniques such as computer-aided design (CAD), 3D printing, laser cutting, welding, and assembly methods. The goal of fabrication is to create robotic systems that are efficient, precise, and reliable, and can perform complex tasks in various applications such as manufacturing, healthcare, and exploration.



BACKGROUND

Robotics fabrication dates back to the1960s, when the first industrial robots were developed for use in manufacturing. These robots were large, expensive, and designed to perform repetitive tasks in assembly lines. They were simple in design, consisting of a manipulator arm, a controller, and a set of sensors and actuators.

In the 1970s, the introduction of microprocessors enabled the development of more sophisticated robot controllers, which could perform with greater accuracy and speed.

In the 1980s and 1990s, CAD software and CNC machines revolutionized the fabrication process, allowing engineers to design and produce complex parts which led to the development of more advanced robotic systems, including mobile robots, humanoid robots, and collaborative robots.

In recent years, the increasing availability and affordability of 3D printing technology have further transformed robotics fabrication. 3D printing allows engineers to quickly produce customized parts and prototypes, reducing the time and cost of the design process.

DATA

DESIGN DATA: Digital 3D models created using computer-aided design (CAD) software, as well as engineering drawings and specifications for individual components and assemblies.

MATERIALS DATA: Information about the mechanical, thermal, and electrical properties of various materials used in robotics fabrication, such as metals, plastics, and composites.

PROCESS DATA: Data related to the various fabrication processes used in robotics, such as 3D printing, CNC machining, and laser cutting. This data can include machine settings, tool paths, and process parameters such as temperature and speed.

Make sure it measures up

APPLICATION

With 3D printing, it is possible to quickly and cost-effectively produce custom prosthetic limbs that are tailored to the specific needs and preferences of the individual user. To create a prosthetic limb using 3D printing, engineers first use CAD software to design a digital model of the limb. They then use a 3D printer to create the limb, layer by layer, using a variety of materials such as plastics, metals, and composites.

One example of this is the work of the e-NABLE community, a global network of volunteers who use 3D printing technology to produce prosthetic limbs for children and adults in need. With 3D printing, they can quickly produce custom prosthetics that are lightweight, durable, and easy to assemble.

REAL WORLD CONNECTIONS

University of Nebraska-Lincoln's Nebraska Intelligent Mobile Unmanned Systems (NIMBUS) lab is focused on the development of autonomous robotic systems for various applications, including agriculture, search and rescue, and environmental monitoring. It uses a range of fabrication processes, such as 3D printing, CNC machining, and laser cutting, to produce custom parts and components for their robotic systems. The lab has developed several innovative robotic systems, such as a fleet of autonomous agricultural robots that can perform tasks such as planting and harvesting crops. They have also created a swarm of quadcopter drones that can work together to search for and locate missing persons in disaster scenarios.