Project Pioneer: James C. (Jim) Sivells

AEDC Fellow James C. (Jim) Sivells, who was the manager of the hypersonics branch of the von Kármán Facility (VKF) for the center's first contract operator, Arnold Research Organization from 1958 until 1977, left a lasting mark on AEDC and across the United States with his pioneering technical contributions to the science, concept and development of the center's hypersonic ground test facilities.

His work, particularly in the area of supersonic/hypersonic nozzle design, set a standard which was put into use in other areas of AEDC and in a variety of applications by a range of test facilities across the country.

Prior to joining the work force at Sverdrup & Parcel and subsequently AEDC, Mr. Sivells worked as an aeronautical engineer at the National Advisory Committee for Aeronautics (predecessor to NASA) at Langley, Va. Already putting his innovative skills to use, he had developed a method to characterize three dimensional un-swept wings using two dimensional nonlinear airfoil section data.

While at the facility, he also developed a 9 by 12-inch supersonic blow down tunnel.

Between 1950 and 1953, while employed at Sverdrup & Parcel in St. Louis, Mo., he took a leading role in the fundamental design of the entire VKF plant, including all of the facility's compressor system, ducting and valves, all of which is in use today.

While at AEDC, Mr. Sivells continued to make revolutionary improvements in the center's hypersonic testing capabilities. He took the lead in developing the model injection and captive trajectory systems now used in VKF's continuous supersonic/hypersonic tunnels A, B and C. This system is credited as one of the main reasons why AEDC continues to be at the forefront of hypersonic wind tunnel productivity today.

He was also instrumental in the development of the magnetic suspension tunnel, Tunnel E. He accomplished early studies on testing related to store separation and store-aircraft compatibility.

One of his most lasting contributions was his development of a FORTRAN (formula translation) computer code, for aerodynamic design of supersonic/hypersonic wind tunnel nozzle contours.

He applied this code to design axisymmetric nozzles to VKF Tunnels B and C and the aerothermal tunnel modification to Tunnel C. The Tunnel B Mach 8 axisymmetric nozzle he designed in the early 1960s is considered to be one of the world's finest nozzles in terms of flow quality.

His successors at AEDC used his code to design axisymmetric nozzles for the VKF Air Flow Calibration Laboratory, the APTU gas generator and most of the center's Arc heater nozzles.

AEDC Fellow Dr. John Adams provided some insight into the value of Jim Sivells' contributions to nozzle design, saying, "The Sivells nozzle design methodology has stood the test of time over four decades and still ranks today as one of the most applicable design tools for high flow quality supersonic/hypersonic contoured nozzles in ground test facilities. It was absolutely crucial to preserve and document (as an AEDC Technical Report) this unique capability for future use."

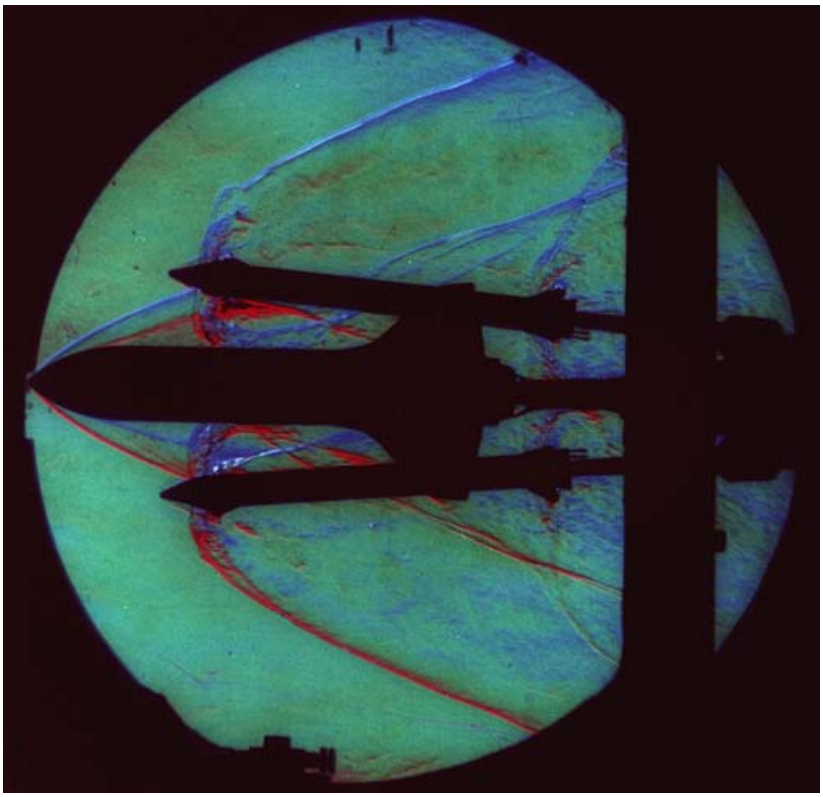
Over the past 27 years, his code has been distributed to close to 24 locations around the United States and world for a variety of applications in industry, academia and other aerodynamic ground testing facilities

His nozzle contour design code has also been incorporated into more contemporary nozzle design procedures, including NASA engineer John Korte's adoption of Mr. Sivells' centerline distribution procedures.

Mr. Sivells passed away in 1997.

From left, Julias Lukasiewicz, Chief of the von Kármán Facility in 1959, consults with Jim Sivells during testing at the facility.

From left to right, Dick Rhudy, Jim Sivells and Jim Langford examine a test article at the von Kármán Facility at AEDC in 1964. The two engineers with Mr. Sivells were members of his Hypersonic Branch in VKF.



Some of the pioneering work done at the center's von Kármán Gas Dynamic Facility included space shuttle separation tests performed to examine dual solid booster separation from the shuttle and external tank. This schlieren photo shoots a test in Tunnel A at the VKF in 1974.