

I, (XRD) ROBOT



ABOVE: Residual stress robot goniometer

When most of us think of robots, we tend to think of large industrial robots that assemble parts inside a factory, performing such tasks as welding cars, assembling electronics, or sorting and inspecting parts. Having the ability to repeat the same task without a break for 24 hours per day, robots have proven to be an ideal way to increase efficiency and part consistency. As computing power has increased, more complex situations can now be analyzed on the fly, allowing robots to work on applications that, until recently, required a human to do. Historically, robots also had to be operated inside a safety cage, to prevent injury to humans. The newer collaborative-style of robot has built-in safety systems that allow the robots to operate out in the open rather than in the confines of a cage. Sensors detect when the robot comes into contact with an object and safely

stops the movement, preventing harm to both humans and objects. The ability to operate robots safely near humans has resulted in robots being used in areas of our life that are much more visible. Some stores are now using robots to help stock shelves: they roam the aisles looking for missing items on shelves and; send a message to a computer to restock or re-order these items. We are seeing robotic dispensing systems inside pharmacies, and even robotic chefs and bartenders. Recently, in the x-ray diffraction world, robots have been integrated into more and more projects. Three particular uses are: robots acting as a goniometer, robotic sample handling systems, and collaborative robots working side by side in a lab with technicians. Newer robots have enough accuracy, that, with the appropriate error-tracking

system, they can move in a concentric circle and act like a goniometer. PROTO has recently been mounting x-ray tubes and detectors directly onto robots and using a robot to measure residual stress. The ability to move a robot around a large sample is proving to be of great interest for customers with large samples who need multiple locations to be analyzed. In high-throughput testing applications, such as PROTO's Laue product line (used for orienting industrial grown crystals), robots are proving to be very valuable handling systems. In a new diamond marking system produced by PROTO, the robot can pick up the diamond, collect the Laue image, determine the orientation of a specific crystal face, and then present the diamond to a laser for etching lines into the side of the diamond. These lines can then be used in a subsequent cutting step, to enable any crystallographic face

to be exposed from the diamond. After processing, the diamond is returned to the operator. This set of procedures would be extremely difficult to do accurately or quickly without the use of a robot. This ability to use a robot as a highly accurate measurement technician, not only helps improve measurement accuracy, but also can also be implemented at a price point that is very reasonable.



ABOVE: Robotics handling system for orienting diamonds before cutting