



**NCCA**

An Chomhairle Náisiúnta  
Curaclaim agus Measúnachta  
National Council for  
Curriculum and Assessment

# Junior Cycle Engineering Classroom-Based Assessment 2: Example of Student Work 05

January 2024

# Engineering CBA 2

## Steering Systems



**Go Kart Steering System**  
 Go Kart steering wheels are made of aluminum and attached to a steering shaft from the tie rods (left and right). These connect to the spindles on each side that turn when you turn your steering wheel. A go-kart steering system operates through a sequence of interconnected components, ensuring precise control. This motion is transferred to the Pitman arm, which influences the left and right tie rods.

**Steering Systems**

**Airplane Steering System**  
 How it works:  
 Turning the control wheel clockwise raises the right aileron and lowers the left aileron, which rolls the aircraft to the right. The rudder works to control freedom the yaw of the plane. The yoke moves rudder left and right, with left and right pedals. Pressing the right rudder pedal moves the rudder to the right.

**Hydraulic powered Steering System**  
 How it works:  
 It pushes super-pressurized hydraulic oil through a series of tubes. This high pressure oil heads into a cylinder with the piston inside. The oil pushes the piston and steers from one end to another.

## Exploring Theme Steering Systems

- For my initial research I considered three different steering systems. (see image)
- Due to the fact that I have a go-cart I will explore this concept further. I will complete some primary and secondary research and communicate my understanding of this steering system in my CBA.

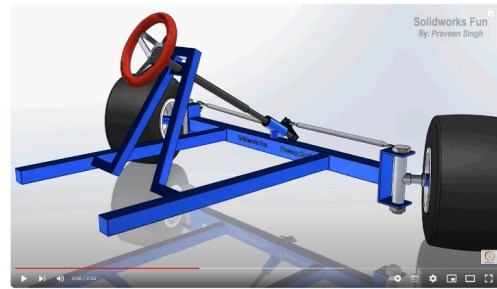
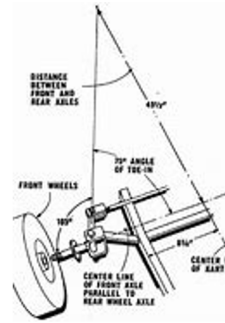
## Research on How it works:

- From my research I understand that Go-kart steering relies on a direct steering system with key components like the steering wheel, steering shaft, tie rods, and spindles.

### Why does a go-kart have a steering system:

- The go-kart's steering system is designed to turn without causing surging and tire squalling. The geometrical relationship between the go kart line of action and the turn radius are important for a smooth turn and even tire wear.

Here is a quick video explaining how the go-kart steering system works: [Go-kart Steering Mechanism \(Model\) Working Animation in Solidworks - YouTube](#)



Go-kart Steering Mechanism (Model) Working Animation in Solidworks

## Go Kart Steering Mechanisms

Go-kart steering system operates through a sequence of interconnected components, ensuring precise turns. When the aluminium-made steering wheel is turned, it moves the steering shaft connected to it. This motion is transferred to the Pitman arm, which influences the left and right tie rods. The tie rods, in turn, move the spindles attached to each wheel, causing a turn. This orchestration of mechanical elements allows the go-kart to navigate corners effectively and respond to the driver's input swiftly and accurately.



## The main elements of go-kart steering:

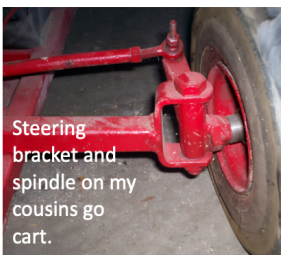


- The main elements of go-kart steering include:
- **Steering wheel:** Usually made of aluminum, the steering wheel is responsible for the driver's input to control the kart's direction.
- **Steering shaft:** This connects the steering wheel to the rest of the steering mechanism.
- **Tie rods:** The left and right tie rods attach to the steering shaft and the spindles on each side of the kart.
- **Spindles:** These crucial components turn when you rotate the steering wheel, enabling the wheels to change direction.

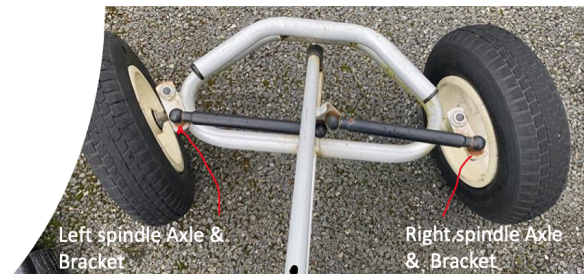
## Primary research:

- For my primary research I looked at my BERG Go-Kart steering system. I also looked at my cousins go cart which uses a similar system
- The grey go cart images are from the steering system of my Go-Kart.

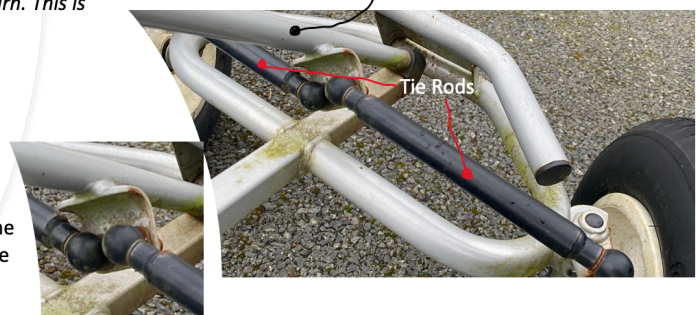
*When I turn the steering wheel the steering shaft rotates. This pushes and pulls the tie rods that are connected to the underside of the shaft. The other end of the tie rods are connected to the spindle brackets on the right and left of the front axle. As they pivot the wheels turn. This is how the system steers the cart.*



Tie rods connected to the underside of the steering shaft



Steering Shaft and Hub



## Reflection:

- During this CBA I have learned that when you look in closer detail of this Go-Kart steering system and now I know it is pretty straight forward and easy to understand.
- I found It a lot easier looking at the steering system in real life because it showed me how the tie rods were going underneath each other to move a certain direction. I had not thought about this before. Even when driving my go-cart.
- I enjoyed looking up and doing research in class and talking with my classmates about their steering systems.

## References:

- [Go-Kart Guru - Steering Systems, What Is It All About? \(gokartguru.com\)](http://gokartguru.com)
- [How Does Go Kart Steering Work? A Quick Guide — RiiRoo](#)

## Teacher annotations using the Features of Quality

The annotations capture observations by the teacher, using the features of quality, with a view to establishing the level of achievement this work reflects. The annotations and judgments were confirmed by a Quality Assurance group, consisting of practising teachers and representatives of the NCCA, the Inspectorate, the State Examinations Commission and the Oide support service.

### Teacher annotations

#### Research and analysis:

The research method chosen was effective for the theme and generated an in-depth level of analysis of the data/findings. The use of photographs from primary sources was very effective and complemented the research conducted through secondary sources.

#### Exploring concepts:

The response demonstrated a high level of understanding of concepts relevant to the theme. This was evidenced through the analysis of both primary and secondary sources of information, complimented by a CAD animation of a Go-Kart steering mechanism.

#### Communicating their work:

The findings are presented to a very high standard, using highly effective media including a PowerPoint presentation, relevant imagery and an animated video. This allowed for careful consideration of what information accurately communicated their response. The use of annotations with the primary photographs of the BERG Go-Kart steering system complimented the communication of their response.

Overall judgement:  Above expectations