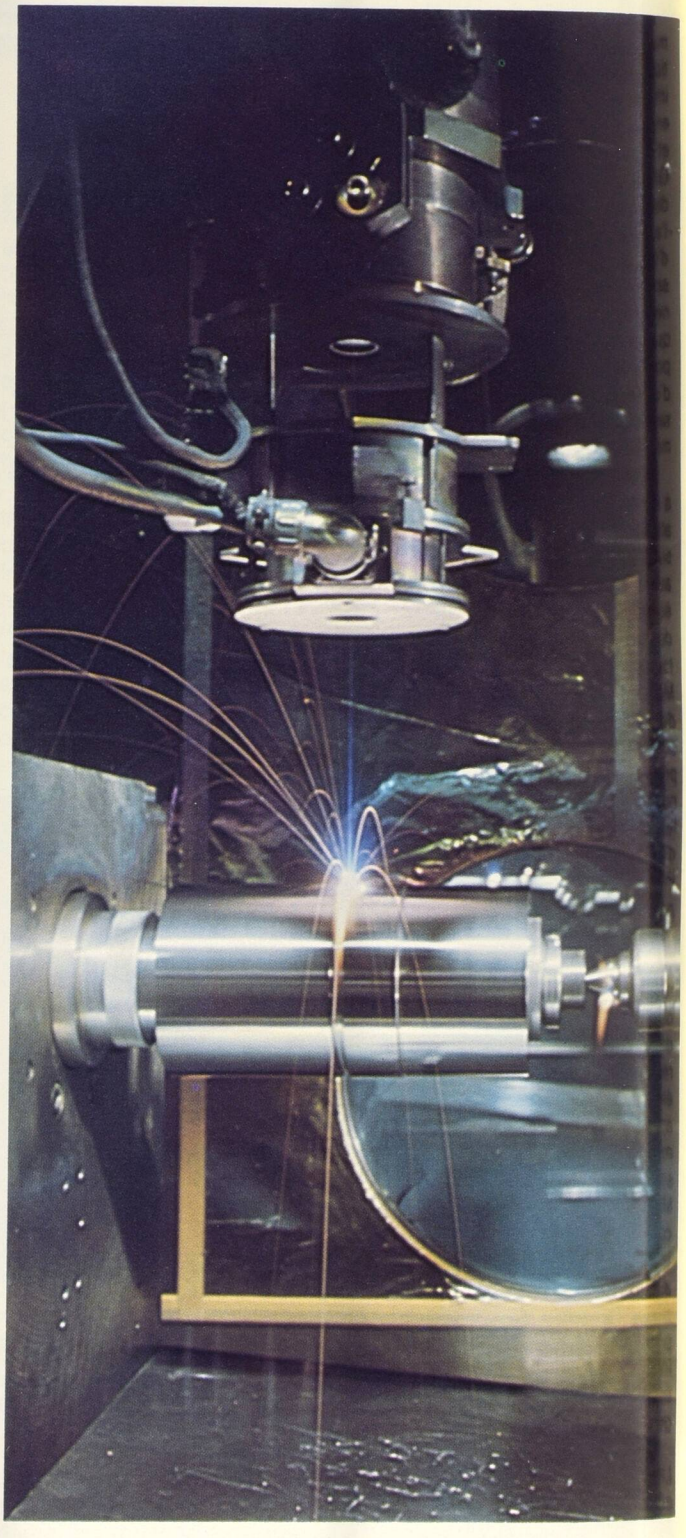
problem can be easily seen when it is remembered that these rollers can measure up to 40 feet (12 m) in length and four feet (1.2 m) in diameter and can cost well over $200,000 each. Added to this is the serious loss in production time resulting from a failure, and in the course of the last seven years, about 60 failures of this nature have been experienced. The Manufacturing Technology Center is experimenting with electron beam welding repair techniques and, as Mr. Moore points out, "if we are successful, then in this single case the Center's investment in electron beam welding equipment will have paid off handsomely indeed."

Another technique that has not been widely adopted by the manufacturing industry in this country is electrochemical machining. This is a metal-removing process based on the reverse of electroplating where material is transferred from one electrode to another (the object to be plated) via a liquid electrolyte. In the machining process, instead of metal being transferred to a component, it is removed from it, the desired shape being achieved by using a carefully shaped electrode whose form is approximately the "mirror image" of the shape to be produced. The process allows the extremely accurate shaping of materials, and is especially useful in the production of small and delicate components which would present considerable production problems on conventional metal cutting machinery. Another important feature of electrochemical machining is that it involves none of the mechanical loadings on the component that are an inherent feature of conventional metal removal processes (turning, milling, etc) and the possibility of causing residual stresses in the component is precluded.

A specific example of this process applied to an industrial problem lies in the work carried out by the Center for a Canadian engineering manufacturer. The problem was the production of titanium turbine compressor blading of such thin cross-section that had only conventional machinery been available the job would have been impossible. "Cutting forces alone would have pushed the blade away from the cutting tool and titanium is a very tough material to machine in the first place," says Mr. Moore. "As it turned out, electrochemical machining provided the ideal answer."

One of the most important aspects of the Manufacturing Technology Center's assistance to Canadian manufacturing industry is the help that can be provided to a company wishing to bid on a contract. Firms are often put in the position of bidding on work that might involve techniques with which they are unfamiliar or of investing in new equipment. In this case, the Center is glad to assist the company by undertaking the manufacture of one example of the component, and can let the company know the specific skills and the time and machine requirements involved. The company can then apply its own costs to produce a realistic bid. Mr. Moore emphasizes that assistance of this kind seems to be useful to many Canadian companies at the present time since they find themselves in competition with much larger foreign organizations whose resources are correspondingly much more extensive. □

David Mosey



A high-energy tightly focussed beam of electrons in a hard vacuum provides contamination-free welds together with minimal heat distortion of the welded component. The Manufacturing Technology Center has been able to demonstrate that there are many industrial applications where this sophisticated technology can profitably be employed.

Un mince faisceau d'électrons à haute énergie travaillant sous vide permet de faire des soudures sans contamination tout en limitant au minimum la déformation thermique de la pièce. Le Centre de fabrication technique a pu démontrer qu'il est avantageux d'utiliser cette technique complexe dans bien des applications industrielles.