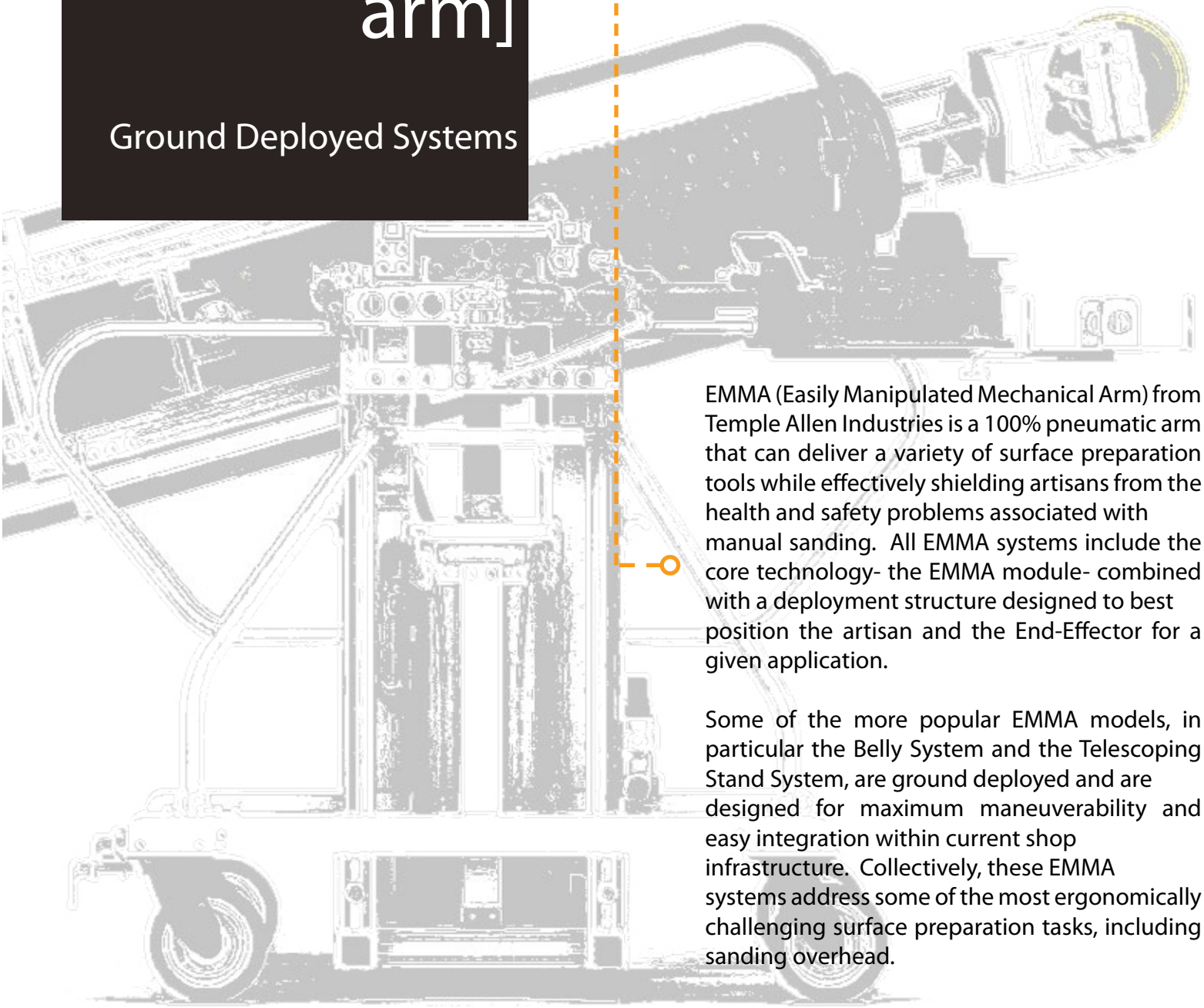
meet EMMA

[easily manipulated mechanical arm]

Ground Deployed Systems



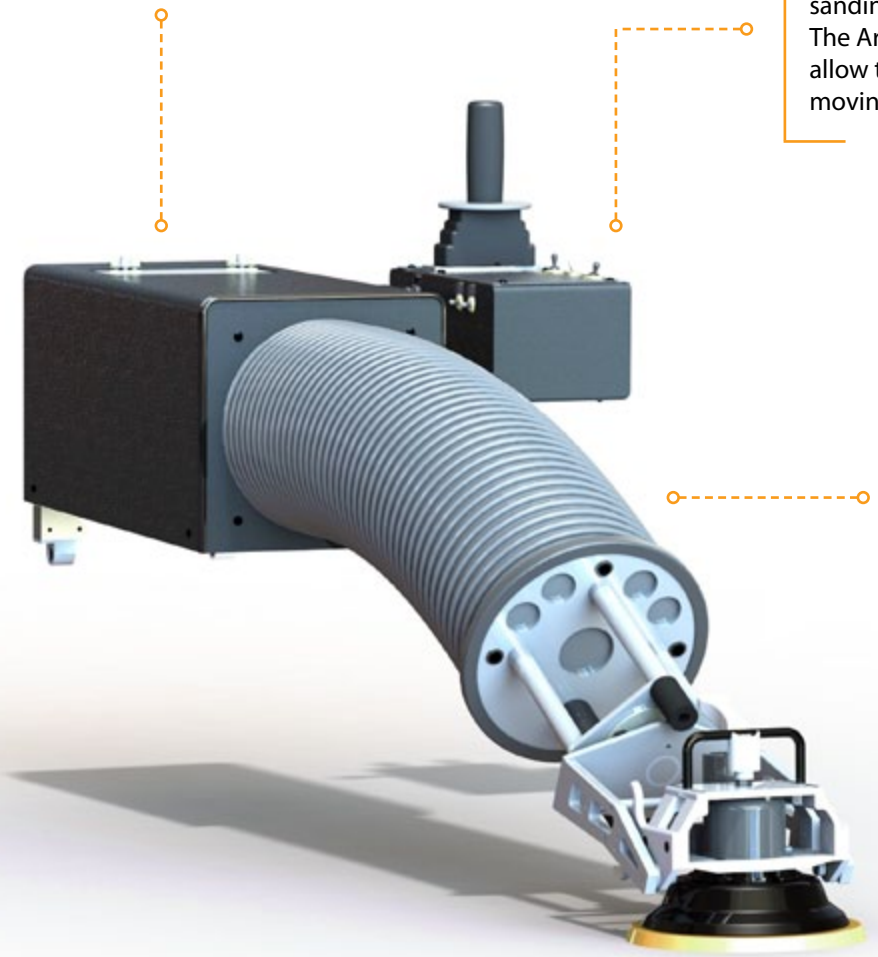
EMMA (Easily Manipulated Mechanical Arm) from Temple Allen Industries is a 100% pneumatic arm that can deliver a variety of surface preparation tools while effectively shielding artisans from the health and safety problems associated with manual sanding. All EMMA systems include the core technology- the EMMA module- combined with a deployment structure designed to best position the artisan and the End-Effector for a given application.

Some of the more popular EMMA models, in particular the Belly System and the Telescoping Stand System, are ground deployed and are designed for maximum maneuverability and easy integration within current shop infrastructure. Collectively, these EMMA systems address some of the most ergonomically challenging surface preparation tasks, including sanding overhead.

EMMA [technology]

Actuation Package
The Actuation Package houses the pneumatic circuitry and an array of cylinders that power the Arm.

Joystick Box
With intuitive joystick controls, an EMMA operator is always in full control of the sanding system and material removal rate. The Arm features proportional controls, which allow the artisan to vary the sweep rate by moving the joysticks more/less.



Arm
The Arm is a sheathed set of control cables and a polyurethane core that generates EMMA's smooth motion. In addition to absorbing all vibration generated by the sander(s), the core provides the necessary compliance to offer artisans the option to manually guide the End-effector by its handle to make micro-adjustments to increase/decrease contact pressure and navigate in/around areas requiring detail sanding.

Auto-Adjust
Each EMMA has an Auto-Adjust mechanism that accommodates both flat and curved surfaces, ensuring the consistent application of user-specified contact pressure over the skin of an aircraft.

End-Effector
The End-Effector is the mounting assembly that holds the sander(s) at the end of the Arm. In an EMMA End-Effector frame, the sander(s) independently pitch and roll and are balanced to allow abrasive discs to conform to the working surface. EMMA End-Effectors always hold sanders flat (normal) to the surface. EMMAs can be outfitted with a variety of End-effectors to tackle different surface preparation challenges.

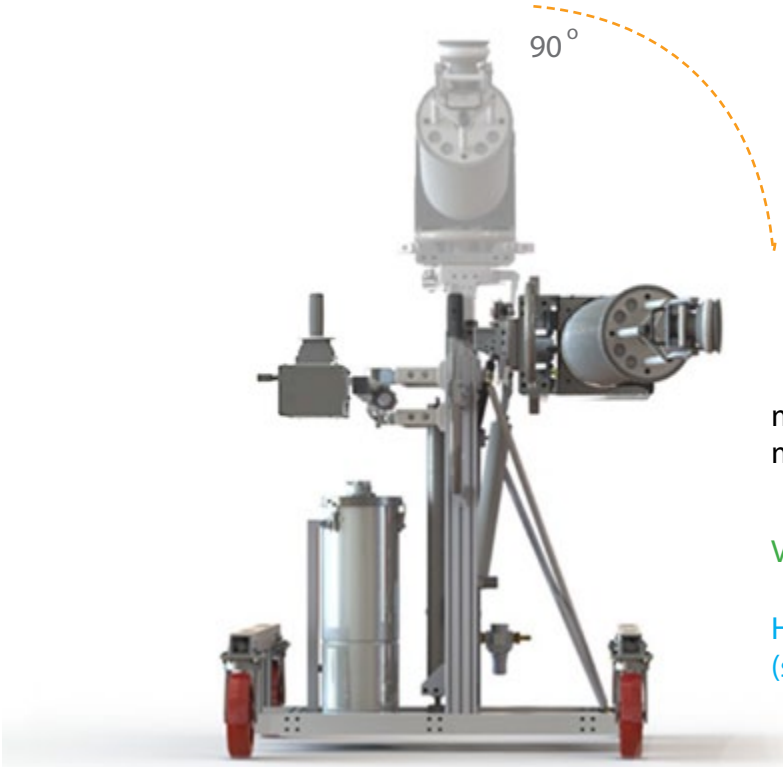
Belly System

The EMMA Belly System solves the greatest ergonomic challenge in surface preparation - sanding or grinding overhead. EMMA allows the operator to comfortably sand the belly of an aircraft and underneath its wings. The operator sits in the EMMA's adjustable reclining chair and controls the system using the joysticks.

All min and max heights are estimates based on the standard EMMA model for each system. The reach of system can be tuned (with wheel selection, extension selection, etc.) to best meet the needs of a specific application.

max 83″
min 35″

Horizontal surfaces (sanding up)



max 98″, 94″
min 19″, 70″

Vertical surfaces

Horizontal surfaces (sanding up)

Telescoping Stand System

The EMMA Telescoping Stand System performs surface preparation either overhead or to the side, and can roll independently along the floor or take guidance from a track or rail. The operator stands comfortably upright and uses the joysticks to control the Arm and End-Effector.

The EMMA Telescoping Stand System has a Turntable feature that grants the artisan the freedom to lock the EMMA module in various positions in the yaw axis. Combined with other degrees of freedom built into the deployment, the Turntable allows easy macro- and micro- positioning.

Telescoping Stand System (D-90)

The EMMA Telescoping Stand System (D-90) performs surface preparation on vertical surfaces and horizontal surfaces (sanding down). The system can roll independently or take guidance from a track or rail.

Like the EMMA Telescoping Stand, Telescoping Stand D-90 Systems have a Turntable feature that allows the artisan to lock the EMMA module in various positions in the yaw axis. Combined with other degrees of freedom built into the deployment, the Turntable allows for easy macro- and micro- positioning.