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To whom it may concern:

I am pleased to provide an appraisal of the potential of technology developed by Mathers Hydraulics Pty. Ltd. I am the Director of the Center for Compact and Efficient Fluid Power, a National Science Foundation funded Engineering Research Center. We are a network of seven universities and more than fifty companies, and are the preeminent academic fluid power research center in the United States. You can learn more about us at www.ccefp.org.

In my professional capacity, I have the opportunity to learn about many new proposed approaches to the problem of efficiency in hydraulics. Most of these proposals are unsound based on practical or theoretical considerations. An exception is the energy-saving technology being developed by Mathers Hydraulics.

The Mathers pump, a vane pump with retractable vanes, is an important new development that has many practical applications. Many functions on mobile hydraulic equipment are only used intermittently. When not in use, the pumps on such circuits waste a considerable amount of energy. Examples of such functions include the dump circuit for trucks and hydraulic fan drives. There are many others. The retractable feature of the Mathers vane pump can greatly lower the energy use in such circuits.

The Mathers pump can also be used to make a power-split transmission, also known as a hydro-mechanical transmission. Such transmissions have the potential of being more efficient than hydrostatic transmissions, but retain the continuously variable effective gear ratio feature. The reason for the increased efficiency is that some of the power is transmitted mechanically rather than solely hydraulically.

Current power-split transmissions are heavy and expensive, often containing complicated mechanisms such as planetary differentials. In contrast the Mather's power-split transmission consists of a Mathers pump on a common shaft with a variable-displacement motor, such as an axial piston swash-plate motor. The design is simple and elegant. The retractable vanes of the Mathers pump function as an integral clutch. The outer ring of the pump is mounted to the input of the motor instead of mechanical ground so that the flow of the pump depends on the difference in rotation rate between the input and output shaft of the Mathers pump. The output shaft conveys the mechanical portion and the fluid conveys the hydraulic portion of the power-split transmission. In this arrangement the speed is reduced and the torque is increased as is desired for vehicle propulsion with the variable-displacement motor regulating the effective gear ratio.

In our research group we are actively pursuing research on hydraulic hybrid vehicles and wind power. Because of potential of the Mathers power-split transmission, I have assigned a doctoral student and a post-doc to study it as part of a systems evaluation of hydraulic hybrid vehicles. I regard the Mather's pump and its application as high potential for providing energy saving technology for a wide-range of possible hydraulic applications. If you require any additional information, I would be happy to provide it.

Sincerely,

Kim A. Stelson

Kim A. Stelson
Professor and Director
NSF Engineering Research Center for Compact and Efficient Fluid Power