

SPACE SYSTEMS SYMPOSIUM (D1)  
Enabling Technologies for Space Systems (2)

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AN VERSATILE APPROACH FOR ASSEMBLING REFLECTORS IN SPACE

**Abstract**

With the development of space exploration, there are many science and commercial missions, such as astronomical observation, mobile communication, detection and early-warning et al, which could benefit significantly from large (in the 10- 50 meter range for main aperture diameter)reflector. On-orbit assembly is likely to be one of the most feasible way to construct those big applications, but previous approaches for assembling large reflectors in space have been perceived as very costly because they require high precision and custom components, or inefficiently because they need to weld hundreds of components (struts and nodes) one by one assisted by two sets of Intelligent Precision Jigging Robots (IPJRs). In this paper, a new versatile and efficient reflector assembly approach is proposed incorporating: Mobile Parallel Symmetry Assembling Robot (MPSAR) that can assembly module precisely and move to the next assembling position efficiently, Versatile Deployable Module Sets (VDMS) that can be used to assembly reflectors of different apertures, Versatile Thermosetting Connection Components (VTCCs) that can be used to connect modules with different gaps by its adjustable lengths and angles, Long Reach Manipulating Robot (LRMR) that can carry module stacks to assembling positions in a far distance, and High-Accuracy Global Measuring System (HAGMS) that can measure module's pose precisely by three predefined marks in the assembling process. Key advantages of the new approach, as well as concept descriptions and ongoing research and technology development efforts for each of the major elements are summarized.