

**Mississippi State University**  
**Notice of Proposed Sole Source Purchase**  
**223-38**

Mississippi State University anticipates purchasing the item(s) listed below as a sole source purchase. Anyone objecting to this purchase shall follow the procedures outlined below.

**1. Commodity or commodities to be purchased (make, model, description):**

Bench-top indentation plastometer with high-temperature capacity for materials testing.

**2. Explanation of the need to be fulfilled by this item(s), how is it unique from all other options, and why it is the only one that can meet the specific needs of the department:**

The Center for Advanced Vehicular Systems (CAVS) at Mississippi State University has a strong track record in developing new cutting-edge materials as well as manufacturing processes. These novel materials must be tested in order to measure their mechanical properties (e.g. strength, ductility, toughness) and determine the effectiveness of the manufacturing process. Such testing conventionally requires producing a large amount of material, careful sample extraction, and lengthy preparation prior to testing each sample individually. This process can be labor-intensive, error-prone, financially expensive, and highly time-consuming.

The requested machine is the first of its kind, using Profilometry-based Indentation Plastometry (PIP) to obtain material properties using a very small amount of material. As such, the system allows for the measurement of a large number of samples with significantly lower material, financial, and time costs. The addition of a high-temperature stage further extends these capabilities to also include the measurement of temperature-dependent data.

CAVS is currently involved in multiple projects funded through the Department of Defense (DoD), particularly the U.S. Army Engineer Research and Development Center (ERDC) and the U.S. Army Research Laboratory (ARL), with these agencies displaying keen interest in the development and testing of new materials and manufacturing processes. Furthermore, there is now an increasing emphasis on the use of Artificial Intelligence (AI) and Machine Learning (ML) in the development of such novel materials. These approaches are heavily data driven and hence require a large volume of tested data for training in order to properly serve their function as design tools. Generation of the requisite large amounts of data through individual tests is

often prohibitive and becomes a hurdle in the development process. Acquiring the bench-top indentation plastometer would enable CAVS to deliver the necessary amounts of testing data from a very large number of samples within a very short turnaround time.

In addition, the smaller amount of material required for analysis extends our testing capabilities beyond their current limits on two key fronts. First, certain new manufacturing processes are meant for production of small amounts of material (such as high-strength protective coatings or small machine components), rendering the extraction of large individual samples for conventional testing completely impossible. Second is the ability to better test functionally graded materials, wherein different locations within the same piece of material are designed to have different material properties. As such, testing larger samples would be inaccurate and non-representative due to the fact that different points within a single larger sample can have significantly different properties. In such circumstances, the bench-top PIP system can provide reliable data using less than 1/16<sup>th</sup> inch worth of material, opening the possibility for measuring thinner materials as well as probing multiple spots for local behavior within functionally graded materials to capture property variations within a single sample.

**3. Name of company/individual selling the item and why that source is the only possible source that can provide the required item(s):**

**Company Information:**

Name: Plastometex

Address: 204 Cambridge Science Park, Milton Road, Cambridge,  
Cambridgeshire, CB4 0GZ, England  
United Kingdom

Phone: +44 744 400 1329

Website: [plastometrex.com](http://plastometrex.com)

Plastometrex is considered to be the only source for the bench-top indentation plastometer, as it is a novel system for which a patent was granted on 25<sup>th</sup> of August 2021 (patent number GB 1908656.0). Therefore, there are currently no other products on the market that perform the same function as this system.

**4. Estimated cost of item(s) and an explanation why the amount to be expended is considered reasonable:**

The system is quoted to cost 65,800 British Pounds, corresponding to 71,860.18 U.S. Dollars. The currency conversion rate used is 1 USD = 1.0921 GBP, which is the most up-to-date conversion rate listed by the federal reserve at the time of preparing this document.

While the material properties measured by the requested PIP machine cannot be obtained using any other bench-top indentation systems, we can compare the cost to other indentation-based hardness testers. Below is a link for a listing from a reputable vendor for a bench-top automated indentation-based hardness tester which is listed at USD 73,900.00.

<https://www.penntoolco.com/mitutoyo-pc-driven-micro-vickers-hardness-tester-hm-220-type-d-v-k-64aab383a/>

Despite this tester only providing hardness data, it is priced higher than the requested PIP system which is capable of providing data on strength, ductility, and toughness in addition to hardness measurements. The PIP system also offers the option of performing these measurements at high temperatures, which is not possible in the hardness tester linked above.

**5. Explanation of the efforts taken by the department to determine this is the only source and the efforts used to obtain the best possible price:**

Given that the patent for the technology used in the system was granted in August 2021 to Plastomterex, there are no other vendors that offer testing systems that are capable of providing the same results, rendering Plastometrex the only source for such systems.

After conferring with the manufacturer for academic discounts, the quoted price includes a deep discount of 50,550 British Pounds (USD 55,205.66), which is a discount of more than 43%.

*(For a breakdown of the specific item prices, please see attached quote, Reference Number: 20220801-152622967).*

Any person or entity that objects and proposes that the commodity listed is not sole source and can be provided by another person or entity shall submit a written notice to:

Don Buffum, CPPO  
Director of Procurement & Contracts  
dbuffum@procurement.msstate.edu  
Subject Line must read "Sole Source Objection"

The notice shall contain a detailed explanation of why the commodity is not a sole source procurement. Appropriate documentation shall also be submitted if applicable.

If after a review of the submitted notice and documents, MSU determines that the commodity in the proposed sole source request can be provided by another person or entity, then MSU will withdraw the sole source request publication from the procurement portal website and submit the procurement of the commodity to an advertised competitive bid or selection process.

If MSU determines after review that there is only one (1) source for the required commodity, then MSU will appeal to the Public Procurement Review Board. MSU will have the burden of proving that the commodity is only provided by one (1) source.

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