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# WKU takes close look at research with one of world's largest microscopes

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Martin Klein, president and founder of Ellcie Industries GmbH in Germa colleagues have examined in his Large Chamber Scanning Electron Micro in a scientific environment, at the NOVA Center at the WKU Center for Research Road in Bowling Green, Ky., on Friday, Aug. 25, 2023. The microscope, which magnifies objects up to 100,000 times and can handle objects up to five feet and 500 pounds, is able to provide a detailed view of the object's surface. The microscope is also capable of splitting the object into smaller sections to be studied in parts with standard

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If you want something engraved into a human hair, a jolly German scientist named Martin Klein is the man to see.

Klein is the inventor of one of the world's largest electron microscopes, housed within Western Kentucky University's Center for Research & Development.

"It's the world's largest electron microscope at a university and it's here in Bowling Green," Klein said. "Another word record, and you should inform the Guinness Book of Records about this, because you would win this prize easy."

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He and his company, Ellcie Industries, help maintain and operate the microscope at WKU's specially-built NOVA Center at the Innovation Camps. Last week, he visited to upgrade parts and stopped to speak to the Daily News.

Klein was invited to bring his Large Chamber Scanning Electron Microscope (LC-SEM) to the center by WKU in 2008. It was formerly housed at a military nuclear research facility in Oak Ridge, Tennessee.

"I remember the first time when I was here, (this lab) was the meat department of a grocery store," Klein said. "They converted everything into this beautiful lab now, so from the beginning, we were here."

Klein said only a few microscopes like this exist in the world: 10 across institutions in Germany, one in Japan's space program and one at the University of Beijing in China.

Traditional electron microscopes, much smaller than Klein's, often require samples be broken up into smaller pieces. This poses a problem

when a car manufacturer needs to measure precise wear and tear on a large part, for example.

Klein said his work is important to nearly every industry, from manufacturing to rocket testing to archeology. The microscope, about the size of a large walk-in freezer, has a four by five foot capacity and can measure objects too large for conventional microscopes.

The machine creates a 360 degree digital model magnified 100,000 times. An ion beam allows researchers to make imperceptibly small marks and it can even measure an object's chemical composition.

Klein presented a photo of a human hair taken by the microscope. The letters “WKU” had been carved into it with unimaginable precision.

He has come a long way from his start in a garage in east Germany.

Following the reunification of Germany the early 1990s, the newly formed government sought to

increase the industrial capacity of former East German areas.



Klein, who hailed from West Germany, said the government began handing out grants for companies willing to open in the east. Ellicie Industries was one of 100 companies born from the program in 1993 after receiving around \$500,000, Klein said.

“I built my first machine, my first microscope, with the money,” Klein said. “When I showed it as a special exhibition, immediately people came up and said ‘hey, we want one, I want one too,’ because it was so new.”

His company has grown to 10 people since then, employing engineers and physicists to facilitate the work. They

contracted several other companies to assemble the LC-SEM to their specifications.

The cost for their services starts at \$300 an hour, or \$100 for internal and graduate students.

It took years of study and work to get to where he is now, but Klein said “for mechanical engineers, everything is possible.”

“I encourage young people to study mechanical engineering because I like it so much, and I think it's necessary for this world,” Klein said.

The NOVA Center is one of six centers at the Innovation Campus under the Applied Research and Technology Program, a state-funded research program that aims to prepare students for careers in STEM.

Martin Cohron, research support coordinator for WKU's Southern Kentucky Center for Advanced Microscopy, works with students who wish to use the microscope for their own research.

Cohron recalled one student who used the machine to determine if gunshot residue left on clothing could give a clue to the caliber of a bullet, hoping the work could prove useful to law enforcement.

Other students have used the machine to study engineering weaknesses, allowing them to see fail points in scale models much easier than with the naked eye.

Cohron said the research potential with the machine is endless, and it can only be found domestically at WKU.

“Our young people, they come up with some really good ideas,” Cohron said. “This is just one of the things that they can use to prove or sometimes disprove something.”

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**Michael Collins**

Reporter

