

Belt drives

DEFINITION: The Belt drive is one of the most common and effective devices of transmitting motion from one shaft to another by means of a thin inextensible band running over two pulleys. Belt drive is generally used when rotary motion is to be transmitted between two parallel shafts. (www.quora.com)

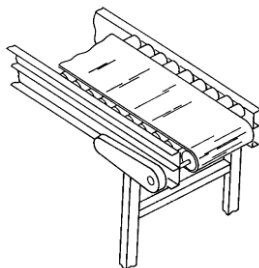
HISTORICAL CONTEXT

Simple flat belt drives have been used for the last 200 years. The belts transmitted power in factories and industries including farming, mining, logging, and electrical. Most belts were made of flat leather, rubber or fabric (cotton or hemp) and ran on cylindrical pulleys. Today most belts are made of rubber or synthetic polymers.

TYPES OF BELT DRIVES

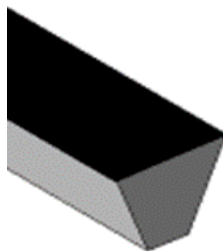
Traditionally belts have been friction type. These include flat and vee belts. Friction belts require tension between the belt and pulley to transmit power.

In this newsletter we will look at flat and V belts.



FLAT BELTS - Flat belts were used to transfer power to various machines. These belts ran on flat pulleys. These belts had a tendency to slide and need alignment to improve tension

V BELTS - V belts improved drive performance. The V shape causes the belt to wedge tightly in the groove. This increases friction and allows high torques to be transmitted. V belts provide the best combination of traction, speed of movement, load of the bearings, and long service life.



Belt driven systems have advantages and disadvantages. Let's look at some of the pros and cons.

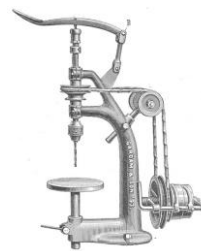
PROS OF BELT DRIVES

- Simple, light and inexpensive
- Protect machinery from overload, jamming, isolate noise and vibration.
- Can transmit large amounts of power.
- Need minimal maintenance and no lubrication. Minimum downtime.
- Visual checks for wear
- Different speed ratios can be obtained by stepped or tapered pulleys.
- Highly efficient (over 95%)
- Absorb shock loads
- Economical when distance between shafts is very large.
- Clutch action is activated by releasing belt tension.
- Use readily available components.

CONS OF BELT DRIVE

- Drive belts deteriorate from exposure to lubricants and chemicals.
- Flat and V belts need to be re-tensioned when they slip and stretch due to overloading
- Worn and stretched belts must be replaced.
- Operating temperatures are usually restricted to -35 to 85°C due to heat build-up.
- Speed is limited to usually 35 metres per second. Power transmission is limited to 370 kilowatts.

REAL LIFE EXAMPLES

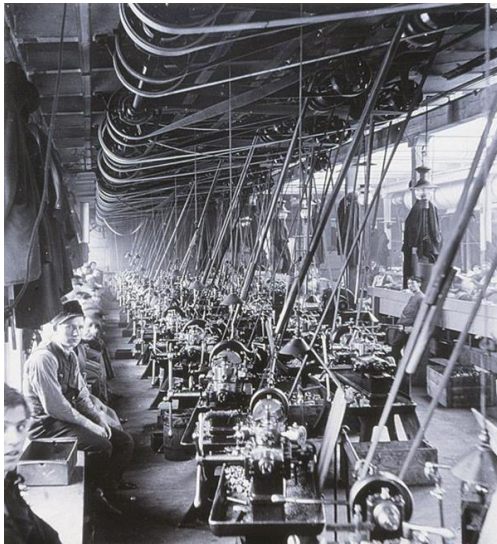


turntables etc.

The versatility of belt drives was shown by the wide range of uses - air compressors, conveyor belts, bicycles, old sewing machines, vintage lathes, drills & planers, LP record player



The Portass "Wood and Metal Turning Lathe" was sold until the early 1950's.

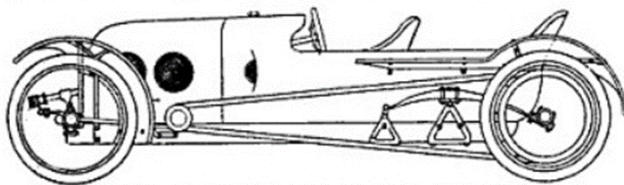


Cadillac Machinists, Detroit Michigan

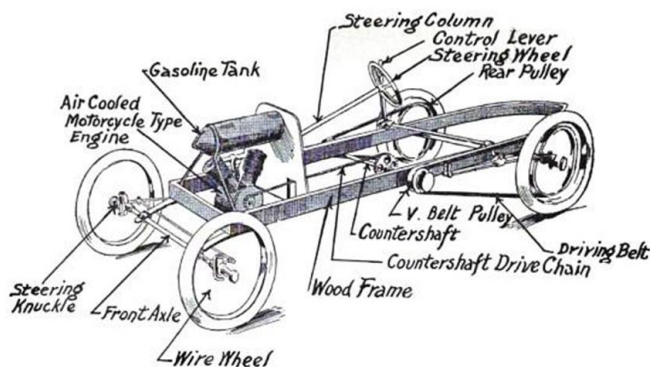
CYCLECAR

The Cyclecar was developed as an alternative to early expensive cars and the motorcycle. They were manufactured mainly between 1910 and the late 1920s. Their only advantage was low cost which was achieved by using basic materials. A basic Cyclecar had a wood frame, wire wheels, air-cooled motorcycle type engine, chain drive and drive belt. These cars had design and technical faults such as no passenger comfort, poor reliability due to badly fitting parts.

When sturdier cars became affordable manufacturers were surprised when customers turned away from Cyclecars.



1913 Malcolm Cyclecar with two-cycle motor



CHILD'S PEDAL TOYS

In the past some pedal toys used belt-drives.



1946 Mi Cycle - belt drive bicycle



1940's Belt Driven Tractall Pedal Tractor

BELT DRIVES OF THE FUTURE

Franco Sbarro (1989) invented a hubless wheel. The wheel with no axis enables it to support the vehicle at the lowest point and lowers its centre of gravity.

In 2011 U.K design student Luke Douglas was assigned a Design Brief that required the use a hubless wheel to create a compact bicycle, with the benefits of a large wheel and belt drive. The result was the "Lunartic Cycle". The hubless wheel houses the working parts, reduces the wheel base without compromising riding comfort.



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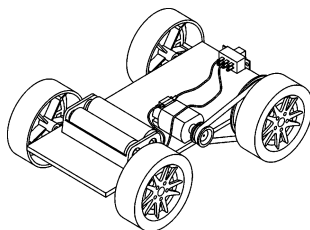


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BELT DRIVEN CAR KIT

The Scorpio **Belt Driven car** is a simple four-wheeled vehicle with no steering. It is available in a solder and no solder version. Motive power is provided to the rear axle by an electric motor-driven belt (a rubber "O" ring).



While making the kit the student will:

- Plan, design, manufacture, construct and assemble.
- Determine platform size and shape.
- Investigate component placement to determine the most efficient and practical placement for ease of operation and stability (e.g. prevent wheels rubbing on platform).
- Examine ideas to change and/or improve design
- Determine ways to improve the basic design by using available technologies and skills.

- Choose material and technology to be used to fabricate the body.
- Record in a diary (or other manner) a timeline of work completed.
- See our website – Kits in Action for some examples

<https://www.scorpiotechnology.com.au/kits-in-action/>

Excite your school community by participating in DATTA Australia's

DESIGN & TECHNOLOGY WEEK.

At present there are over 40,000 students registered through their schools.



"The world needs creative problem solvers and that is what the Design and Technology learning area delivers."

Students will have the opportunity to take part in fun and creative activities while exploring the role that design and technology plays in our lives and our futures.

More than just making, we encourage everyone to take part and to help us demonstrate just how vital and engaging this learning area is."

<http://www.datta.vic.edu.au/designandtechnologyweek>

Students may like to try one or more of Scorpio's exciting project kits or they could design and make their own invention using the parts and components in our range.



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