mo-sys

CAMERA MOTION EXPERTS

Mo-Sys L40 Remote Head

'High payload tech-less remote head with zero backlash'

Key Features

- ***Industry Standard –*** the most popular heavy duty remote head for high end Hollywood feature films.
- ***Tech-less –*** can be set up and used by a camera operator rather than a remote head specialist.
- ***3 Axis Remote Head –*** Pan & Tilt axis as standard, Roll axis as an optional module that can be added on set.
- ***Single Sided 'L shape' Design –*** easier access, and easier loading and unloading of camera rigs.
- ***High Payload –*** 40kg / 88lbs payload and 18kg / 40lbs weight.
- ***Incredibly Powerful Motors –*** 100Nm rated, equivalent to holding 20lbs at the end of a 1m pole, and therefore can hold a camera even out of balance.
- ***Zero Backlash –*** uses cycloidal gears, not affected by changes in temperature, no adjustment required under different loads, and most importantly no juddering under heavy loads.
- ***High Speed Precision Movement –*** pan 180 degrees/second, zero delay, even with the largest payloads.
- ***Backpan Option –*** automatically keeps camera face parallel to a scene when jib or crane moves through an arc.
- ***Cable Hole Through Drive Motor –*** no slip rings required, minimises cable tangles, no specialist cables required.

The Remote Head Landscape

The L40 is a remote head that sits between a standard 2-axis medium payload remote head, and a 3-axis gyro-stabilized head, based on its strength and rigidity achieved through its frame design and toughened bearings. It provides greater payload capacity, simpler operation, and several unique capabilities. But the L40 was primarily designed to address common challenges that most remote head operators experience.

Remote Head Movement

The motors and gears chosen for a remote head impact both its movement and its performance under different loads, and even in different ambient temperatures.

Lower priced remote heads often use worm gears, and whilst these reduce the price they add unwanted characteristics. The tooth gap of worm gear drives changes with temperature due to the different expansion rates of the manufacturing materials used.

The thermal expansion of aluminium is twice that of steel, and with gear housings often made of aluminium surrounding steel gears, this results in changes in the gaps between the gear teeth when these systems get warmer or colder.

For example a 50 cm long aluminium frame expands by 0.5 mm between -20 deg in Winter and 40 degrees in Summer, resulting in either sloppy or seizing gears if they're not adjusted to compensate.

However, the biggest problem with worm gear drives in changing ambient temperatures, is the juddering of the gear movement, which can cause steppy motion when moving larger camera and lens packages.

The Remote Head Landscape

Remote Head Costs

Often the complexity of a remote head requires a specialist to accompany it whilst on set, working in conjunction with the camera operator and focus puller. This makes setting up, operating, and adjusting the remote head easier, but it also adds additional headcount to a production budget.

Remote Head Setup and Operation

One of the challenges of connecting cables to a camera rig mounted on a remote head, is ensuring that the connected cables don't impede the full 2 or 3-axis range of movement of the head.

Normally slip rings are used to solve this issue, but these have limitations on the data rates they allow across the electrical connection, require specialist adapter cables, and are often the weakest in the connection chain adding a degree of uncertainty.

Remote Head Downtime

Remote head design is heavily focussed on ensuring the range and smoothness of camera movement is optimal. However, this can come at the expense of ignoring how easy it is for cameras and lenses to be mounted to and from the head, and how simple it is to balance the head after adjustments are made to the remote head payload.

Remote Head Limitations

About the last surprise you want on set is finding out that your remote head won't accommodate last minute changes/challenges; such as the addition of a 12:1 zoom lens making head motion steppy due to the additional weight, or the ambient temperature increasing and impacting smooth gear movement under heavy loads.

Remote Head Payload

The payload of a remote head is a flexible limit. It is not the case that a remote head would break if a heavier camera package was mounted than the specified maximum payload. It is more a question of what level of twist the frame can withstand, and how fast a larger package can be accelerated.

A larger camera package has significantly more inertia and requires much stronger motors to generate rapid movements. The payload rating is less a technical criteria and more an artistic one, so the question is more about what type of rapid moves are required.

The L40 Remote Head

Provides Rapid Precision Movement

The L40 uses powerful 100Nm motors and cycloidal gears to allow rapid movement of even the heaviest payloads.

The motors are custom designed and built in-house specifically to provide the highest power output in the shortest package. The motor/gear combination provides zero backlash and with this zero delay, resulting in immediate crisp replication of the operator's commands. The Mo-Sys designed gear drive uses cycloidal gear technology that allows repeated 100 Nm torque. This is equivalent to holding 40 full pint bottles at the end of a 1m rod.

The L40 was developed for use on rapid movement motion-control robots, where the centrifugal force generated on the remote head at the end of a robotic arm, is easily sufficient to impact smooth motion.

The extremely stiff and over dimensioned precision bearings allow a static torque of 1000 Nm, which is equivalent to 400 full pint bottles held at the end of a 1m pole.

This excessive over engineering allows nose mounting of heavy camera packages and also provides the ultra-strong connection between the L40's frame sections. This enables the L40 to be used with the heaviest payloads on telescopic cranes, even with abrupt camera moves where normally a gyro-stabilised head would be required.

A popular choice on the L40 is the **back-pan** option. This enables the L40 mounted on a jib or crane to be swung through an arc, whilst automatically ensuring the camera is always facing the same plane of action from the start to the end of the arc movement. This makes combined camera and crane moves simpler, and the camera operator and crane operator can focus on their own tasks without impeding each other.

The L40 Remote Head

Reduces Costs

The L40 is specifically designed to be simple enough for either a Camera Operator or Focus Puller to set up and use, without requiring a remote head technician on set. This means that productions can benefit from headcount savings, whilst the Camera Operator and Focus Puller can easily fill the Remote Head Technician's role.

Simplifies Operation

The L40 uses a single daisy-chain power and communications cable - Mo-Sys Bus – to connect Mo-Sys components/equipment/modules together quickly and simply. In addition, all motors features a hole through the centre enabling standard camera cables to be connected to the camera whilst allowing full pan, tilt, and roll movement without the use of slip rings. This design significantly reduces any possibility of cable tangles, and removes the need for specialist adapter cables. Often sliprings together with connectors in general are the weakest point in a remote head system.

The L40 can be controlled by pan bars, hand wheels, or a joystick, using either a touch panel or a button console. It can be operated wired, wire-less, or over extreme distance (fibre optic cable). It can also have a 3rd Roll axis drive motor added, enabling the DP the widest possible choice of shots

Reduces Shooting Downtime

When moving a camera from a fluid head onto the L40, the power of the L40's motors, the cable connect holes through the centre of the tilt and pan motors, and the open 'L-shape' design, all enable the heaviest camera rigs to be moved straight onto the L40 without disassembling and reassembling the camera peripherals to save weight or aid balancing.

Lens changes are a frequent occurrence on set, which is why the L40's motors have been designed to be powerful enough to support an unbalanced camera body plus peripherals, during a lens change. This makes changing lenses faster reducing downtime between shots.

Combined these unique features reduce shooting downtime.

The L40 Remote Head

Accommodates Widest Choice of Camera/Lens Combinations

The clever design of the L40 delivers a remote head that weighs only 18kg/40lbs yet supports a camera/lens payload of up to 40kg/88lbs, meaning that virtually any camera/lens combination can be used. This enables DPs the widest choice of tools to choose from.

Virtual Production Enabled

The L40 is capable of virtual production workflows due to its 3-axis motors having in-built encoders. The encoders provide pan, tilt and roll data, and this can be supplemented by adding other Mo-Sys options to provide the additional X,Y,Z axis data completing the 6-axis data set.

The L40's data set can be delivered to virtual production software, and used live for on-set pre-viz or on-set finishing, or saved for post-production compositing. Mo-Sys manufactures all the components required for virtual production workflows, including Unreal Engine based previsualisation and 6-axis extended data recording.

The design of the L40 was inspired from a specialist head Mo-Sys developed for the film "Gravity" which required heavy remote head payloads, rapid acceleration on motion controlled industrial robots, both without impeding the light from the LED volume on the talent.

The L40 is the leading remote head choice in Hollywood, trusted by camera operators, DPs, and Focus Pullers. It's the only system that solves all of the typical remote head challenges production teams encounter, and it's the only remote head you'll need outside of a gyro-stabilized head.

What's in the Box?

L40 Remote Head

Touchscreen Console

PanBar

Handwheels

Gateway

Button Console

Roll-Axis

Specifications

Weight	18 kg (40 lbs)
Payload	40 kg (88 lbs)
Pan/Tilt speed	180 °/sec
Pan/Tilt range	±720
Max system bus length (operating distance)	100 m
Max operating distance with optional radio	300 m
Max operating distance with optical fiber bridge	20 km
Pan/Tilt control options	Hand-wheels, pan-bar, joystick, micro joystick
VR encoder resolution	> 2 Million counts per revolution
Power	15-32V (24V nom) 3A (nom) 20 Apk
Mains	With PSU 110V-200V

For more information

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