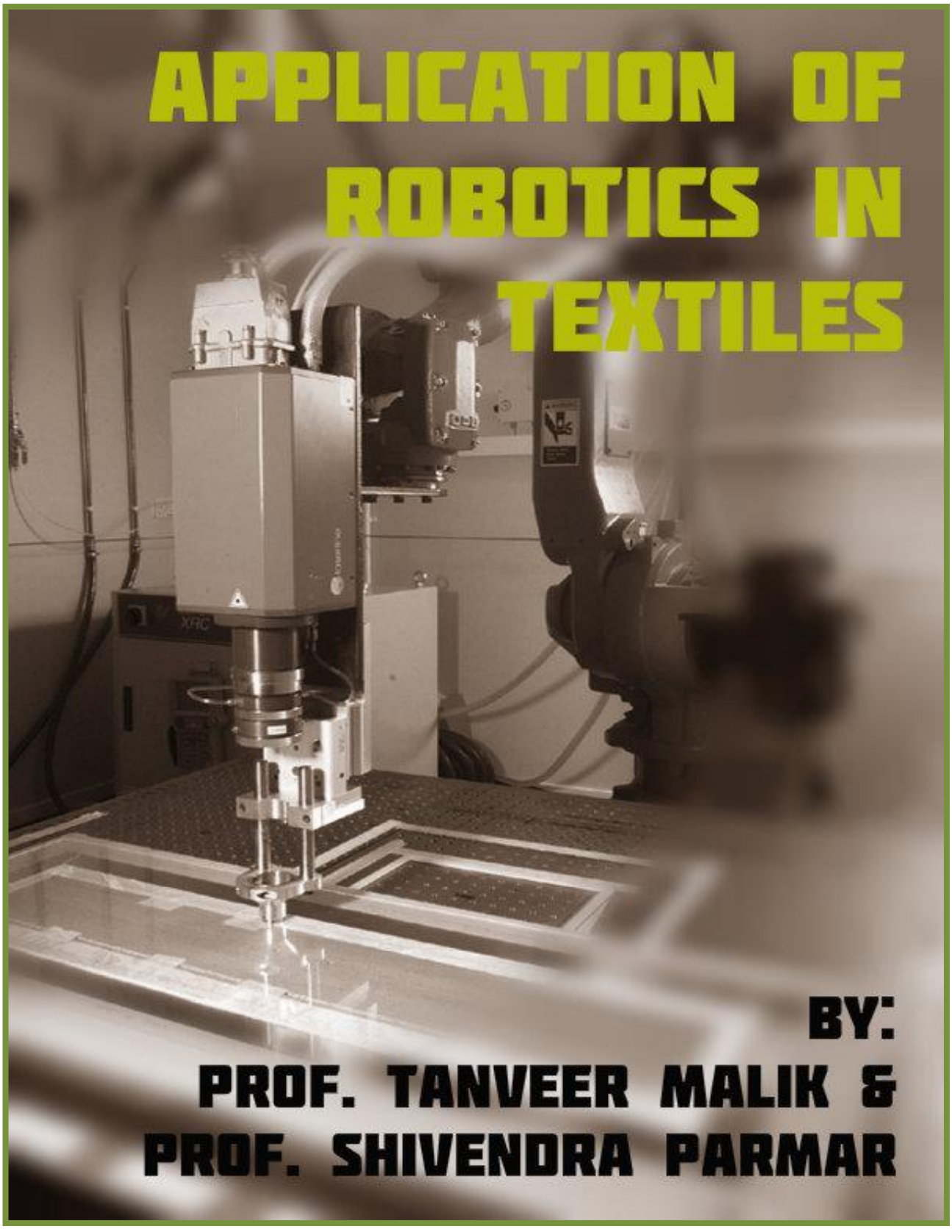
APPLICATION OF ROBOTICS IN TEXTILES
BY:
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Application of Robotic automation in the textile industry provides so many benefits like labour savings, reduced cycle times, improved part quality, improved safety, increase productivity and efficiency. The application of such Robotic automation has resulted in significant benefits to textile industry. High levels of consistency and precision in work pieces and high levels of repeatability and accuracy in manufacturing equipment have been required. Economic Justification can be shown only for large quantities of production. To achieve this, we need adaptive manipulation systems having some "Artificial Intelligence". This article shows a wide range of automation in textile process by using robots which ultimately increase the both basic requirement of textile industry i.e. productivity and efficiency.

Robots are being used in textiles today with substantial developments already being made and the future use of this new technology will develop as the economics of each area of manufacturing dictates. These are machine systems that can be conveniently directed to change their mode and sequence of operations by means of software instruction. Ideal examples are numerical controlled machine tools and industrial robot arms. These programmable systems still require high levels of consistency, precision, repeatability and more importantly, adaptability. More people in industry are becoming aware of the technology & aware of its potential for useful applications. The technology of robotics will improve over the years in such a way as to make robots more user friendly, easier to interface to other hardware & software and easier to install.

Automation and robotics are two closely related technologies. In an industrial context, we can define automation as a technology that is concerned within the use of mechanical, electronic and computer based system in the operation and control of production. Examples of this technology include transfer lines mechanics assembly machines, feedback 'Control systems (applied to industrial process), numerically controlled tools and robots. Accordingly, robotics is a form of industrial automation.

APPLICATION OF ROBOTICS IN TEXTILES

Application of Robotics in Handling of bales in Blow room

All samples of the bales and the shipping list will be sent to a grading laboratory for observation and to verify the quality of the shipment immediately after it has been received. After passing the receiving station each bale will be moved by the conveyor to a loading station where it will be picked by a robot and taken to storage.

All the bales stored randomly in racks and position of bale with regard to bale number, weight and fibre characteristics.

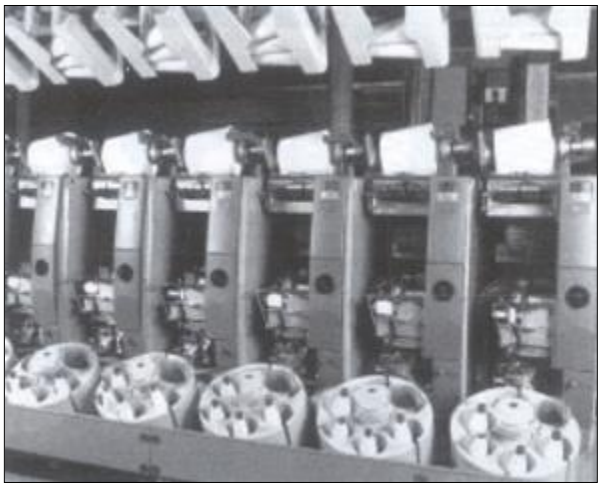
When bale is selected for processing it will be removed from the warehouse by a robot on a "first in, first out basis".

Application of Robotics in Carding

Robot can be programmed to pickup cams from each card place them on to a sliver truck and transport them to a production area for drawing frame for conventional operation. This will provide excellent cross blending and it will be a simple matter for an operator to clear the cans from the touch into a drawing frame.

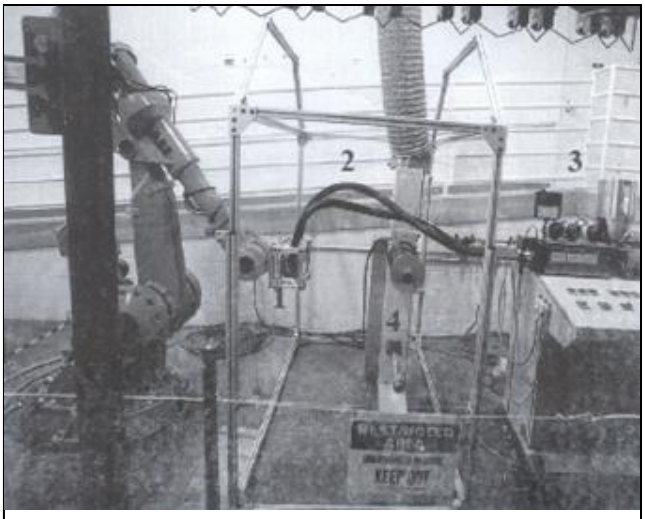
Application of Robotics in the splicing in autoconers and other winders

Each time there is an end break or bobbin change, this join the yarn ends with a splice which is virtually identical to the yarn. The strength and elongation values of the spliced joint are almost always comparable (more than 90%) with those of the yarn itself. Latest automatic splicer arm act like a robot and it offers even better opening of the yarn ends and a more favourable overlap in splicing zone.



Application of Robotics in Nonwovens

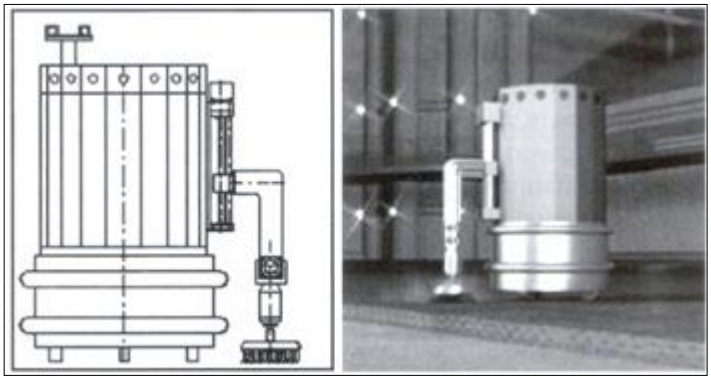
The production of nonwoven and tailored 3D structures for protective garments (such as those worn by fire fighters) using robotics is under development by the researchers. In particular, the integration of robotics and a small-scale meltblowing unit is also possible. The researchers are developing the framework and general motivation of the model which shows the novel 3D-fiber application system developed using a seven-degree of freedom system. This system will be used with control algorithms developed at the NCRC to improve uniformity of the shaped fabric structure.



Robotic Fiber Assembly and Control System (RFACS) 1. Melt-Blowing Die Housed in a Cage. 2. Polymer and Air Flexible Supply Hoses. 3. Melt-Blowing Extruder Unit. 4. Collector

Application of Robotics in cleaning of textile industry

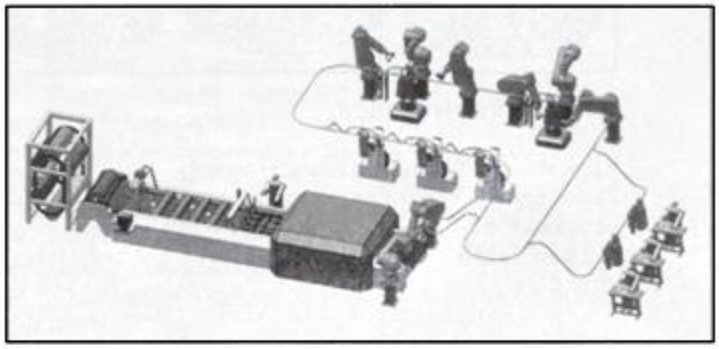
An application of a MRP Nomad 200 for cleaning and polishing of floor surfaces is sketched in diagram. A linear module from our "tool-kit" is attached to the NOMAD's body vertically by a connecting console (specially formed as to save the use of more modules), a rotational module is leading an electrically driven disc brush which is fastened firmly to it. By the linear motion



"down", the brush starts to approach the floor and cleans or polishes it. By turning the disc brush on 90 degrees the system can be used for cleaning or brushing of side stone or mosaic frames of the floor. The brush touch to the floor or frames with a certain preset force can be realized by using of a special tactile sensors build in the brush.

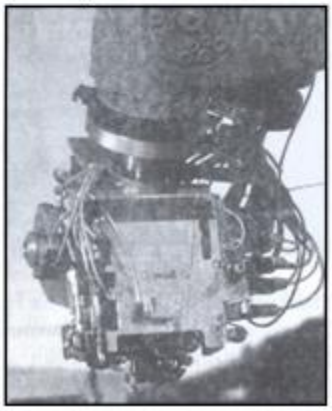
Application of Robotics in Garment Manufacturing

As from the diagram shown below it is clear the use of robot in garment manufacturing. In garment industry the use of robot is for automatic manufacturing of garment like jackets as shown. This gives a good quality as well as maximum productivity.



i. **3D sewing (the joining head):**
   - Able to perform 3d seams
   - Adapting the joining parameters to the fabric and garment cad.
   - Enhanced flexibility
   - Cooperation skills

ii. **The grasping and handling of near 2D parts:**
   - That have different shapes and dimensions with regard to the garment fashion and size
   - That have to be moved and 3d reshaped on the adjustably actuated mould in order to be rightly held and presented to the joining processing



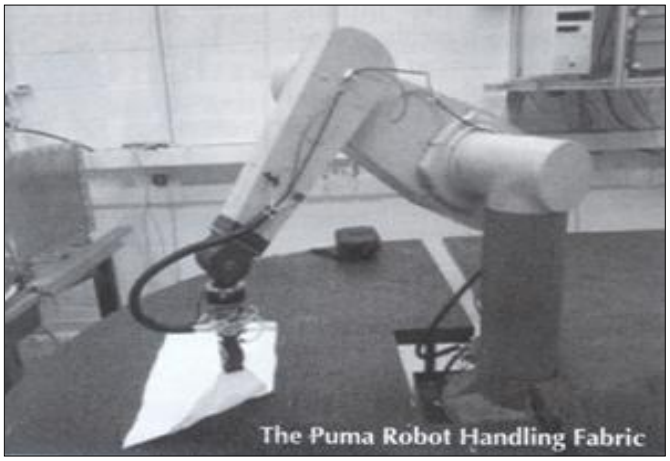
iii. **Use of robot for reconfigurable mannequin:**

- Able to assume shape and size suitable for the specific garment to be assembled
- Endowed with suitable mechanisms strategically designed for holding the items edges in the right position all along the sewing operation Note: The image is only shown to illustrate the concept. It is in no way indicating the final form of the reconfigurable mannequin, which is under investigation.

Application of Robotics in Airbag Manufacturing

Realistic manipulation processes involve interaction of fabric parts with other objects such as: work surfaces, robot manipulators, and other fabrics. Therefore, the ability to model contact has been implemented. A representative simulation results is shown next. Fig. shows several steps of a simulation sequence where an airbag is being picked up by robot.

(Sequence from left to right)



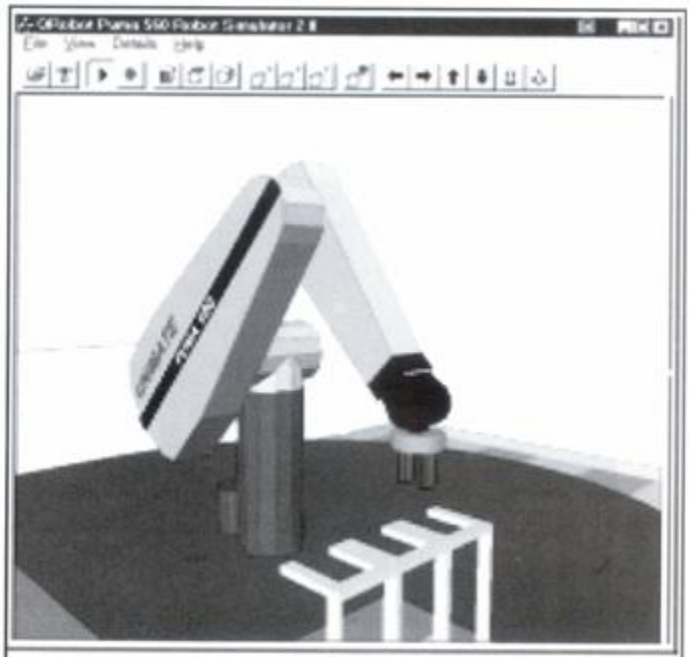
The Puma Robot Handling Fabric

Application of Robotics in Fabric Handling

Fabric handling tasks require various tools and sensors. To accommodate these tasks, an ATI Industrial Automation Gamma 30/1 00 FIT sensor is mounted at the end of the robot arm. A tool changer is mounted on the FT sensor. It is a Light 5 Robotic Tool Changer, also from ATI. The custom-built tool rack provides space for a standard pneumatic gripper and other special end-effectors for fabric manipulation. The fabrics handling is shown in figure below by robot.

The Robot Simulator in Fabric Handling

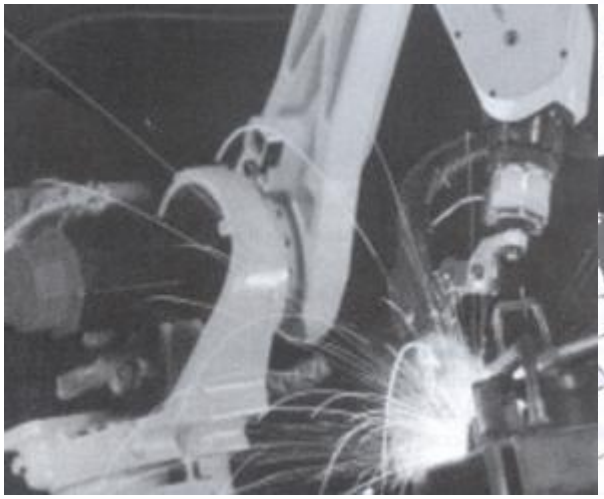
The robot simulator allows running robot control programs in simulation mode, without accessing hardware. This is useful for debugging robot programs without the risk of damaging the robot during fabric handling. The operator can navigate by using the mouse, selecting and defining custom viewpoints or selecting the end-effectors view. The latter option simulates the view of a camera mounted on the end effectors. The level of detail in the display can be reduced to accelerate the display.

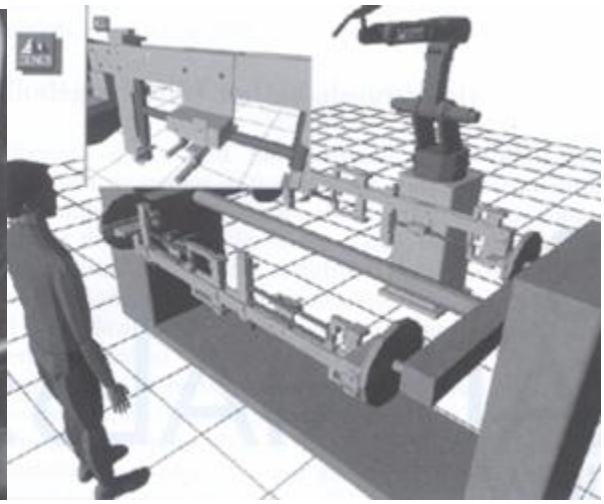


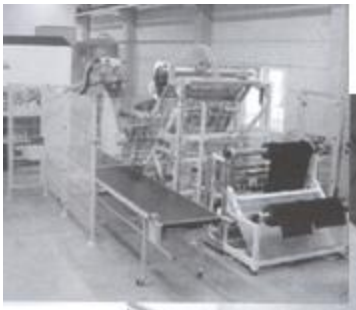
The Virtual Operator Interface/Robot Simulator

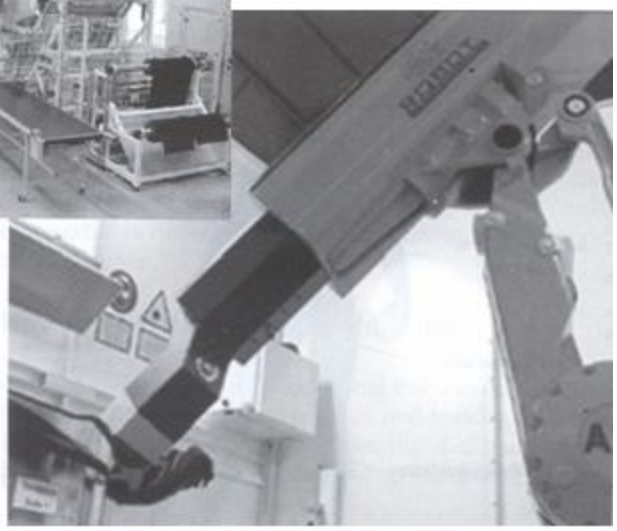
Use of Robot Welding In Textile Machines

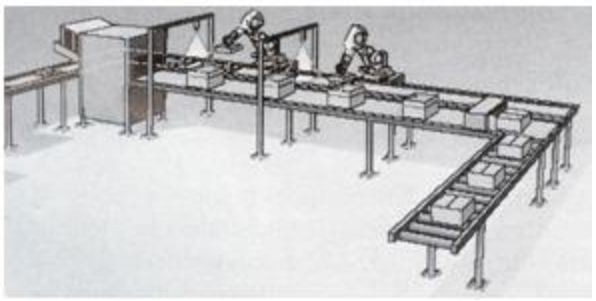
In Textile Industry there may be breakage of machine parts & repaired of those parts by manually are very difficult so we have used the robot welding which do it very precisely.











Use of robots in Laser Cutting

While the laser robot is cutting, the handling robot takes up a finished cut part including remnants from the second station of the rotating table and sets both onto a conveyor. The conveyor at the end of the system has a sufficient length to buffer finished trunk trim. The IRS 6650 moves back to the material supply after putting the parts down and picks up new needle felt to insert it into the heating fabric supply, complete heating station, IRS 6650 robot for handling including four grippers, robot controllers, stacking conveyor including protective grating, and master SPS controlling the entire system

Use of robots in folding and packing

In garment industry the garment folding and packing is carrying out by the robots. They take the garment, fold it and then pack it.

IMPACT OF ROBOTICS ON THE TEXTILE INDUSTRY

Demand driven:

- Quick response to market/customer
- Increased capability to satisfy consumer requirements
- Increased capability to react to market changes
- A new market segment -customized garments- to expand

Quality driven:

- Increase in the final product quality (lower risk of production rejects) and quality standardization
- Intelligent flexible highly re-configurable manufacturing
- processes
- Increase in the process efficiency, speed and reliability
- Reduced costs mainly for small batches
- Integration of human and technical resource.

Advantages of Robotics

- Robotics and automation can, in many situations, increase productivity, safety, efficiency, quality and consistency of products.
- Can work in very critical situation i.e. in hazardous environment without the need of life support.
- It needs no environmental comfort such as lighting, air conditioning etc.
- Much more accurate than human
- Work consistently, tirelessly
- Speed of operation is fast
- Robot will not ignore the work

Disadvantages of Robotics

- Robots are more costlier
- Experts are required to maintain them
- Threat to employment in population crowed country like India

CONCLUSION

Robots are being used in textiles today and substantial developments are already being made. Since we operate in what may generally be described as free enterprise economy, the future use of this new technology will develop as the economics of each area of manufacturing dictate. No doubt about it, all of us can look forward to exciting developments in this field.

Current industrial robots are generally used for simple ·repetitive tasks of low added value, which substitute for unskilled factory workers. Such robots have value only if they are less

expensive and used in mass production to achieve higher speed and yield. However, mass production is not the only form of operation in manufacturing industries. There are various types of manufacturing crafts that only experienced artisans can perform. Such crafts are usually of small quantity but can create high value added products. A new market for robot technologies might develop if robotics researchers were attracted to such areas, utilizing the potentials of accumulated techniques, e.g. sensory feedback control, to achieve valuable application tasks for which even expensive intelligent robots can be worthwhile.

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