

Speed and Consumption: factors affecting performance

Captain John Stone, (C.F. Spencer and Co Ltd., International Marine Consultants and Surveyors) looks at the factors which may affect the performance of a ship in relation to speed and consumption claims that are sometimes overlooked.

The speed and fuel consumption of a vessel can be, and are, affected by a number of factors which may not be stipulated in the charterparty such as fuel quality, marine growth and ocean currents. These are factors which are quite often overlooked in the preparation of a charterparty and by claims handlers in relation to assessing a vessel's capability in a speed and consumption claim.

SPEED AND CONSUMPTION

i) General

When a vessel is chartered under a time charterparty, along with a description of the ship, the charterparty usually contains a provision that the ship is capable of sailing at a certain speed on a certain consumption under a given set of good weather conditions such as "... speed of about 14.0 knots and a consumption of about 28.0 tonnes which owners guarantee the vessel will maintain under good weather conditions not exceeding Beaufort Scale 4...".

ii) About

As can be seen in the sample clause the speed and the fuel consumption figures are often preceded by the word "about". This gives a reasonable margin of tolerance to the owner. Case-law has not established a precise meaning of "about" but, in our experience, the generally accepted allowance in the industry for vessels with a speed range of 12 to 16 knots is +/-0.5 knots for speed and between 3 and 5 per cent for fuel consumption, the latter being more common in the last few years.

iii) Good weather conditions

The good weather conditions are defined by reference to a maximum Beaufort wind force and Douglas Sea State Scale under which the speed and consumption figures can be achieved.

Failure to achieve the speed for whatever reason can lead to delayed arrival, missed cargoes and lost profits. Along with

excess fuel consumption these are some of the factors giving rise to disputes between owners and charterers in relation to speed and consumption.

When a charterer hires a ship he will often appoint a weather-routing company to provide a route for the subject voyage which follows the best voyage distance and weather conditions combination available for the vessel.

It does not always work however, "...steaming basis not exceeding Beaufort Scale 3 and without any swell ..." for a voyage across the South Atlantic Ocean in April are conditions which will be a challenge for the weather-routing company and the charterers to make a claim. It is highly unlikely these conditions are going to be met during that particular voyage.

Although the weather conditions in which the minimum speed and maximum fuel consumption can be achieved are stipulated in the charterparty, the speed of the vessel and its fuel consumption can, and are, affected by a number of factors which will not be stipulated in the charterparty such as fuel quality, marine growth and the ocean currents.

MATTERS AFFECTING SPEED AND CONSUMPTION CLAIMS

In general speed and consumption claims can be affected to varying degrees by a number of different factors:

i) Wind

In simple terms a ship will lose speed in headwinds and will gain speed in following winds. The effect is difficult to determine and will depend on the wind speed itself. A ship's speed may be reduced not only when the wind is from ahead but also with a following wind due to the increased wave height and action.

Even with a following wind, the following sea results in



Effects of a head swell under blue sky and moderate wind conditions

increased drag from steering corrections and the position of the propeller in the water as the vessel pitches and rolls in the seaway. Sea conditions are equally important in determining a ship's performance as the wind.

The strength of the wind may have a greater effect depending on the type of vessel. A large, fully loaded container ship or a 'pure' car carrier will be more adversely affected by strong winds than a fully loaded tanker or bulk carrier of a similar size. This effect is not only from head winds but also strong beam winds persisting over several days which can lead to considerable additional miles steamed in compensation for drift as well as loss of performance.

ii) Wave Height

A secondary weather condition, in this context, which also has a major effect on a ship's performance, is wave height. The sea state is a term used to describe the waves created by local wind conditions. By contrast a swell wave is generated by remote storms which may be many hundreds or even thousands of miles away. These are described in the Douglas Sea State scale which gives two scales, one describes the state of the sea against a measure of the height of the waves, the second measures the swell of the sea.

In any sea condition waves create the conditions which cause the ship's rolling and pitching motion. This motion will result in reduced thrust from the ship's propeller and an

increased drag from the constant steering corrections.

Both the height of the waves and their direction will affect the ship's speed in a similar manner to the wind. Head seas will reduce the ship's speed to a small degree but as the seas get heavier they will begin to reduce the speed as the motion becomes more pronounced, increasing the effect on the efficiency of the engine, leading to a decrease in speed through the water and a probable increase in fuel consumption.

Waves are not necessarily associated with local wind conditions. Swell waves from a deep low pressure system which has developed in the North Atlantic in winter can roll unchecked down to the Equator and beyond. A ship in tropical latitudes, with little wind and a calm sea may find itself under sustained rolling and pitching from a long swell coming down from the North, which may lead to a reduction in speed under conditions where the good weather conditions of the charter party are being met.

Wave heights which are frequently referred to in a weather routing company report are often the combined wave height of both the wind waves and the swell waves.

iii) Fuel quality

Bunker fuel, although carefully refined, contains various elements including residual fuels which vary from region to region. By contrast, fuel for a car from a service station

forecourt is carefully refined to set specifications.

The minimum speed and maximum fuel consumption which the owner guarantees in the charterparty are conditional on the fuel used corresponding to a specified quality which is generally indicated by its viscosity. However, the precise composition of bunker fuel is unknown when it is supplied and the results from a bunker fuel samples analysis can reach the ship a number of days after the engine may have been burning the received fuel. The supplied bunkers are cleaned on board the ship using a centrifuge to remove water and solid contaminants.

If the fuel has been supplied at a viscosity that is incorrect then the temperature of the fuel to the separator and particularly to the machinery will require adjustment to provide the correct injection qualities. If the density of the fuel is incorrect a traditional purifier will require adjustment in order to treat the fuel effectively.

Both damage to the engine and a reduction in speed can result from poor quality fuel. Either of these outcomes can result in a speed and consumption claim from the charterer even though the charterer, itself, is responsible for supplying the fuel.

iv) Marine growth

Marine growth is a natural occurrence which is more prolific in some parts of the world than others. The effect of marine growth on a ship's performance can be compared to a swimmer trying to swim the length of a pool in a heavy overcoat.

In tropical waters the growth of weed and barnacles can occur quickly on a stationary hull. Even a single, lengthy port stay under such conditions can reduce the achievable speed of a vessel by as much as 2 or 3 knots in extreme cases of marine growth. If the vessel spends more than 20 consecutive days at anchor or when alongside, many charterparties provide that the speed and consumption warranty is no longer valid.

v) Current

While the warranty in the charterparty typically stipulates the "about" speed under the "about" good weather conditions there is seldom any reference to the ocean currents which may be encountered by a vessel during its voyage.

The distance a vessel steams between two positions in a set period of time, say noon to noon, gives the speed of the vessel over the ground. It is important that current is therefore considered to convert the speed over the ground to speed through the water which is more likely to be the speed warranted in the charterparty.

In our experience, currents can have a marked effect on the overall performance of a vessel and should not be ignored.

Adverse currents will have an obvious effect on the speed achieved by a vessel. The current does not need to be adverse to

have an effect on the vessel's speed. A strong cross current can lead to a noticeable deviation and additional miles steamed on a voyage. Information on ocean current strength and direction is available to the mariner from the Admiralty Routeing Charts which are carried on board many vessels. Another source of information is the use of satellite radar ocean current readings although this is a more expensive option.

Ocean currents can fluctuate in both strength and direction and have to be taken into consideration when assessing a vessel's performance. Moreover the major ocean currents can be disrupted for several days by very intense weather systems, such as hurricanes.

FINAL COMMENTS

Hopefully this article will give food for thought in relation to some of the factors which affect speed and consumption (bunker fuel quality, fuel settings, sea, swell, weather, dirty bottoms - there are a host more that have not been covered) for the charter period. These are factors which claims handlers should be aware of when considering the claim.

Owners can help to protect their interests by ensuring that in the operation of their vessels, detailed records are kept of both the weather and sea conditions during the voyage in the deck logbook and the operation and performance of the vessel in the engine logbook. These records, which may be nothing more than daily entries at the time, can be of paramount importance two or three years along the line when, in a speed and consumption claim, they come under close scrutiny. ⚓

Substantial barnacle growth on the hull of a ship trading in Red Sea waters. The barnacles have been scraped clear on the bottom fo effect repairs to the plating.

