CONCENTRATED SOLAR ENERGY FOR MANUFACTURING IN SPACE. R. B. Garvey[1] and A. T. Brewer[2], [1]Blueshift, LLC, 575 Burbank St. Unit G, Broomfield, CO 80020, rgarvey@blueshiftusa.com, [2]Blueshift, LLC, abrewer@blueshiftusa.com.

Abstract: Heat generation for manufacturing in space is energy intensive using traditional methods of energy collection, storage, and heating (e.g. microwave, resistive heating, radioactive decay). Concentrated solar thermal energy can act as the primary heat source in a number of current space applications and can serve as a plentiful source of heat for manufacturing and materials processing throughout most of the solar system. However, usage of concentrated solar energy is limited for use in space systems due to a perception that it is not as reliable or controllable as electrical methods of heat generation. This paper explores techniques from terrestrial manufacturing and large-scale power generation which incorporate concentrated solar thermal energy, and which may be applied in various capacities for space exploration and infrastructure development. These technologies are discussed in the context of space applications using lightweight lenses, mirrors, and reflective foils for easily deployable solutions. The major benefits of these approaches include an abundant and renewable energy source (i.e. the Sun), 1.36 kW/m^2 energy capacity at 1 AU, and a range of producible heats up to a theoretical maximum of 5,700 K. Advancing technologies in space resource utilization show that concentrated solar may play a key role in the development of tools and a robust infrastructure for in-space manufacturing.