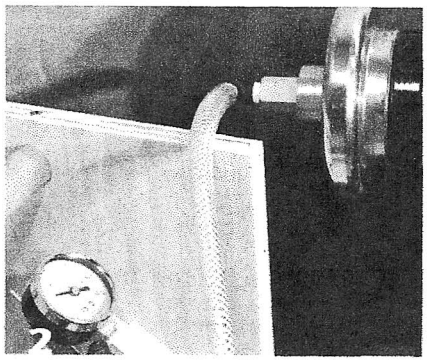
It should be noted that vacuum systems, while convenient, have some drawbacks. Porous or open-grained wood will allow air to pass through the walls of the turning and the bowl may not be held securely. Thin-walled turnings can be crushed if pressure is too high. And, vacuums will not hold as securely as a faceplate or a four-jaw chuck.

The problem of leakage

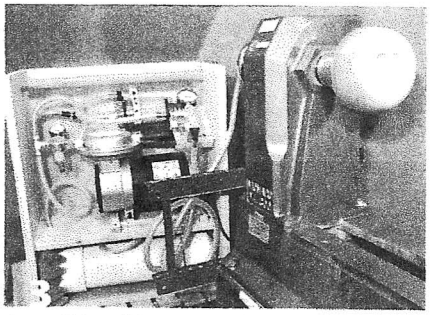
When I decided to upgrade my lathe by adding a vacuum chucking setup, I found many good articles describing how to *assemble* systems. Most descriptions of vacuum systems, however, failed to emphasize the importance of eliminating air leakage. Leakage can cause significant reduction in performance to the point of having undesirable consequences.

My engineering background told me that something was missing. All of these systems work and are successful, but the terms used to describe the systems and the descriptions of the operation were not always accurate. Furthermore, all the articles missed an important point. *The key to understanding a vacuum system and getting the most out of it is to control the leakage of air within the system.* Several authors suggest measuring the leakage by using the static reading of the vacuum gauge while the pump is running, but that is not a true indicator of whether there is leakage. This article will help you work with the system you already have, or will build, so that you better understand how and why it works and how to get the best performance from it.

I will offer an analogy to help explain some of the concepts of a vacuum system. Let's say Monty and Dave take Monty's boat out to do some fishing. Dave is a cautious guy and asks Monty if ▸



The rotary vacuum adapter (coupling) is shown inserted into the spindle in the center of the hand wheel at the outboard end of the headstock.



A small bowl is mounted onto the lathe using a vacuum chuck. This is the configuration utilized to clean up and finish the bottom of the bowl. This same setup is used for the fall-off test when looking for leakage.

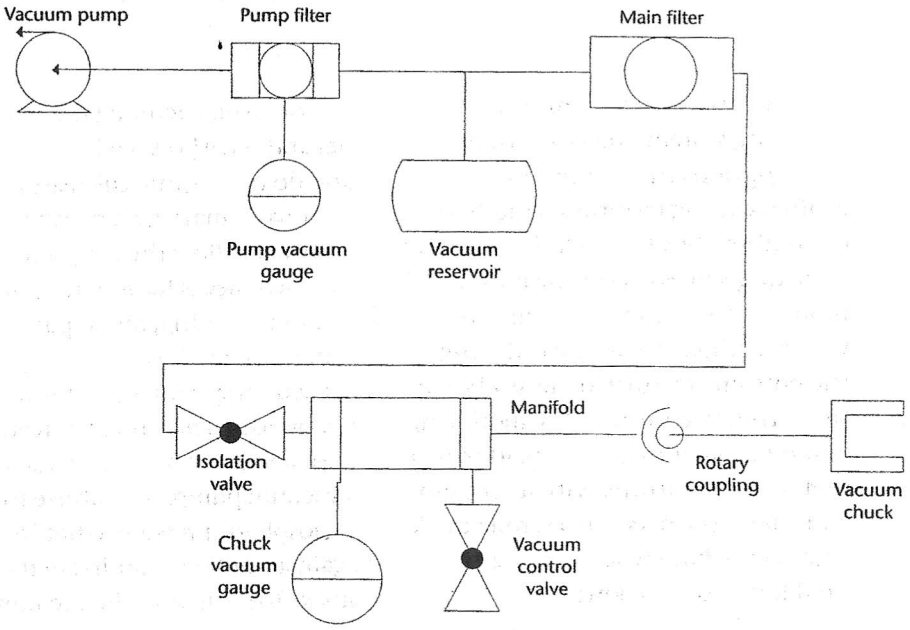


Figure A. Schematic diagram of the system in *Photo 1*. The isolation valve and vacuum reservoir are optional but recommended.

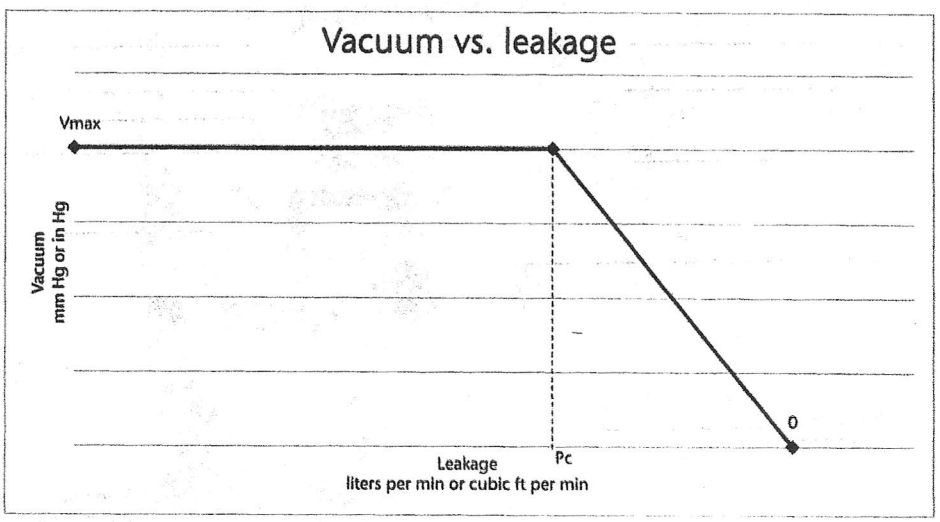


Figure B. The graph shows the relationship between the achieved vacuum and the system leakage. When there are no leaks, the vacuum will be at the maximum, Vmax. As the system leakage increases, the measured vacuum will stay near Vmax until the pump capacity, Pc, is reached and then it will decrease toward zero.