

Newspaper in Education Presents

inquiziKidz

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What does it take to make a robot?

Discover the Future

Most jobs in robotics require a combination of electronics, computers, and mechanical systems knowledge because the robotic systems combine precision, electromechanical engineering, control theory, computer science, sensor and actuator technology they provide for a wide variety of career opportunities.

- Robotics Engineer
- Software Engineer
- Hardware Engineer
- Electrical engineer
- Mechanical Technician
- CAD Designer
- Electronics Assembler
- Machinist
- Systems Tester
- Automotive Technician

For more career information see your school counselor and get information on-line at:
<http://jobstar.org/tools/career/spec-car.cfm>
 OR
<http://www.acinet.org/acinet/default.asp>



Wendy Sheehan & David Grenier

Kidzbiz: Robots Invade Manatee County

Earlier this month the School District of Manatee County embarked on the 4th Annual No Teacher Left Behind Workshops where Career and Technical Education teachers gathered for an in-depth workshop for implementing robotics in the classroom. Nationally known robotics expert Buzz Dawson who is an instructor at the University of Center Florida and also a BattleBots TV Personality and contender was the instructor for the workshop. Participants included elementary, middle, and high school technology education teachers from our schools in addition to our postsecondary technical teachers from the Manatee Technical Institute (MTI). The workshop participants learned how to apply the academic benchmarks to the proper tools, machines and systems in a real world robotics application. The instruction started with the use of robotics in today's society and moved from the mechanical fundamentals to the advanced electronic controls and complex systems.



Bud Elkin, Paul Fratiello

Robotics: Think you'll never use high school math?

Think again... Here is a robotics problem that could be solved by the students in a robotics unit. Give it a try and see if you can solve it!

Problem: Determine the drive ratio for a 12 tooth sprocket driving a 30 tooth sprocket.

Drive ratios greater than 10:1 should not be used. In order to achieve higher ratios it is good practice to create multiple drives using two drives in series.

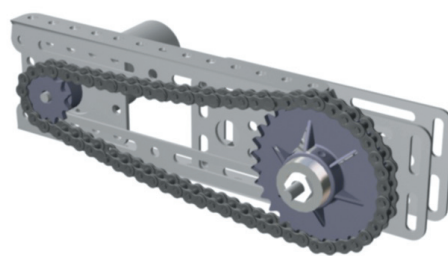
The drive ratio between two sprockets is specified by the relationship between the number of teeth of the Driven Sprocket to the number of teeth of the Drive Sprocket. It is therefore important to understand that power is transferred through a drive train from one sprocket to another through the tension created on the chain.

In the figure below a 12 tooth sprocket is attached to an electric motor. The 12 tooth sprocket is the Drive Sprocket (the drive sprocket is the sprocket that initiates the transfer of power). The 30 tooth sprocket is the Driven Sprocket (the Driven Sprocket receives the power from the drive sprocket).

The sprocket ratio in this case is given as 2.5:1. The Drive Sprocket must turn 2.5 revolutions before the Driven Sprocket turns 1. A simple rule to follow when determining ratio is:

$$\text{Ratio} = \frac{\text{DrivenSprocket}}{\text{Drivesprocket}}$$

$$\text{Ratio} = \frac{30}{12} = 2.5 : 1$$

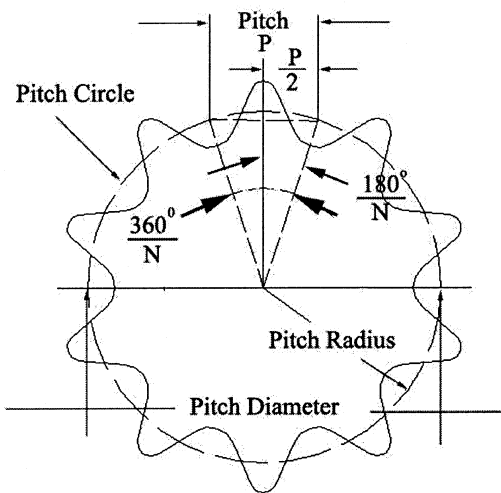


Drive Ratio = 2.5:1

Designing Chain Drive Systems

In order to design, build and discuss chain drive systems it is necessary to understand the terminology and concepts associated with chain drive systems. Good designers and engineers have experience and knowledge and the ability to communicate their thoughts and ideas clearly with others. The students and teachers of Manatee County who participate in this new robotics unit will learn the terms and concepts necessary to design, draw, and build chain drive systems, and improve their "Chain Drive literacy". Calculating Sprocket Pitch Diameter is an essential design skill that is used to determine the center-to-center distances of chain drive systems.

The sprocket pitch diameter is an imaginary circle through which the chain pin centers move around the sprocket. The pitch diameter is the fundamental design geometry that determines the size, shape and form of the sprocket teeth dimensions.



Sprocket Pitch Diameter Calculation

$$PD = \frac{P}{\sin \frac{180^\circ}{N}}$$

- PD = Pitch Diameter
- P = Chain Pitch in inches
- N = Number of teeth on the sprocket

Example: Using the information from the figure above, calculate the sprocket pitch diameter.

$PD = \frac{P}{\sin \frac{180^\circ}{N}}$	PD = Pitch Diameter P = Chain Pitch in inches N = Number of teeth on the sprocket	PD = ? P = 1/4" = 0.250" N = 10 Teeth
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Solve the equation above using the standard order of operations (PEMDAS), Parenthesis, Exponents, Multiplication, Division, Addition, and Subtraction.

$$\text{Answer: } PD = \frac{P}{\sin \frac{180^\circ}{N}} = \frac{0.250}{\sin \frac{180^\circ}{10}} = \frac{0.250}{\sin 18^\circ} = \frac{0.250}{0.309} = 0.809"$$

School biz: The competition heats up

Teachers were paired in teams of two and applied the mathematical and physical science principles in engineering applications. The teams were given a problem to solve that first involved designing a catapult by applying the use of simple machines with the electronic, pneumatic, and mathematical systems to launch a foosball across the room and land in a designed drop zone. Teams had to problem solve their way to success in order to move on to the main event which was to capture the flag type competition. "These are hands on type



Tim Estep

engineering activities which are intended to excite and engage students with a passion for learning", said Mark Newby, President of GEARS Educational Systems who supplied the hands-on materials for the workshop. Because of this very innovative training Governor Bush has offered to send three Manatee County technology teachers to the BattleBots Certification week long course this summer in Orlando so the schools can participate in national robotics competition. Justin Devine, Braden River Middle School, Greg McGrew Lakewood Ranch High School, and Gil Burlew, Braden River High School have been selected and are giving up their summer to attend the certification class.

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Manatee Technical Institute

- Ballard Elementary Magnet
- Daughtrey Preparatory Magnet
- Harllee Middle Magnet
- Johnson Middle Magnet
- Lee Middle Magnet



- Lincoln Middle Magnet
- Manatee Elementary Magnet
- Rowlett Elementary Magnet
- Tillman Elementary Magnet
- Wakeland Elementary Magnet

Schools listed in red offer instruction in the subject area featured in today's InquiziKIDz



- <http://www.usfirst.org/>
- <http://www.TSAweb.org/>
- <http://www.battlebots.com/>
- <http://www.Florida-TSA.net/>
- <http://www.firstlegoleague.org/>