Highlights

Many of today's robotic work cells are unable to adapt to even small changes in tasking without significant reprogramming. This results in downtime for production lines anytime a change to a product or procedure must be made. This article examines a novel knowledge-driven system that provides added agility by removing the programming burden for new activities from the robot and placing it in the knowledge representation. The system is able to automatically recognize and adapt to changes in its work-flow and dynamically change assignment details. The system also provides for action verification and late binding of action parameters, thus providing flexibility by allowing plans to adapt to production errors and changing environmental conditions. The key feature of this system is its knowledge base that contains the necessary relationships and representations to allow for adaptation. This article presents the ontology that stores this knowledge as well as the overall system architecture. The manufacturing domain of kit construction is examined as a sample test environment.