caused by a sudden reduction of engine power setting, reduce power slowly. Shock cooling is generally considered to be the outside components of an engine cooling much faster than the truly hot parts inside the engine not directly exposed to cooling airflow. This shock cooling allows the external parts to cool faster and shrink more than the interior components resulting in binding and scuffing of moving parts such as piston rings and valves.

To reduce the possibility of inflight fire, the manufacturer provides engine cool-down procedures for reducing engine system temperatures prior to shutdown. Reducing throttle setting allows the engine to begin a gradual cool down. The GFM/POH may also instruct the pilot to adjust propeller pitch at this time. Lowering the nose to increase airspeed provides faster flow of cooling air to the engine cooling system. Several minutes of reduced throttle and increased cooling airflow are enough to allow the engine to be shut down.

If the engine is retractable, additional time after engine shutdown may be necessary to reduce engine temperature to acceptable limits prior to retracting and stowing the engine in the fuselage. Consult the GFM/POH for details. *[Figure 7-22]*

Retractable-engine self-launching gliders are aerodynamically more efficient when the engine is stowed, but produce high drag when the engine is extended and not providing thrust. Stowing the engine is critical to efficient soaring flight. Prior to stowing, the propeller must be aligned with the longitudinal axis of the glider, so the propeller blades do not interfere with the engine bay doors.

Since the engine/propeller installation in these gliders is aft of the pilot's head, these gliders usually have a mirror, enabling the pilot to perform a visual propeller alignment check prior to stowing the engine/propeller pod. Detailed instructions for stowing the engine and propeller are found in the GFM/POH for the particular glider. If a malfunction occurs during engine shutdown and stowage, the pilot cannot count on being able to get the engine restarted. The pilot should have a landing area within power-off gliding distance in anticipation of this eventuality.

Some self-launching gliders use a nose-mounted engine/propeller installation that resembles the typical installation found on single-engine airplanes. In these self-launching gliders, the shutdown procedure usually consists of operating the engine for a short time at reduced power to cool the engine down to acceptable shutdown temperature. After shutdown, the cowl flaps (if installed) should be closed to reduce drag and increase gliding efficiency. The manufacturer may recommend a time interval between engine shutdown and cowl flap closure to prevent excess temperatures from developing in the confined, tightly cowled engine compartment. These temperatures may not be harmful to the engine itself, but may degrade the structures around the engine, such as composite engine mounts or installed electrical components. Excess engine heat may result in fuel vapor lock.

If the propeller blade pitch can be controlled by the pilot while in flight, the propeller is usually set to coarse pitch. Some installations have a propeller feathering system that reduces propeller drag to a minimum for use during non-powered flight. Some self-launching gliders require the pilot to set the propeller to coarse pitch prior to engine shutdown. Other self-launching gliders require the pilot to shut down the engine first and then adjust propeller blade pitch to coarse pitch or setting to a feathered position. As always, pilots must follow the recommended shutdown procedures described in their GFM/POH.

Common errors during climb-out and shutdown procedures include:

- Failure to follow manufacturer's recommended procedure for engine shutdown, feathering, and stowing (if applicable).
- Failure to maintain positive aircraft control while performing engine shutdown procedures.
- Failure to follow proper engine extension and restart procedures.

Landing

If the self-launching glider is to land under power, the pilot should perform the engine restart procedures at an altitude that allows time to reconfigure. The pilot should follow the manufacturer's recommended engine start checklist. Once the engine is started, the pilot should allow time for it to warm up. After the engine is started, the pilot should ensure that all systems necessary for landing are operational, such as the electrical system and landing gear.

Caution: Follow the manufacturer's recommended engine extension and restart procedures or a loss of situational awareness could result in attempting a landing with the glider a high drag configuration. The pilot of a sustainer or self-launching glider should plan for the engines to fail to start and not have sufficient power to retract the engine and exhibit a much higher drag coefficient. Should the engine not start and retract, a glider pilot should have an alternate landing area available with the decreased performance available in the higher drag configuration.

The pilot should fly the traffic pattern to land into the wind and plan the approach path to avoid all obstacles. The landing area should be of sufficient length to allow for touchdown