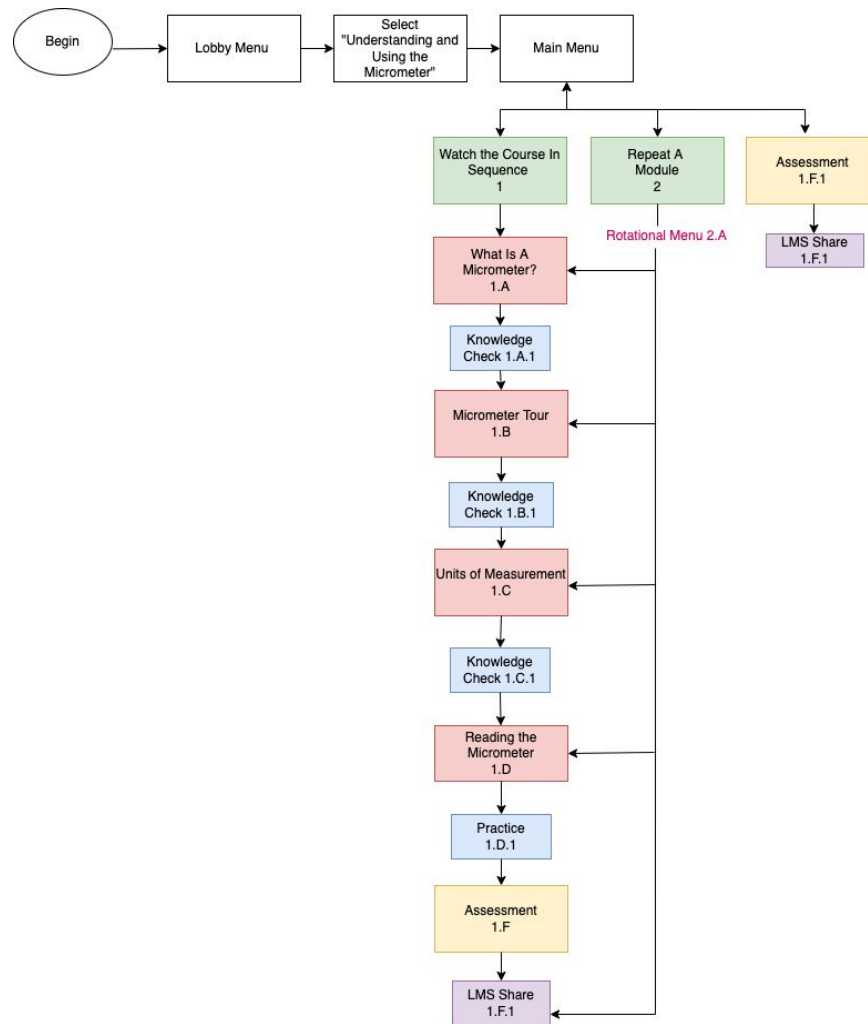


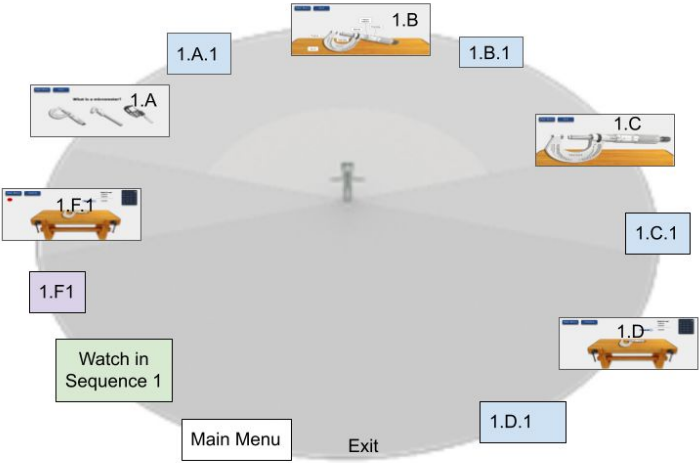
Understanding and Using the Micrometer


Demo Project - TRANSFRVR
Victoria Heric
May 12, 2022

Course Title	Understanding and Using an Inch Micrometer (15 minutes in length)
Stakeholders	TBD
SME	TBD
Target Audience	The target is young adults, approximately 15 years to 30, with no previous experience.
Terminal Objective	Given a series of VR videos, demonstrations, vocabulary, and hands-on exercises, participants will be able to record measurements using an outside inch micrometer accurately.
Learning Objectives	<ul style="list-style-type: none"> -Given access to a video in the VR headset, the participant will learn the purpose of a micrometer, its role in mechanical engineering, and the difference between a caliper and a micrometer -The participant will understand the purpose of learning to read a dial inch micrometer when digital micrometers are typical and develop the ability to differentiate from a metric micrometer. -Given a 3D tour of the micrometer, students will understand and articulate the key parts of a micrometer, including the spindle, thimble, barrel, anvil, hatch marks, and frame. -Given a close-up view of an inch micrometer barrel and thimble, students will understand and articulate the meaning of the hatch marks on the barrel, thimble, and vernier scale. -Students will understand how to read up to .0001" and add the different units of measurements together -Students will understand and articulate how to use an inch micrometer to take a reading -Students will understand common mistakes, including a failure to calibrate and zero out the micrometer before starting, mistaking the thimble for the barrel as required, not using the lowest hatch mark value on the thimble, or adding on the final vernier reading in the wrong decimal position
Expected Outcome	Participant can accurately read an inch micrometer in the classroom

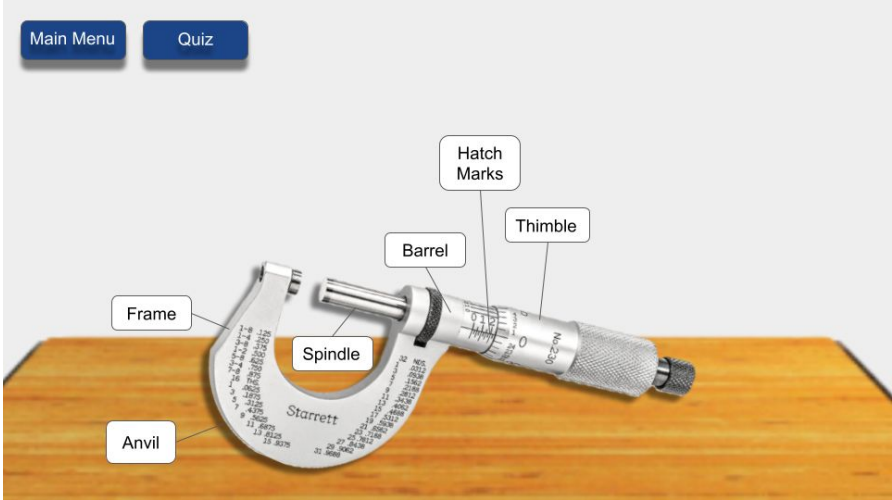
User Flow

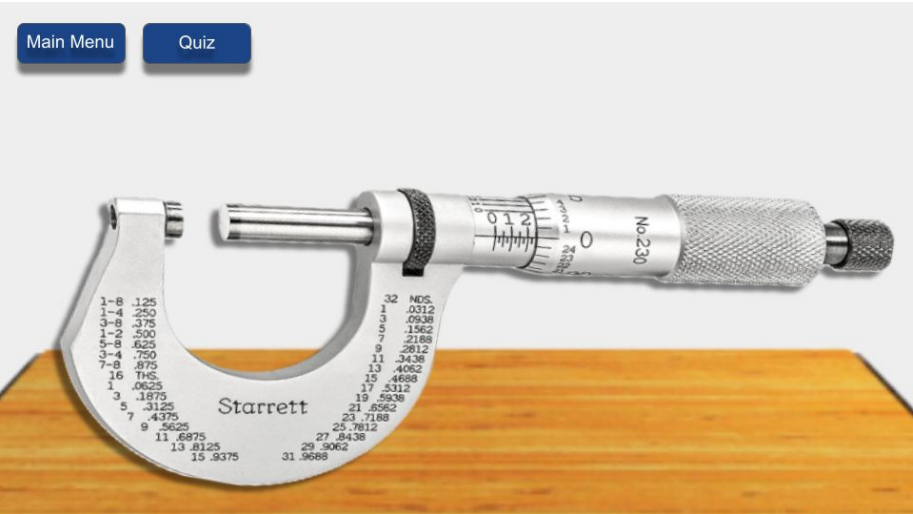


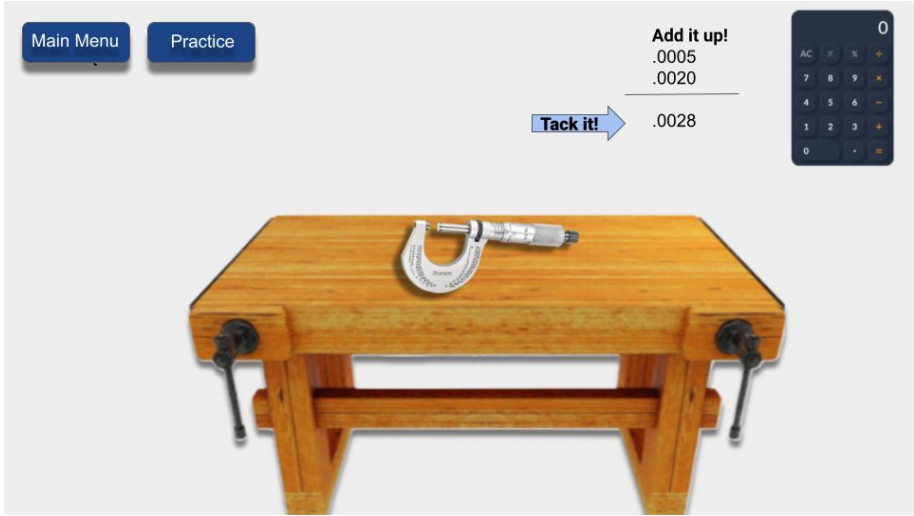
Understanding and Using an Inch Micrometer	Rotational Menu	2.A	VR Navigation Info
			<p>Thumbstick - rotate the room menu, move forward to view the items Trigger, A & X buttons to select menu item B & Y - enable to return to previous screen or menu</p> <p>Visual Info/Media</p> <p>Use intro slides for each module and knowledge check to create a rotational menu</p> <p>Reviewer Comments</p>
<p>Voiceover/ Audio</p> <p>Make a selection to view</p>			

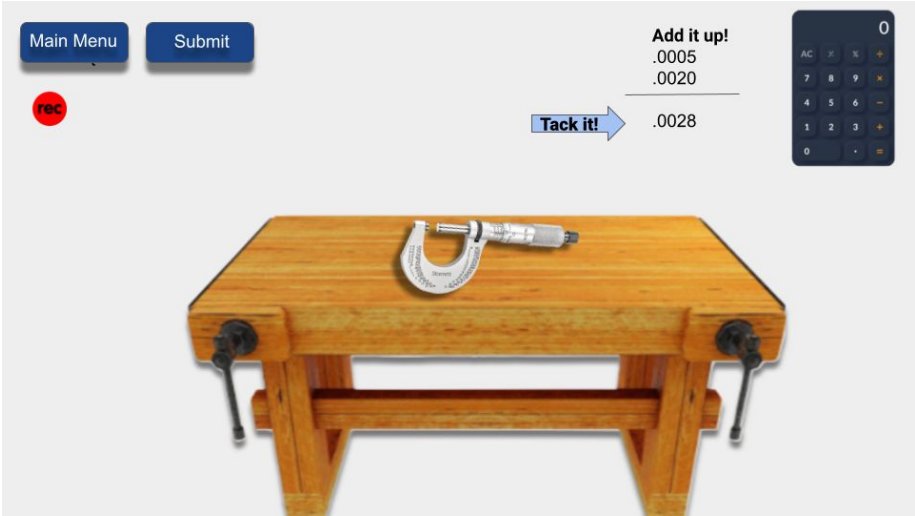
Understanding and Using an Inch Micrometer	What is a Micrometer	1.A	VR Navigation Info
<div data-bbox="206 186 1114 702"> <div data-bbox="227 208 334 252">Main Menu</div> <div data-bbox="349 208 457 252">Quiz</div> <h3 data-bbox="481 310 801 339">What is a micrometer?</h3>  </div>			<p data-bbox="1300 197 1783 331">Thumbstick - rotate the room menu, move forward to view the items Trigger, A & X buttons to select navi buttons and leave</p> <div data-bbox="1240 374 1914 450"> <p data-bbox="1460 405 1692 429">Visual Info/Media</p> </div> <p data-bbox="1315 487 1829 621">Use 3D models of different kinds of micrometers and calipers to showcase measurement tools on a plain 3D background. Allow the student to zoom.</p> <div data-bbox="1240 653 1914 729"> <p data-bbox="1441 683 1711 707">Reviewer Comments</p> </div>
<p data-bbox="48 734 280 756">Voiceover/ Audio</p> <p data-bbox="79 778 1184 1033">The outside inch micrometer is a measurement device that incorporates a calibrated screw to record accurate measurements of components in the mechanical engineering and machining trades. While the caliper can take multiple measurements, including outside, inside, height or depth, the outside inch micrometer can only be used to determine measurements outside an object. Micrometers can measure up to 1000th of an inch, allowing for precision when used by a skilled operator. Therefore, accurately reading an outside inch micrometer is an essential skill for any technical trade. Digital outside micrometers are typical in the workforce, but this is no replacement for understanding the fundamental steps required to take an accurate reading using a dial inch micrometer. Micrometers may vary in scale, including metric micrometers and sizes ranging from 1-2 inches to 20-25 inches.</p>			

Understanding and Using an Inch Micrometer	Knowledge Check	1.A.1	VR Navigation Info
<div data-bbox="220 194 1105 692"><div data-bbox="239 216 343 255">Main Menu</div><div data-bbox="363 216 467 255">Submit</div><div data-bbox="452 327 900 393">What is the single measurement that a micrometer can take?</div><div data-bbox="486 447 826 589"><ul style="list-style-type: none"><input type="checkbox"/> Height, width, depth, inside and outside<input type="checkbox"/> Inside of an object<input type="checkbox"/> Outside of an object<input type="checkbox"/> All the above</div></div>			<div data-bbox="1298 196 1789 364">Trigger, A & X buttons to select menu item or answer Grip - enable to point finger and select answer B & Y - enable to return to previous screen or menu</div> <div data-bbox="1244 375 1914 452">Visual Info/Media</div> <div data-bbox="1244 452 1914 653">Add highlight to navi buttons, and slight glow.</div> <div data-bbox="1244 653 1914 729">Reviewer Comments</div>
<div data-bbox="50 733 282 755">Voiceover/ Audio</div> <div data-bbox="81 810 1012 849">Music plays, voice to speech accessibility tools enabled.</div>			

Understanding and Using an Inch Micrometer	Micrometer Tour	1.B	VR Navigation Info
<div data-bbox="241 194 1137 699"></div>			<p data-bbox="1271 197 1846 248">Thumbstick - rotate the room menu, move forward to view the items</p> <p data-bbox="1271 257 1846 281">Trigger, A & X buttons to select menu item or answer</p> <p data-bbox="1271 290 1846 314">Grip - enable to point finger and select words and drag</p> <p data-bbox="1271 323 1846 347">B & Y - enable to return to previous screen or menu</p> <div data-bbox="1244 375 1914 452"><p data-bbox="1464 405 1692 429">Visual Info/Media</p></div> <p data-bbox="1282 478 1827 634">3D model of micrometer on workbench with drag and drop vocab words, navi buttons same as last.</p> <div data-bbox="1244 653 1914 729"><p data-bbox="1445 682 1711 706">Reviewer Comments</p></div>
<p data-bbox="50 734 278 758">Voiceover/ Audio</p> <p data-bbox="79 811 1199 1051">The essential parts of an inch micrometer include the spindle, thimble, barrel, anvil, hatch marks, and frame. The barrel and the thimble are used for taking the measurements using hatch marks which are the mathematical notations seen as lines on each side. The heart of the micrometer is the spindle which makes contact with the object being measured. The anvil can come in many sizes. Lift the micrometer and zoom in to view the parts, then take the knowledge check to match vocabulary words to these sections when you're ready.</p>			

Understanding and Using an Inch Micrometer	Units of Measurement	1.C	VR Navigation Info
<div data-bbox="193 185 1110 704"><div data-bbox="208 207 444 256">Main Menu Quiz</div></div>			<div data-bbox="1265 191 1845 365"><p>Thumbstick - rotate the room menu, move forward to view the items</p><p>Trigger, A & X buttons to select menu item or lift item</p><p>Grip - enable to finger to touch item</p><p>Arm raised enables lifting of item in air</p><p>B & Y - enable to return to previous screen or menu</p></div> <div data-bbox="1246 376 1912 453">Visual Info/Media</div> <div data-bbox="1265 469 1835 627"><p>3D model of micrometer on workbench should be able to move and rotate at barrel, thimble and spindle using grip and trigger.</p></div> <div data-bbox="1246 649 1912 726">Reviewer Comments</div>
<div data-bbox="48 731 280 758">Voiceover/ Audio</div> <p data-bbox="77 808 1178 911">Provides the end-user with a detailed explanation of the hatch marks and system of measurement on the inch micrometer including how to record .0001' measurements-script TBD.</p>			

Understanding and Using an Inch Micrometer	Reading the Micrometer	1.D	VR Navigation Info
			<p>Thumbstick - rotate the room menu, move forward to view the micrometer more closely</p> <p>Trigger, A & X buttons to select menu item or lift item</p> <p>Grip - enable to finger to touch calculator & articulate micrometer</p> <p>Arm raised enables lifting of item in air</p> <p>B & Y - enable to return to previous screen or menu</p> <p>Visual Info/Media</p> <p>3D model of micrometer on workbench should be able to move and rotate at barrel, and animate the process of a read upon first entry. Pause at Tack It! Before final number is entered to emphasize.</p> <p>Reviewer Comments</p>
<p>Voiceover/ Audio</p> <p>Provides the end-user with an opportunity to see a complete reading of the micrometer and move around the space using the Meta Quest controllers. This module also explain common mistakes: failure to calibrate and zero out the micrometer before starting, mistaking the thimble for the barrel as required, not using the lowest hatch mark value on the thimble, or adding on the final vernier reading in the wrong decimal position. This module will show the “Tack It!” approach to adding vernier .00000 readings to get accurate final number.</p>			

Understanding and Using an Inch Micrometer	Assessment	1.F	VR Navigation Info
<div data-bbox="193 186 1112 707"><div><div>Main Menu</div><div>Submit</div></div><div><div>rec</div><div><div>Add it up!</div><div><div>.0005</div><div>.0020</div><div><div>Tack it!</div><div>.0028</div></div></div></div><div><div>0</div><div>AC</div><div>7 8 9</div><div>4 5 6</div><div>1 2 3</div><div>0</div></div></div></div>			<p>Thumbstick - rotate the room menu, move forward to view the micrometer more closely</p> <p>Trigger, A & X buttons to select menu item or lift item</p> <p>Grip - enable to finger to touch calculator & articulate micrometer</p> <p>Arm raised enables lifting of item in air</p> <p>B & Y - enable to return to previous screen or menu</p> <div>Visual Info/Media</div> <p>3D model of micrometer on workbench should animate into 10 randomized configurations. Data records all correct entries, and sends report back to end user. Record buttons exports to social share feature native to main menu + class LMS. User may repeat the assessment.</p> <div>Reviewer Comments</div>
<div>Voiceover/ Audio</div> <p>Take the simulation and complete the ten readings to complete this course and share your results on Google Classroom using the record button</p>			

Lesson Title:

Understanding and Using an Inch Micrometer / KC 1

Screen #	Question Type	Text on Screen	Answer	Feedback
1.A.1	Multiple Choice	<p>What is the single measurement that a micrometer can take?</p> <p>A. height, width, depth, inside and outside</p> <p>B. Inside of an object</p> <p>C. Outside of an object</p> <p>D. All of the above</p>	C. Outside of an object	<p>A. Remember, the micrometer only takes on kind of measurement.</p> <p>B. Close, but that would be a different tool, try again.</p> <p>C. That's correct, the micrometer measures the outside of an object.</p> <p>D. The right answer is up there, but it can only be one.</p>