



Ingenuity on Display

THE CLINIC PROGRAM AT HARVEY MUDD COLLEGE

by Sheila Wagner

In 1963, Jack Alford and Mack Gilkeson, engineering professors at Harvey Mudd College, were watching a homecoming parade. While marveling at the ingenuity on display with the design of floats, they came up with the idea of Harvey Mudd College Clinic Program. They named it “Clinic Program” because it offers students experiences like medical students receive.





Tackling Design and Manufacturing Problems

Over the years, junior and senior engineering students at HMC participating in the Clinic Program have tackled design and manufacturing problems in over 1,600 projects for more than 500 clients, many of them Fortune 1000 companies. This program depends entirely on problems provided by the engineers, scientists and mathematicians at the sponsor companies—the untried problems, the open-ended problems that stretch the imagination, the authentic, complex and messy problems that stimulate creative thinking.

The sponsors retain full rights to all intellectual property developed by the team. Sponsors regularly attest that the fresh ideas and project results have dollar values that far exceed the Clinic fee. Perceived sponsor value is further evidenced by the fact that more than half of the sponsors have returned for additional projects.

Colleen Coxe, Harvey Mudd College Corporate Relations Director, said that the fee is \$50,000 in 2018-19. She stated, “The value



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sponsoring companies have placed on results can range from preventing a company from investing in R&D that ends up not being productive or feasible, to millions of dollars in patent rights and/or cost savings.”

Selecting Strong Teams of Students

Coxe explained that the teams are divided according to the disciplines necessary to complete the project. Sometimes there are teams of just engineering students or computer science students. There are a few teams that are joint between two majors, typically math and computer science, computer science and engineering, or physics and engineering. Students are able to submit ranked choices for projects and then faculty consider the choices in building teams that meet the needs of the project in terms of skill sets. Faculty also consider team dynamics in building the teams, which can be a significant success factor. She continued, “Having the faculty insight provides unique value to the process.”

During their Clinic projects, students work in groups of four or five under the guidance of a student project manager (team leader), a faculty



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advisor, and a liaison from the sponsoring organization. Projects begin in September, involve about 1,200 to 1,500 work hours, and are completed the following May. The sponsor's liaison outlines the project requirements, approves the team's proposal for accomplishing the work, and receives weekly progress reports. In most cases the student team visits the sponsoring company during the first month. All the teams unveil their findings to professors, friends, families, company liaisons and other sponsor representatives at HMC's annual "Projects Day."

Project for HP, INC.

Nancy Lape, Professor of Engineering at HMC, was the faculty advisor last year of a project for HP, Inc. This company has a new type of printer that uses an electrical charge long enough to get ink to stick to the right parts of a roller so that it quickly and easily switches to different images to make beautiful color prints, unlike the old fashioned way of having to prepare a plate for each individual page. Their printer used lithium salt with the rubber roller to make it conductive, but it leached out after usage.

Lape's team was working on the best way to add carbon black to the rubber that goes onto the roller to hold that charge. It needed to have the right conductive and mechanical properties. In addition, the carbon black needed to spread evenly all through the rubber. Her team explored a lot of different ways to make the samples in the lab-based research. HP is continuing the research and is in negotiation with HMC for possibly continuing the project this year. Lape said, "Our team was able to advise them how they should make their composites with the carbon black and the rubber to get the best performance for the rollers in their printers."

Jacey Coniff, a 2018 graduate from the Engineering Program, who was actively involved in the HP clinic project, gained a lot of useful practice in solving problems in an industry setting and working in a team. She said, "Professor Lape provided us with helpful feedback about project management and technical solutions and aided us in communicating well with our HP liaisons."

Harvey Mudd's Commitment to Intellectual Breadth and Depth

College rankings repeatedly have recognized Harvey Mudd College's commitment to both intellectual breadth and depth. *U.S. News and World Report* ranked HMC number one in 2018

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for undergraduate engineering programs at non-doctoral institutions, as well as number seven for “Most Innovative Schools.” *Forbes* magazine also cites the college for its diversity initiatives, in particular engaging women and minorities in STEM majors.

Charles Volk, Vice President and Chief Technologist, Navigation System Division, for Northrop Grumman praised HMC for projects in the last five years. “These symbiotic Clinics give the students a forward look into the execution of a project in the engineering industry and bring open and unfettered ideas into the industry,” he affirmed.

Adam Bernstein, Group Leader, Lawrence Livermore National Laboratory has stated, “LLNL has been sponsoring Harvey Mudd College Clinic teams for nearly two decades, and I personally have engaged with the teams nearly every year for the last decade. The students are invariably among the brightest in the country and a pleasure to work with and...meet or exceed the goals we set in our Clinic projects.”



ABOUT THE AUTHOR: Sheila Wagner has spent the last several years working as a professional editor and recently became the staff writer for *Private University Products and News*. Wagner can be reached at sheila@pupnmag.com.

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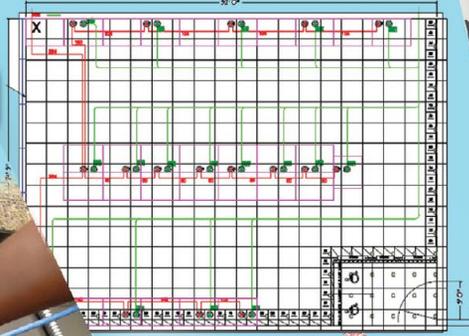
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