

## The Machine Tool Quest at the American Precision Museum Windsor, Vermont

*To get there: Windsor is located on Rte. 5 between exits 8 and 9 off Interstate 91. American Precision Museum is located on Rte. 5 (Main St), at the south end of Windsor Village, just south of the stoplight at the intersection of Main and Union/Bridge streets.*

*Go to the visitor center desk This is where you start the Quest. There you can pay to get in Now you may begin.*



American Precision Museum  
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*You will need a pencil!*

- A. The Precision Museum invites you to see  
An important chapter in American history. Right here—in the  
Robbins & Lawrence Armory— A revolution took place in  
machinery.

*Now pass through a door that is metal and thick.  
There is much to see in a room made of brick.*

- B. All things, including tools, were once built by hand.  
“One at a time” and “handmade” were rules of the land.  
But thanks to inventions, machines just like these,  
Identical copies (or parts) could be created with ease.

- C. As we learn about machines, along the Quest’s course Know that  
each machine requires an input: a **power source**. **Water** first  
powered all of these machines; Later, **steam** then **electricity**  
entered the scene.

*How did power get from **power source** to machine?  
Look up, down & around: can clues still be seen?*

- D. **Shafts, belts & pulleys** carried energy to the machines.  
Glance up to the ceiling...these three things can be seen.  
**Shafts** carry energy across. **Belts** carry energy down  
And where energy meets the tool? A **pulley** can be found!

*Look around the room; and at machines—2 or 3.  
Can you find **shafts, belts & pulleys**? Sure, that's easy.*

- E. Now despite having very specific functions The machines around  
you have things in common.  
Each machine rests on a sturdy **base**.  
Holding the machine steady—keeping it in place.

*Look around at the machines. Choose three or four.  
Can you find the **base** where the machine meets the floor?*

- F. And what in the world is this thing called a **lathe**?  
Well I'd hoped that you'd ask—that you would be brave.  
A **lathe** is a machine which holds, rotates and cuts.  
The result: *Precision manufacturing*...no ifs, ands or buts!

*Can you look around the workshop floor and find another **lathe**?  
That holds a work piece and spins it, while the cutting tool shaves?*

- G. Your next challenge: find a “Lathe” that is 20 feet in length.  
A column below (in the middle of the base) adds to its strength.  
Traveling across the **table** (or top) two parallel **rails** can be found  
And to adjust for different work piece sizes, a **handle** turns around.

*Look at a few machines. Can **rails** or **handles** be seen?  
Be careful not to touch or turn...but do take time to look & learn.*

- H. Now every machine has a different **cutting tool**. Keeping it sharp  
is a machinist's golden rule.  
While the base holds still, the cutting tool cuts or grinds.  
Look at a few machines: How many **cutting tools** can you find?

*To help you find them, one cutting tool has been painted gold.  
Can you find a **cutting tool** without being told?*

- I. Next, the **work piece** is a thing that is being cut or shaped.  
Depending on the settings, many forms this piece might take.  
Some **work pieces** might end up as the stock of a gun.  
Others might become a gear or lock when they were done.

*Look around for **work pieces**: to make things easier to view  
Some are wood and one has been painted bright blue.*

- J. Next, find a tall machine with an arching, curved top.  
The “Vertical **Boring** Machinel” (c. 1835) is your next stop.  
In this case “**boring**” means drilling a hole.  
Can you find another machine which has this same goal?

- K. Please search the room for a base that is green.      On top are ten  
circles just waiting to be seen!  
The thing this “**Iron Planer**” does is “**plane**.”  
What do we mean by this? Is the answer plain?

*To **plane** means to make a surface flat, even or “true”  
There are other **planers** here...can you find one or two?*

- L. So you’ve found machines that bore and plane.  
Can you find others that **mill**? Or the ones called **lathes**?  
In this case, “milling” means to cut down from *outside*.  
As opposed to boring: which drills, removing *inside*.

*Take a look around the workshop floor, if you will.  
Near the planers can you find machines that **mill**?*

- M. Because of this new machinery, precision and control,      Making  
parts—not just wholes—would be a new goal.  
Instead of having to create an entire new gun  
“**Interchangeable parts**” became the fashion.

- N. In the northeast corner of this workshop      Is the next place that I’d  
like you to stop.  
Behind this low wall all the tools you can see  
Worked together to build guns using new machinery.

*Look at the tools. Read the signs. Use your mind.  
Can you see how the tools were imagined & designed?*

- O. Kendall, Lawrence and Robbins—and others with this factory—  
made a significant impact on the course of history.  
Imagine a world without interchangeable & precision parts.  
Gone are cars, computers, phones and planes: things dear to our hearts.

*Finally, I have six questions for you to review.*

*Solve this puzzle and a WORD will come to you.*

1. Machine tools sit on a sturdy \_ \_ ( \_ ) \_  
1
2. The part of the machine that cuts is the ( \_ ) \_ \_ \_ ( \_ ) \_ \_ \_ \_ \_ \_  
2a 2b
3. The material being cut or worked on is called the \_ \_ \_ \_ ( \_ ) \_ \_ \_ \_  
3
4. \_ ( \_ ) \_ ( \_ ) \_ \_ means drilling a hole in the work piece 4a 4b
5. A \_ \_ \_ ( \_ ) \_ ( \_ ) creates a flat, even surface on the work piece  
5a 5b
6. A machine that holds, turns and cuts is called a \_ \_ \_ \_ ( \_ )  
6

\_\_\_\_\_

3 5b 6 2a 4b 1 2b 4a 5a

*Bring this word to the museum's front desk –  
To get the treasure box...you've passed the test!*

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*This Quest was created with the help of Valley Quest, with funding from the Challenge Cost Share Program of the National Park Service.  
2009-05-19*