

JONAS SMITH

METC 107

WHAT IS A WIND TURBINE?

A WIND TURBINE IS A DEVICE THAT CONVERTS THE KINETIC ENERGY FROM THE WIND, INTO ELECTRICAL ENERGY THAT CAN PRODUCE POWER TO ANOTHER DEVICE. WIND IS A FORM SOLAR ENERGY, AND THEY ARE CAUSED BY THE UNEVEN HEATING OF THE ATMOSPHERE BY THE SUN, THE IRREGULARITIES OF THE EARTH'S SURFACE, AND ROTATION OF THE EARTH. WIND FLOW PATTERNS ARE MODIFIED BY THE EARTH'S TERRAIN, BODIES OF WATER, AND VEGETATIVE COVER. THIS WIND FLOW, OR MOTION ENERGY, WHEN IS HARVESTED BY MODERN WIND TURBINES, CAN BE USED TO GENERATE ELECTRICITY.

HOW IS WIND POWER GENERATED?

THE TERMS “WIND ENERGY” OR “WIND POWER” DESCRIBE THE PROCESS FOR WHICH THE WIND IS USED TO GENERATE ELECTRICITY. WIND TURBINES CONVERT THE KINETIC ENERGY THAT IS IN THE WIND, INTO ELECTRICITY. THE ELECTRICITY THAT IS CREATED CAN BE USED FOR SPECIFIC TASKS, OR A GENERATOR CAN CONVERT THIS ELECTRICITY TO BE ABLE TO POWER HOMES, BUSINESSES, SCHOOLS, AND ETC.

HOW DO WIND TURBINES WORK?

WIND TURBINES, LIKE AIRCRAFT PROPELLER BLADES, TURN IN THE MOVING AIR AND POWER AN ELECTRIC GENERATOR THAT SUPPLIES AN ELECTRIC CURRENT. IN SIMPLER FORM, A WIND TURBINE IS THE OPPOSITE OF A FAN. INSTEAD OF USING ELECTRICITY TO MAKE WIND, LIKE A FAN, WIND TURBINES USE WIND TO MAKE ELECTRICITY. THE WIND TURNS THE BLADES, WHICH SPINS A SHAFT, WHICH CONNECTS TO A GENERATOR AND BAM!!!! YOU HAVE ELECTRICITY.

[HTTPS://WWW.YOUTUBE.COM/WATCH?V=0Kx3QJ_oRCc](https://www.youtube.com/watch?v=0Kx3QJ_oRCc)

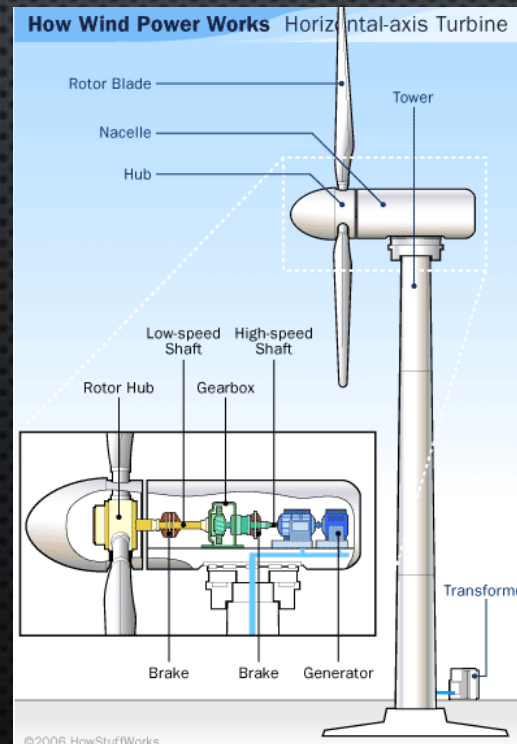
“ TURBINE COMPONENTS

BLADE OR ROTOR, WHICH CONVERTS THE ENERGY IN THE WIND TO ROTATIONAL SHAFT ENERGY

DRIVE TRAIN, USUALLY INCLUDING A GEARBOX AND A GENERATOR

TOWER THAT SUPPORTS THE ROTOR AND DRIVE TRAIN

AND OTHER EQUIPMENT, INCLUDING CONTROLS, ELECTRICAL CABLES, GROUND SUPPORT EQUIPMENT, AND INTERCONNECTION EQUIPMENT. ”



HOW MUCH DOES A WIND TURBINE COST?

WIND TURBINES UNDER 100 KILOWATTS COST ROUGHLY \$3,000 TO \$8,000 PER KILOWATT OF CAPACITY. A 10 KILOWATT MACHINE (THE SIZE NEEDED TO POWER A LARGE HOME) MIGHT HAVE AN INSTALLED COST OF \$50,000-\$80,000 (OR MORE). THE COSTS FOR A UTILITY SCALE WIND TURBINE RANGE FROM ABOUT \$1.3 MILLION TO \$2.2 MILLION PER MW OF NAMEPLATE CAPACITY INSTALLED. MOST OF THE COMMERCIAL-SCALE TURBINES INSTALLED TODAY ARE 2 MW IN SIZE AND COST ROUGHLY \$3-\$4 MILLION INSTALLED.

DISADVANTAGES OF THE TECHNOLOGY

EVEN THOUGH THE COST OF WIND POWER HAS DECREASED DRAMATICALLY IN THE PAST 10 YEARS, THE TECHNOLOGY REQUIRES A HIGHER INITIAL INVESTMENT THAN FOSSIL-FUELED GENERATORS. AROUND 80% OF THE COST IS THE MACHINERY ALONE, WITH THE BALANCE BEING SITE PREPARATION AND INSTALLATION. IF WIND GENERATING SYSTEMS ARE COMPARED WITH FOSSIL-FUELED SYSTEMS ON A "LIFE-CYCLE" COST BASIS (COUNTING FUEL AND OPERATING EXPENSES FOR THE LIFE OF THE GENERATOR), WIND COSTS ARE MUCH MORE COMPETITIVE WITH OTHER GENERATING TECHNOLOGIES BECAUSE THERE IS NO FUEL TO PURCHASE AND MINIMAL OPERATING EXPENSES.

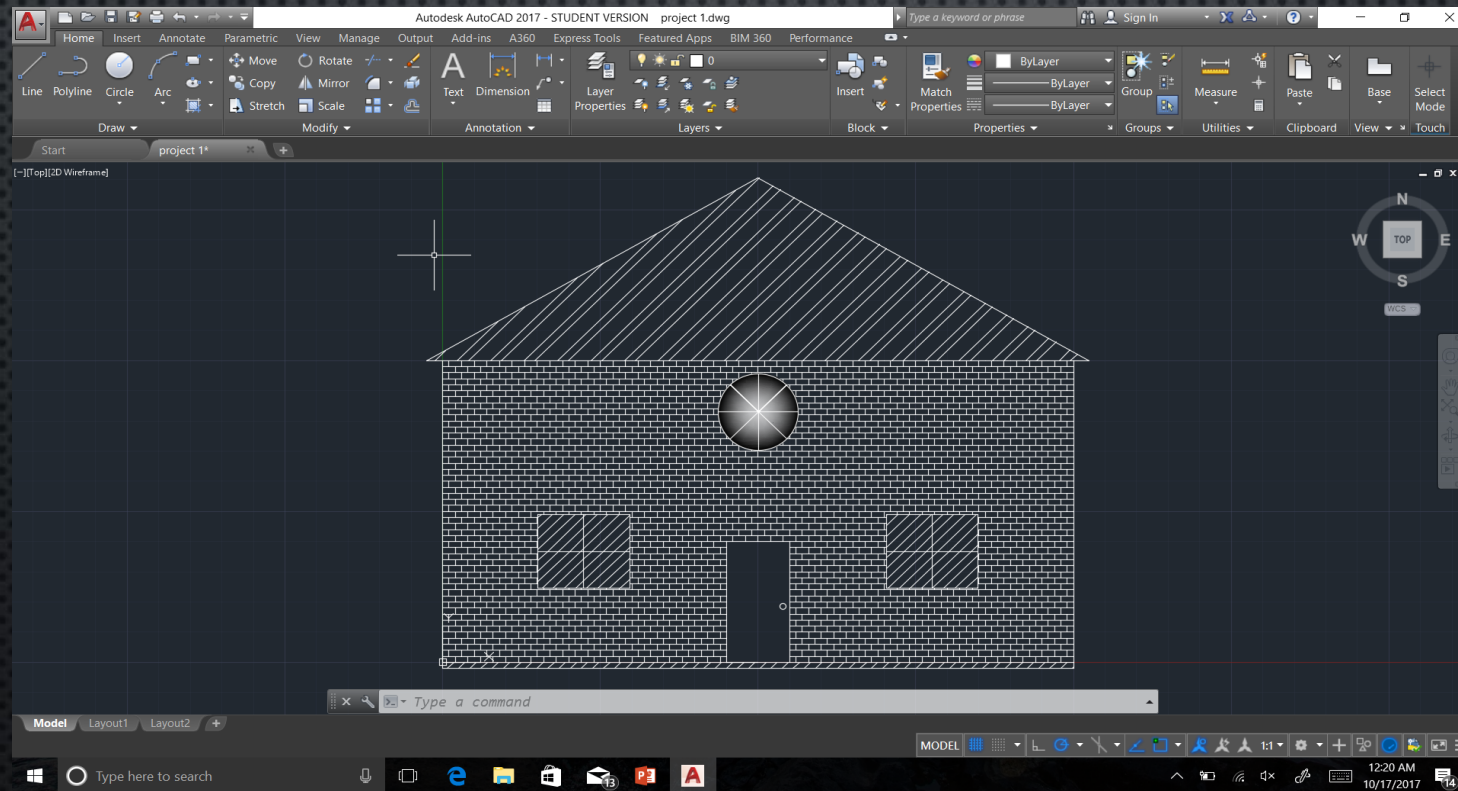
DISADVANTAGES OF THE TECHNOLOGY

ALTHOUGH WIND POWER PLANTS HAVE LITTLE IMPACT ON THE ENVIRONMENT COMPARED TO FOSSIL FUEL POWER PLANTS, THERE IS SOME CONCERN OVER THE NOISE PRODUCED BY THE ROTOR BLADES, AESTHETIC (VISUAL) IMPACTS, AND BIRDS AND BATS HAVING BEEN KILLED BY FLYING INTO THE ROTORS. MOST OF THESE PROBLEMS HAVE BEEN RESOLVED OR REDUCED THROUGH DEVELOPMENT OR BY PROPERLY SITING WIND PLANTS.

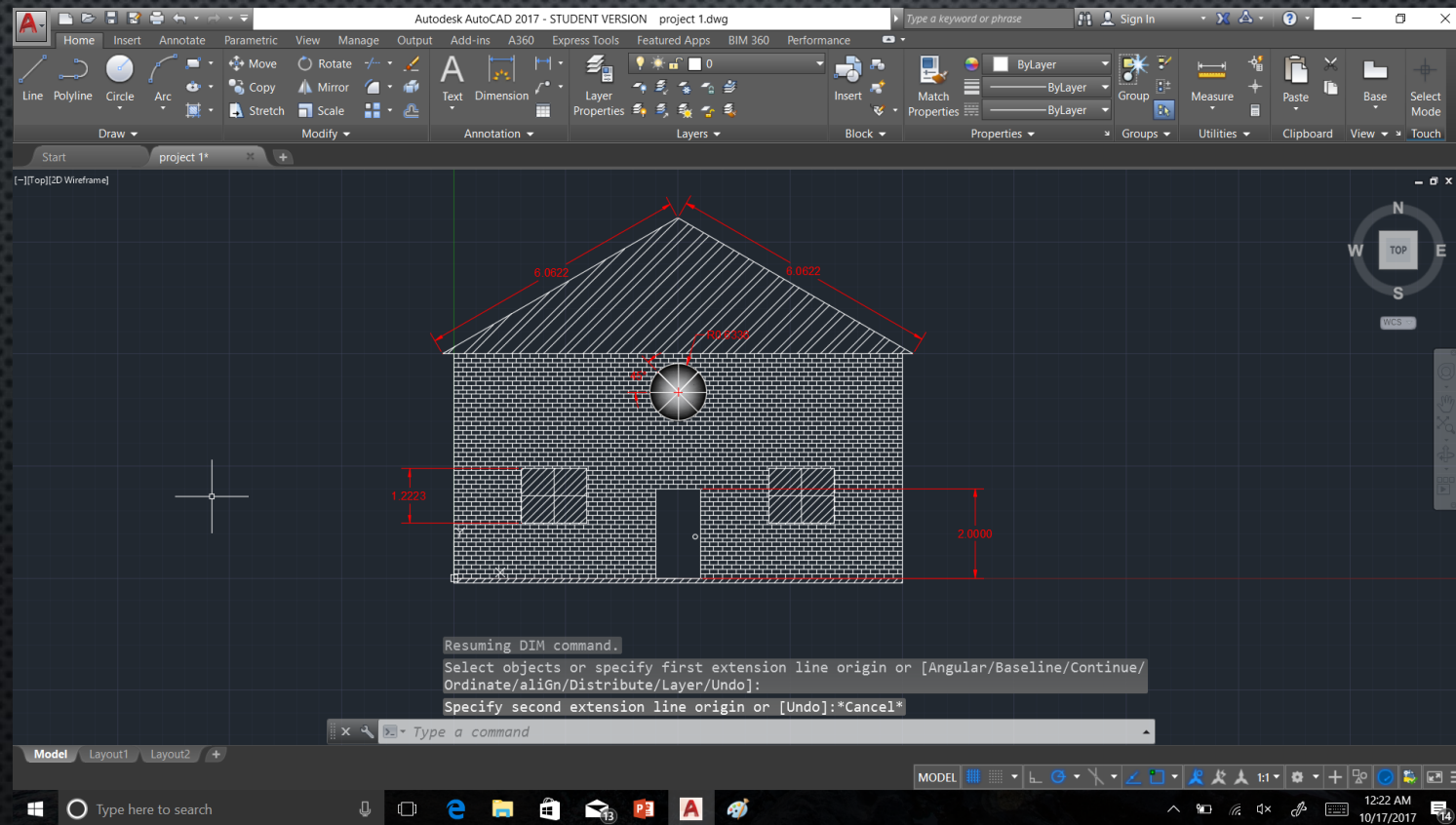
DISADVANTAGES OF THE TECHNOLOGY

THE MAJOR CHALLENGE TO USING WIND AS A SOURCE OF POWER IS THAT IT IS INTERMITTENT AND DOES NOT ALWAYS BLOW WHEN ELECTRICITY IS NEEDED. WIND CANNOT BE STORED (ALTHOUGH WIND-GENERATED ELECTRICITY CAN BE STORED, IF BATTERIES ARE USED), AND NOT ALL WINDS CAN BE HARNESSSED TO MEET THE TIMING OF ELECTRICITY DEMANDS. FURTHER, GOOD WIND SITES ARE OFTEN LOCATED IN REMOTE LOCATIONS FAR FROM AREAS OF ELECTRIC POWER DEMAND (SUCH AS CITIES). FINALLY, WIND RESOURCE DEVELOPMENT MAY COMPETE WITH OTHER USES FOR THE LAND, AND THOSE ALTERNATIVE USES MAY BE MORE HIGHLY VALUED THAN ELECTRICITY GENERATION. HOWEVER, WIND TURBINES CAN BE LOCATED ON LAND THAT IS ALSO USED FOR GRAZING OR EVEN FARMING.

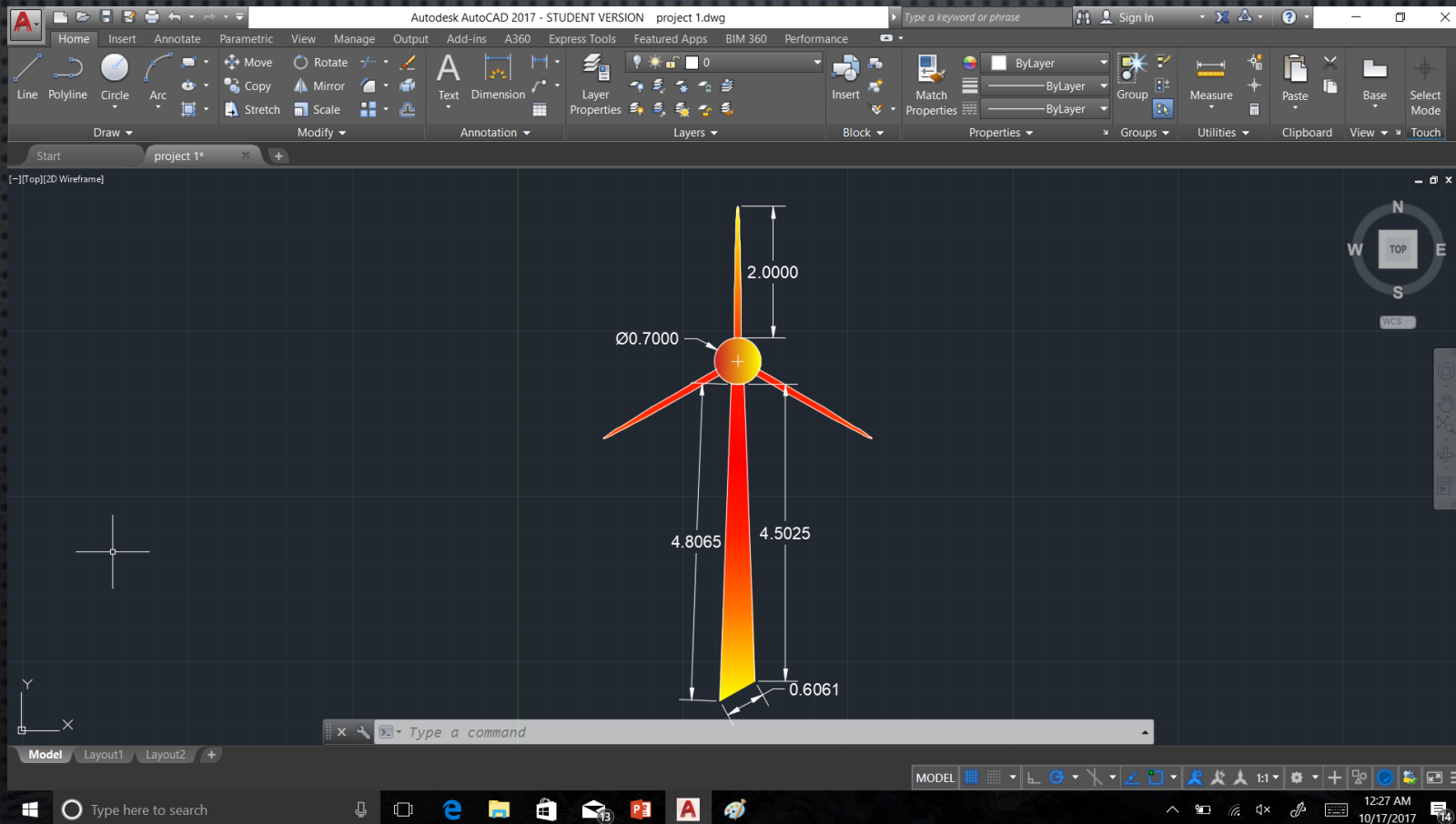
HOW I CREATED THE DRAWINGS



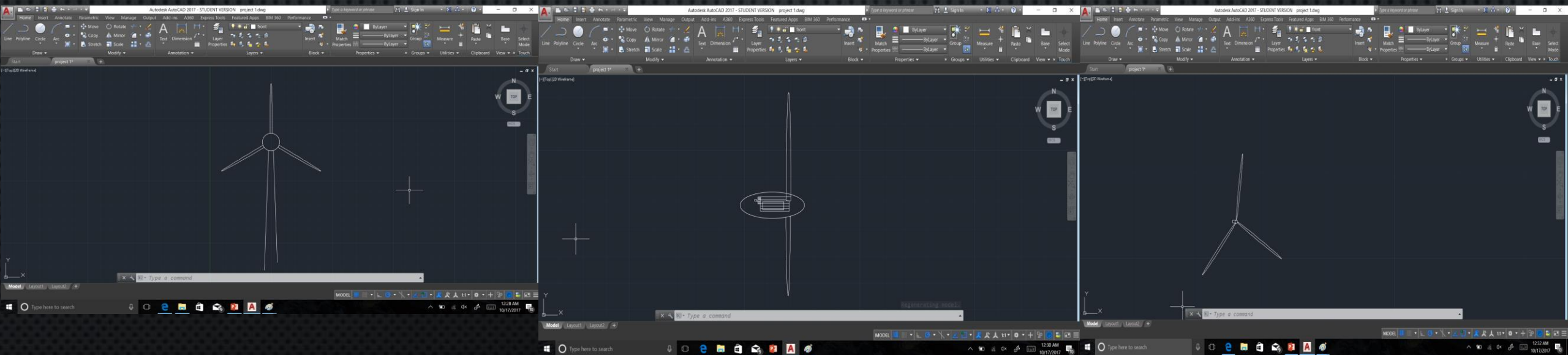
HOW I CREATED THE DRAWINGS



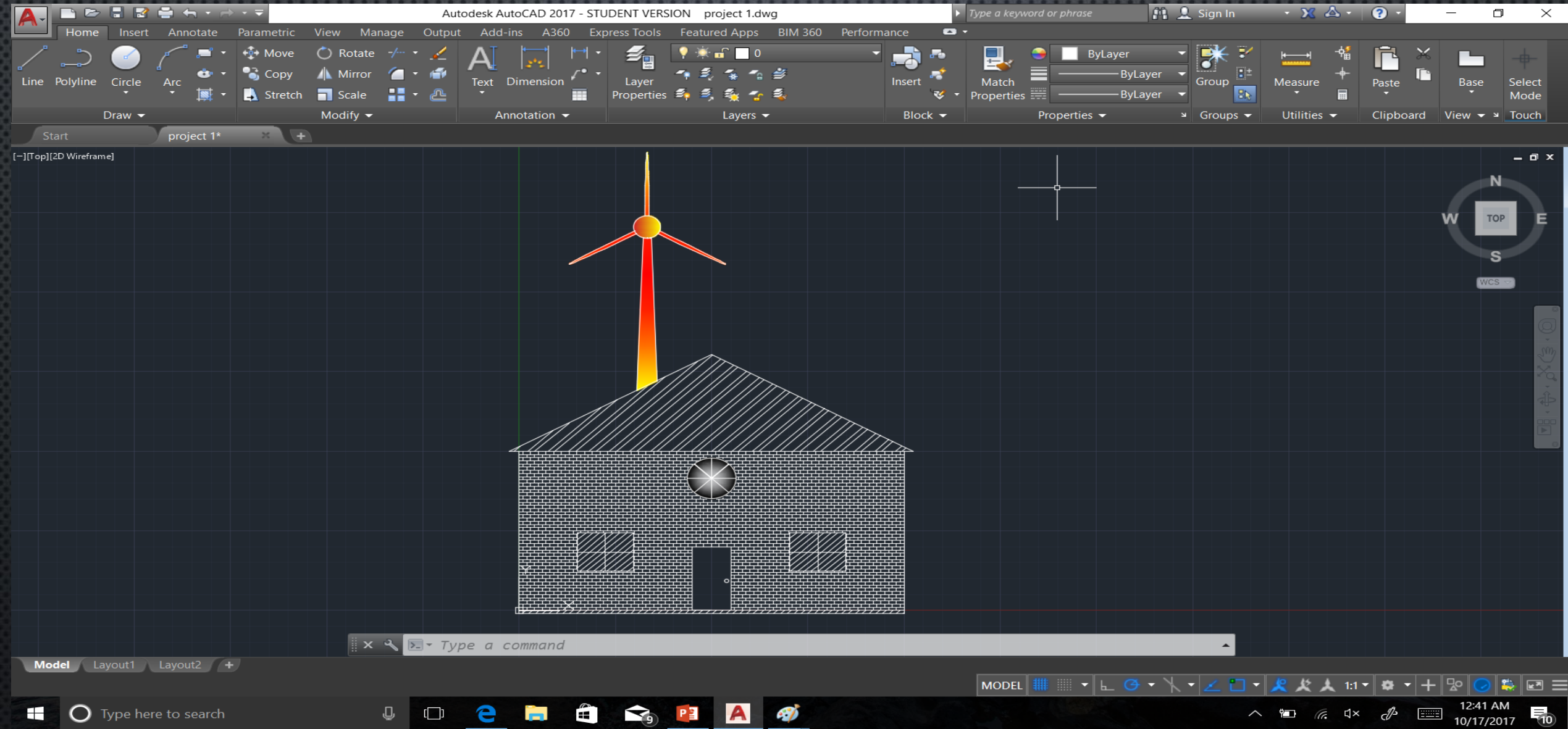
HOW I CREATED THE DRAWINGS



HOW I CREATED THE DRAWINGS



HOW I CREATED THE DRAWINGS



HOW I CREATED THE DRAWINGS

The screenshot displays the Autodesk AutoCAD 2017 - STUDENT VERSION interface. The title bar shows the file name "project 1.dwg". The ribbon includes tabs for Home, Insert, Annotate, Parametric, View, Manage, Output, Add-ins, A360, Express Tools, Featured Apps, BIM 360, and Performance. The main workspace shows a schematic diagram on a grid. The diagram includes a wind turbine labeled "Wind" with a vertical arrow pointing down to a rectangular box labeled "Inverter/Capacitor". An arrow points from the "Inverter/Capacitor" box to a rectangular box with horizontal lines labeled "Breaker Box". From the "Breaker Box", an arrow points to a circle labeled "House Power", and another arrow points to a circle labeled "Grid". A small crosshair symbol is positioned between the "House Power" and "Grid" circles. On the right side of the workspace, there is a compass rose with "TOP" selected and "WCS" below it. The command line at the bottom shows "Type a command".