

**OMB Control No. # 0693-0033 – NIST Generic Clearance for Program Evaluation Data Collections**

**NIST Advanced Manufacturing Strategic Planning Study: Economic Analysis of Technology Infrastructure Needs for Advanced Manufacturing**

**FOUR STANDARD SURVEY QUESTIONS**

**1. Explain who will be surveyed and why the group is appropriate to survey.**

The purpose of this information collection is to acquire information from manufacturers that will allow the National Institute of Standards and Technology (NIST) to evaluate its strategic options and programs for investing in research and support activities that will best support manufacturers as greater numbers of them develop and/or adopt advanced manufacturing methods and technology.

The collection will acquire information and perspectives from firms who are engaged in (1) additive manufacturing, (2) roll-to-roll manufacturing, (3) advanced robotics and automation, and (4) smart manufacturing technologies. These advanced manufacturing methods are emerging; the information that is required to assist NIST in evaluating its standards and measurement programs and options has never been collected before. The information collection is being launched in direct response to requests from industry (including potential interviewees) and government for NIST to enhance its programs.

Collecting information will allow NIST to evaluate its programs and launch activities that will directly benefit interviewees. Thus, we expect that interviewees will be interested and see benefit to themselves of participating in our information collection.

**2. Explain how the survey was developed including consultation with interested parties, pre-testing, and responses to suggestions for improvement.**

There are four instruments—one instrument for each of the four technical areas of interest. The interview guides were developed following early, unstructured discussions with potential interviewees; a review of the scientific, engineering, and industry literature related to the topics; consultations with industry associations and independent technical experts; and in-depth consultation between NIST technical experts and the contractors leading the data collection on NIST's behalf.

During the review of our draft instruments, we received comments from third parties and technical experts about mode of collection, word choice, length, and potential redundancy among questions. The edits recommended by reviewers were accepted by the authors. The interview guides were subsequently pretested by 8 interviewees, who found the questions to be

reasonable, answerable, and logically ordered. The mean conversation length was 35 minutes.

**3. Explain how the survey will be conducted, how customers will be sampled if fewer than all customers will be surveyed, expected response rate, and actions your agency plans to take to improve the response rate.**

Interviews facilitated by semistructured interview guides were recommended as the mode for data collection by potential interviewees, who felt that many of the questions included on the instruments are better suited to open-ended response than to choosing from predefined answer selections. Therefore, the instruments will be implemented using interview-based primary data collection over the telephone or in-person at conferences, meetings, and gatherings of professionals and researchers engaged in the technical areas of interest. Interview guides will be shared with respondents in advance, allowing them the opportunity to review the questions and burden estimate, and choose whether or not to participate in the information collection. Interview guides will be shared with respondents in advance, allowing them the opportunity to review the questions and burden estimate, and choose whether to participate in the information collection.

Firms engaged in advanced manufacturing are not characterized by a common NAICS code, but rather by the methods being used by firms across many NAICS codes to develop and manufacture products. Therefore, rather than sampling using lists of firms by NAICS codes, we are sampling using lists of firms that belong to or participate in industry associations, consortia, professional associations, and other cross-industry thematic groups.

The groups from which our sample will be drawn include:

- Association of Manufacturing Technology—Additive Manufacturing
- Composite and Advanced Materials Expo
- FlexTech Alliance
- Industrial and Systems Engineering Advanced Manufacturing and Logistics Symposium
- International Collaborative Robotics Conference
- International Manufacturing Technology Show
- National Academy of Engineering Summit for the Grand Challenges in Manufacturing
- Rensselaer Center for Automation Technologies and Systems/Center for Economic Growth Advanced Manufacturing Conference
- Robotics Industries Association’s National Robot Safety Conference
- University of Texas at Austin Solid Freeform Fabrication Symposium

We will invite 800 firms to participate in the information collection, with 200 invitees for each of the four focus areas. Invitees will be invited by email. The email invitation will include a synopsis of the study and a copy of the appropriate interview guide. Because of the timeliness of the topic and the opportunity to participate in an evaluation of NIST’s programmatic options, we anticipate that 50% will accept our invitation. We will issue one request to participate and one reminder.

Participating firms will receive copies of the analysis and all reports when they are approved for public release by the NIST Economic Analysis Office. These reports will provide an analysis of industry needs and trends that will be useful to participants.

**4. Describe how the results of the survey will be analyzed and used to generalize the results to the entire customer population.**

For the purposes of this prospective evaluation, NIST does not require statistically significant results. Rather, it requires an overall evaluation of trends, needs, and prospective impact.

The information collected will be analyzed using Nvivo, Stata, and Excel software tools. These tools permit efficient thematic analysis that will allow NIST to evaluate overall trends and needs by each of the four technical areas. The tools will also allow us to export data to an economic model that will allow NIST to understand how its programs could mitigate market failures impeding advanced manufacturing's progress and quantify the consequent prospective economic benefit. The results will be generalized to the overall population using the revenue, research and development expenditure, and employment data summed for the unique firms included on the membership lists referred to previously.