

KEELSON

Toolbox Training



Position Reference Systems for Dynamic Positioning

LASER SYSYEMS

DELIVERY GUIDE

- 🔴 The video, participant workbook, and this delivery guide form PART 2 of a series of KEELSON *Toolbox Training* packages that address the most common position reference systems in use as listed in section 4.6.3 of the MTS DP TECHNICAL COMMITTEE DP GUIDANCE PART 1 Ver_2 09201217. These are listed as:

Absolute	Relative
LASER PRS (DGPS and GLONASS)	Laser (Fanbeam, Cyscan)
Acoustic (USBL, SBL, LBL)	Radar (RADius, RadaScan)
Taut Wire	DARPS

- 🔴 This delivery guide provides the necessary background, instructions and content to support senior officers and superintendents delivering the KEELSON *Toolbox Training* - DP Position Reference Systems PART 2 **LASER PRS** - to ship's officers and crew.

AIM:

- 🔴 To provide DP equipment users with knowledge of the operating principles of, and an understanding of the operational limitations of LASER PRS.


OBJECTIVES:

- 🔴 To explain the operating principles of LASER PRS.
- 🔴 To explain the operational limitations of LASER PRS as a position reference system for DP operations.
- 🔴 To evaluate and justify the use of LASER PRS as a position reference system for DP operations in a variety of operational circumstances.

You will need:

- 🔴 1 hours preparation time to familiarise yourself with this guide, the participant pack and the video.
- 🔴 Audio-visual equipment to show the Laser PRS video with seating and table space for all your participants.
- 🔴 One participant pack printed for each participant.
- 🔴 A pencil or pen for each participant.
- 🔴 20 minutes delivery time.

Getting Started

- 🔴 This delivery guide supports the participant workbook and contains the answers to the short exercises in the participant workbook.
- 🔴 Before you deliver this KEELSON *Toolbox Training* it is important that you familiarise yourself with its content, even if you are confident in your own knowledge and understanding of LASER PRS as a position reference system for DP operations.
- 🔴 Throughout the video, this guide, and the participants work books you will see this symbol. This is a THOUGHT WARNING and indicates an important piece of information that you and your participants need to think about and remember. It signifies a 'pay attention' moment! 



TOP TIPS!


- 🔴 *Present with passion! Be enthusiastic and supportive of the content, let the participants know you are there to help and support them.*
- 🔴 *Wherever you can apply the content to YOUR vessel and YOUR company operations. The more relevant you make it the more they will remember it.*
- 🔴 *Make eye contact with every participant and smile, it's OK to have fun while you learn!*

Training Schedule

This training package takes no more than 20 minutes to deliver.

TIME	SECTION	RESOURCE
2 minutes	Introduction	Workbook
6 minutes	Video	Video
10 minutes	Exercises	Workbook
2 minutes	Learning Check	Workbook

Introduction - 2 minutes

- Make sure all your expected participants are present and have a seat at a table where they can see the video screen.
- Introduce yourself and the training package.
- Tell them it will take no more than 20 minutes.
- Give each participant a participant workbook, make sure they have a pen.
- You can use this time to explain WHY this training is important – refer them to the info-graphic in their workbooks.
- Explain the THOUGHT WARNING symbol  and what it means.

Video - LASER PRS - 6 minutes

- Watch the video yourself before delivering the training.
- Write down some notes in this delivery guide if you want to.
- Make sure all your participants can see the screen and show the 3-minute video.

Exercises - 6 minutes

- Make sure you understand all the exercises and their answers before delivering this training.
- If you have any real life examples resembling any of the exercise scenarios make a note of them and share them with your participants as they work through the exercises.
- Ask your participants to look at the diagrams in their workbooks. Note: - they will look slightly different to the diagrams in this delivery guide, as this guide has the ANSWERS and some discussion points.

TOP TIPS!

- ❗ *Resist the temptation to simply give your participants the answers; they will learn best and from working them out themselves.*
- ❗ *Encourage them to work in pairs or small groups; this will develop discussion and help to embed learning – they will remember more this way.*
- ❗ *Walk amongst your participants, look at what they are doing and listen to what they are saying. Engage with them and 'nudge' in the right direction where necessary.*
- ❗ *Don't make a commotion if some participants don't get the right answers. Instead, engage in discussion and explain where the misconceptions are.*
- ❗ *Tell them they are doing well (even if they're not!). Encouragement is a big part of training.*
- ❗ *Remember - we learn best when we are supported and feel comfortable!*

At the end of any training session it is important to check the knowledge and understanding of your participants. You can use the tear off feedback slip in the participant workbook to record participation or use your company specific training records.

Exercise 1 Lasers Set Up

Sketch a rough diagram of your vessel indicating the optimum location of the projector/scan unit and the laser target. State two reasons why proper set up of a laser system is critical?

ANSWER

- a projector/scan unit is situated on the DP vessel in a place with an uninterrupted view of the horizon.
- A reflective target is be placed on a fixed object such as a nearby platform or FPSO
- Distance -1k to 250m depending on the manufactures specifications due to the laser being 'eye safe'.

Exercise 2 Target Properties

Describe three situations that might reduce the reflective properties of a laser PRS target and explain how you might be reduced these on your vessel.

ANSWER

- Dirty targets - The laser targets must be kept clean otherwise the laser will not be reflected, or the range of operation will be reduced
- The crew of the DP vessel need access to the platform or rig or to clean permanently rigged targets to clean them.
- The DP vessel may keep it's own targets on board and deploy them on arrival at the site.
- The system is not available for arrival and that the crew of the DP vessel still need access to the object in order to deploy.
- Time consuming as permissions and access is arranged
- Crew on the platform can be assigned to clean the targets. The DPO should be certain that the task will be performed adequately before delegating
- Atmospheric - If environmental conditions deteriorate, if it rains, if the target gets wet and in reduced visibility, the reflective properties of a laser PRS target. might be reduced.
- Use a different PRS or cease operations

Exercise 3 Target Position

Explain why the position of the laser PRS target is critical?

ANSWER

- *There must be a direct line of sight between the projector/scan unit and the target.*
- *IF the target is placed near a walkway or area of heavy foot fall the laser system may suffer from 'Seduction of the signal link'. This is where the scan unit picks up on fixes on the reflection of a person walking past the target, this is made all the more likely as the platform crew will in reflective high vis clothing.*
- *The DP vessel must make it clear to the platform crew that the placing of the target in an appropriate place is critical and DP operations should not commence until the DPO is satisfied with the location of the target*
- *IMO MSC 1580 'Microwave and laser ranging devices which may be susceptible to interference should be located to minimise the risk of such interference'*
- *IMCA M 103 "The risk that radar or laser range-finding position reference instruments may have the line of sight with their target obstructed by the lift should be analysed and mitigated;"*

Exercise 4 Gyro Input

Explain why the DPO must be satisfied with the gyro input before relying on a laser PRS for DP operations?

ANSWER

- *The laser system gives the relative azimuth of the reflector to calculate the relative bearing of the DP vessel to the target.*
- *The vessels gyro heading is then integrated into the system to calculate position.*
- *This means that the accuracy of the laser system` is dependent on the accuracy and stability of the gyro compass.*

Refer to Marine Technology Society Dynamic Positioning Committee DP Operations Guidance Part 2 Appendix 1 (MODUs) Ver 2.0 April 30 2012 pages 20 and 21.

Is it recommended that a Laser PRS be used for:

1. Standby vessels
2. OSV Snatch Lifts

ANSWER

- Note 4 (DP at non fixed Assets, e.g. FPSOs/ TLPs/ Spars) - When carrying out DP activities in close proximity to or in conjunction with floating facilities it is strongly recommended that redundant relative position reference systems are used. In these situations, a mix of absolute
- and relative position reference systems for station keeping is to be used only after validating that movement of the floating structure, if any, does not impact station keeping. The DPOs must be extremely vigilant when using a mix of absolute and relative position references and must be fully aware of the potential danger of diverging positioning information from both types of system.

References and Further Reading

You do not need to read these additional documents; this training package provides all the necessary background, instructions and content to support senior officers and superintendents delivering it to ship's officers and crew.

Should you want to read further then these documents provide a good, but not exhaustive, starting point.

- IMO MSC.1/Circ.1580 Guidelines For Vessels And Units With Dynamic Positioning (DP) Systems 16 June 2017
- MTS DPC Technical And Operational Guidance (Techop) Techop_Odp_06_(D) (LASER PRS Position Reference Sensors) August 2015
- IMCA M 246 Station Keeping Incidents Reported For 2017 January 2018

TOP TIPS!

At the end of any training session it is important to check the knowledge and understanding of your participants. Just because you have TAUGHT IT, doesn't necessarily mean they have LEARNED IT!

Our aim was to:

To provide DP equipment users with knowledge of the operating principles of, and an understanding of the operational limitations of LASER PRS.

Ask all your participants if they are now comfortable:

- Explaining the operating principles of LASER PRS?*
- Explaining the operational limitations of LASER PRS as a position reference system for DP operations?*
- Appropriately selecting LASER PRS as a position reference system for DP operations in a variety of operational circumstances?*

Finally, you can ask your participants to complete the short feedback table.

JOB DONE!