Plant engineering and maintenance book pdf

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Media Platforms Design Team This summer brings a crop of five new coffee-table books for those who love to garden 1 / 8 iStockphoto/Thinkstock Fix a leaky garden hose by plugging the hole with a toothpick. Cut off the excess part of the toothpick and the water will make the wood swell, stopping the leak from springing again. 2 / 8 iStockphoto/Thinkstock Don’t invite the bugs in for a bite. Instead, use a small square of pantyhose to temporarily patch a hole in your window screen. Apply rubber cement around the hole before pressing the patch in place. If you want it to last longer, sew it on to the screen with some thread. 3 / 8 Never whack your finger with a hammer again! Use a clip-on clothespin to grip nails when hammering in hard-to-reach places. 4 / 8 iStockphoto/Thinkstock When leaves and debris clog up your rainspout and gutters, stick a hose up the spout and poke through the blockage. You don’t even have to turn the hose on because the water in the gutters will flush everything out. 5 / 8 iStockphoto/Thinkstock Painted cement floors tend to peel after a while. Make paint stick longer by brushing the floor with a coat of white vinegar before painting. Be sure to let the vinegar dry before slapping on the paint! Working with plaster? Keep it pliable longer for easier smoothing by adding a couple tablespoons of white vinegar to the plaster mix. You can also make rusty tools brand new by soaking them in full-strength white vinegar for several days. 6 / 8 iStockphoto/Thinkstock If stormy weather damages your vinyl siding, patch the tears with duct tape. Choose tape in a color that matches your siding and apply it when the surface is dry. Smooth it with your hand or with a rolling pin and the patch should last at least a season or two. If your windows are cracked, crisscross the broken glass with duct tape to hold the pieces together before removing the pane; that way, shards won’t fall out and cut you. 7 / 8 iStockphoto/Thinkstock If water is dripping inside your refrigerator, it’s most likely from a blocked drain tube, which runs from a drain hole in the back of the freezer along the back of your fridge. Try forcing hot water through the drain hole in the freezer with a baster. After clearing the tube, pour a teaspoon of ammonia or bleach to keep algae spores away, the probable culprit. 8 / 8 Jupiterimages/Thinkstock Cardboard slipped into a plastic bag works just like a shingle. Place the plastic-wrapped cardboard underneath shingles for a temporary fix. Originally Published: June 11, 2013 Originally Published in Reader's Digest By Fraser Sherman Updated June 25, 2020 Where a company has a manufacturing plant, it usually has a plant engineer on the payroll. Also known as manufacturing engineers, plant engineers oversee the plant's mechanical, electrical and automated systems, according to Plant Engineering. Good technical knowledge is only part of the skill set that a plant engineer needs. A plant engineer oversees a manufacturing plant's electrical and mechanical systems. Duties range from installation to troubleshooting. Technical skill is a must, but you also need good planning skills, and solid written and oral communication skills to do your job successfully. A plant or manufacturing engineer is a subspecialty of industrial engineering, the federal Bureau of Labor Statistics (BLS) says. Industrial engineers look at ways to make manufacturing as cost-effective and efficient as possible, including both the machines and the factory staff; plant engineers focus entirely on the machine side. GHD says plant engineers may be called on to improve efficiency, upgrade to new technologies, repair equipment, increase production and reduce bottlenecks in manufacturing. Businesses may consult with plant engineers when they're preparing to launch a new product or when it's necessary to solve problems at an existing facility. Aspiring Minds, a talent evaluation company, says that the job of plant engineer is often more intense than the description makes it sound. Errors in installation or glitches in the machinery can translate into big, expensive losses for the manufacturing company. A plant engineer has to test and evaluate machinery regularly and fix problems fast. It's quite common for engineers to be constantly on the go, taking care of one problem only to have another erupt under their feet. The BLS says that if you want to enter any branch of industrial engineering you need, at a minimum, a four-year engineering degree. Industrial engineering, mechanical engineering and manufacturing engineering degrees are all good options. On top of education, you need hands-on experience. Any sort of apprenticeship program or college co-op education program that gets you out of the classroom and into the field is a plus for your career. Technical knowledge is only part of what's required to do a good job as a plant engineer. Aspiring Minds says a plant engineer needs excellent problem-solving skills and the knowledge and intelligence to correctly analyze and interpret data. You need to be able to set priorities and plan effectively to keep the factory running. Aspiring Minds and BLS both stress that a plant engineer needs excellent communications skills, both oral and written. You have to document problems and solutions and write down standard procedures as you develop them. You'll also have to direct your team's work and explain your plans to your bosses and fellow engineers. Like other industrial engineers, plant engineers are valuable anywhere there's a factory churning out products. They may be able to work in a variety of manufacturing industries or for the government. According to PayScale, the average plant engineer salary is $79,607, with a range from $56,000 to $112,000. Bonuses can add as much as $15,000 to the compensation package, and profit sharing adds anywhere from $1,000 to $10,000. The job outlook for all kinds of industrial engineering is promising, the BLS says. Job growth through 2028 is projected at 8 percent, higher than the average for the job market as a whole. The BLS says increasing rates of automation in manufacturing will increase the need for plant engineers. This site is not available in your country This site is not available in your country Small gas engines serve us in many ways. They power lawn mowers, tillers, cultivators, trimmers, edgers, snowblowers, chain saws, pumps, generators, air compressors, and other useful home tools. They also power our fun: outboard boats, snowmobiles, motorcycles, all-terrain vehicles, ultralight aircraft, and other toys. To keep them operating efficiently, an owner of these tools and toys should know about small engines: how they work and what to do when they don't. Small gas engines are made up of individual systems that work together to produce power. Each system has many components. Internal combustion gasoline-powered engines require six systems: fuel, exhaust, ignition, combustion, cooling, and lubrication. In this article, we will discuss the systems and components that make small engines work. Fuel and Exhaust The fuel and exhaust systems are critical to operation. They furnish the fuel for combustion and remove exhaust gases. The following are components of a fuel and exhaust system. Gasoline: Gasoline is a combustible liquid that burns relatively slowly. However, when sprayed as a mist and mixed with air, it is quite explosive. All it needs is a spark. Two-stroke engines require that oil be mixed with the gasoline to lubricate internal parts. Four-stroke engines use a fuel-air mixture. Fuel Tank: The fuel tank stores fuel in preparation for mixing by the carburetor and use by the engine. Some fuel tanks are pressurized with air to help deliver fuel to the carburetor. Other tanks are non-pressurized and depend on a fuel pump to deliver fuel to the carburetor. Fuel Line: Fuel is moved from the tank to the pump and/or carburetor through a fuel line. Pressurized fuel systems often have a squeeze bulb in the fuel line for building pressure. Filter: A carburetor jet has a small opening that can easily become clogged. A fuel filter traps dirt and sediment from the gas before it is delivered to the carburetor. Pump: A fuel pump produces a vacuum that pulls the fuel from an unpressurized tank, then delivers it to the carburetor. Carburetor: The carburetor has one job: to mix the correct proportion of gasoline and air for the engine. Too much gasoline in the mixture makes it rich; too little gas makes it lean. Throttle: The throttle controls the amount of fuel-air mixture that enters the engine from the carburetor. The throttle thus controls the speed of the engine. Primer: A primer injects a small amount of gasoline into the carburetor throat to make the initial fuel-air mixture rich. A primer is used to help start a cold engine. Choke: Some engines control the richness of the fuel-air mixture at startup by controlling the air rather than the fuel. A choke reduces the amount of air in the fuel-air mixture. Governor: A governor is a device that automatically opens the engine's throttle when more power is needed and closes it when the load is light. Muffler: Small gas engines, especially two-stroke engines, are noisy when they operate. A muffler reduces the sound of the exhaust gases by passing them through baffles. Spark Arrestor: A spark can exit the exhaust port of a small gas engine, potentially starting a fire on nearby combustibles. A spark arrestor on the exhaust port can reduce the chances of such a fire. Spark arrestors are especially important on chain saws, motorcycles, and all-terrain vehicles operated in dry woodlands. Ignition The ignition is a primary system within all small gas engines. It produces and delivers the high-voltage spark that ignites the fuel-air mixture to cause combustion. No spark means no combustion, which means your engine doesn't run. Below are the components found in small engine ignition systems. Some systems will include breaker point ignitions while others depend on solid-state ignitions. Magneto-Powered Ignition System: A magneto uses magnetism to supply electricity in ignitions where there is no battery. The magneto is turned by the crankshaft, which rotates when the manual recoil starter is pulled. The three types of magneto ignition systems are mechanical-breaker, capacitor-discharge, and transistor-controlled. Battery-Powered Ignition System: If your small engine includes a battery for starting, the ignition coil will also use it to supply spark to the spark plugs. A battery stores electrical energy until needed. Battery ignition systems also use mechanical-breaker, capacitor-discharge, and transistor-controlled ignitions. Mechanical-Breaker Ignitions: High-voltage electricity must be sent to the spark plug at the appropriate time. In mechanical-breaker ignitions, this job is performed through the contact points and a condenser. Points: As the crankshaft rotates, a cam opens and closes a set of contact points. These points function as an on/off switch: Closed is on, and open is off. Condenser: Because the spark moving across points can damage their surfaces, the condenser stores voltage to reduce arcing between points. Capacitor-Discharge Ignitions (CDI): A capacitor is a large condenser. A CDI stores and delivers voltage to the coil using magnets, diodes, and a capacitor Transistor-Controlled Ignitions (TCI): Transistors are electronic controllers. A TCI uses transistors, resistors, and diodes to control the timing of the spark. Coil: An ignition coil is simply two coils of wire wrapped around an iron core. The coil changes low voltage (6 or 12 volts) into the high voltage (15,000 to 30,000 volts) needed by the spark plug. Spark Plug: A spark plug is an insulated electrode that is screwed into the top of the engine cylinder. High-voltage timed electricity from the magneto travels by wire to the spark plug. The base of the plug has an air gap of about 0.030 inch (30 thousandths of an inch), which the current must jump. Wires: The primary wire from the coil to the breaker point and secondary wire from the coil to the spark plug(s) deliver electricity to the ignition components. Distributor: A distributor is an ignition system for engines with more than one cylinder and spark plug. It distributes the spark to the appropriate cylinder using a rotor, cap, and individual spark plug wires. Combustion The combustion system of a small gas engine is where the work gets done. Components of the combustion system include the cylinder block, cylinder head, camshaft, valves, piston, connecting rod, crankshaft, timing gears, and flywheel. To better understand small gas engines, let's look at how this vital system works. Cylinder Block: The largest single part in a small gas engine is the cylinder block. It is a piece of metal in which the cylinder hole is bored or placed. Cylinder Head: The cylinder head is the top, or ceiling, of the cylinder and is attached to the block with bolts. Depending on the type of engine, the head may or may not include valves. Piston: A piston is the movable floor in the combustion chamber. Its upward movement compresses the fuel-air mixture. After combustion, its downward movement rotates the crankshaft. Crankshaft: An engine's crankshaft is a metal shaft with an offset section onto which the connecting rod is attached. Rotation of the crankshaft moves the piston up in the cylinder. Movement of the piston down in the cylinder then rotates the crankshaft. Connecting Rod: Between the piston and the crankshaft is a connecting rod. At the larger end of the connecting rod is a bearing that allows rotation around the moving crankshaft. The small end is attached to the piston pin. Valves: Valves simply open and close passages. A reed valve in a two-stroke engine is activated by changes in air pressure. Flywheel: At the end of the crankshaft is a circular weighted wheel called a flywheel. The flywheel delivers the engine's power to devices (wheels, blades, etc.) and helps keep the crankshaft turning smoothly. Small Engine Image Gallery ©2006 Publications International, Ltd. Here are some of the components of a two-stroke engine's combustion system. See more pictures of small engines. Cooling and Lubrication Combustion and friction produce heat. Heat and friction -- if not controlled -- can quickly damage an engine's components. Small gas engines are typically cooled by air. Friction is reduced using movable bearings and lubricants. Air-Cooling Fins: For simplicity, most smaller gas engines are cooled by air. Metal fins around the outside of the combustion chamber help dissipate the internal heat. Friction: Friction is resistance that occurs when one surface rubs against another. Friction causes wear. In an engine with many moving parts, friction is reduced with bearings and lubricants. Bearings: A bearing is a replaceable part that takes the brunt of the friction. A friction bearing relies on lubricants to minimize friction. A nonfriction bearing uses hard steel rollers or balls to prevent wear, though it too requires some lubrication. Lubricants: Lubricants such as oil and grease reduce surface friction by coating parts with a film. Lubricants in two-stroke engines are applied to surfaces by mixing oil with fuel. Viscosity: An oil's viscosity is its resistance to flow. The thicker a lubricating oil or grease is, the higher its viscosity number. Filters: Friction happens. Moving parts wear, even with the best lubricants. The resulting metal as well as carbon from the combustion process must be cleaned from the oil to ensure long lubrication. Some small engines use oil filters to remove contaminants from the circulating oil. Regularly servicing your small engine will ultimately save you money and time. In the next section, we'll review how, where, and when to service this engine.

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