

The virtues of spud carriages

Introduction



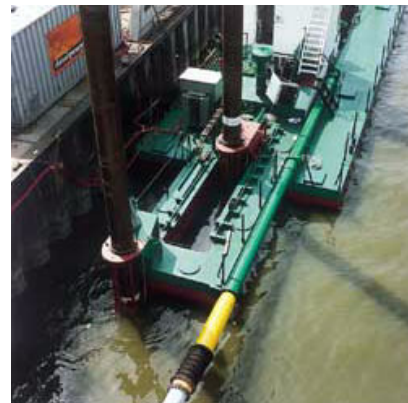
Stationary suction dredgers are, well, stationary, but some are more stationary than others. The problem with being stuck with a dredger in one position is that you get a very deep hole in a very limited area. This is rarely what clients want, so that quite a few contraptions have been invented to move stationary dredgers. They tend to be pushed around by tugs, hauled on 'christmas tree' anchor

wires, pivoted on independent spuds and walked with tilting spuds. Few of these worthy inventions, however, work quite as satisfactory in such a broad range of conditions as spud carriage systems. These have become the norm on middle and upper range wheel and cutter dredgers. In recent years they have markedly proliferated in smaller craft as well. This article explains why.

Save time

By exactly measuring how much time each action of his fellow bricklayers took, Frank Gilbreth, a 19th century college drop-out, managed to hugely improve his gang's production and ultimately became a business consultant himself. His profession was to become one of the most profitable businesses of our times. Since measuring the amount of time actually spent on production and the time spent on unproductive but unavoidable collateral activities is an essential management tool in optimising dredging efficiency, we will, following Gilbreth's star, indulge in some useful spud consultancy here.

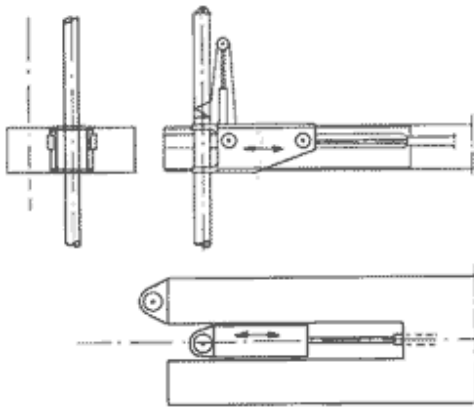
Shifting a stationary dredger implies that the dredging process must be interrupted. It certainly pays therefore, to analyse how this interval can be kept as short as possible, against the lowest possible operational costs. Any approach involving auxiliary craft, for instance, will tend to be more expensive and risk longer waiting times than tactics that the dredgermaster can carry out with on-board equipment. That is, for instance, one of the charms of anchor booms, which can kedge the anchors forward as soon as their wires have run out of scope. But it is with spud carriages that really big savings in time can be expected. Thanks to these constructions, the days are gone when crews of auxiliary craft had the entire dredging operation's efficiency in their hands.



The spud carriage

With spud carriage system a cutter or wheel dredger acquires the means to move up and down its working track independently, step by step advancing on its working spud (in the carriage) and held by auxiliary spud each time the carriage has run its span. The spud carriage cuts out

the need of a considerable number of spud changes, which gives average production increases of about 20%.



The spud carriage system needs two spuds: one auxiliary spud working aft in a fixed position (in the horizontal plane that is); and the working spud in a carriage, which allows it to travel fore-and-aft. As a matter of fact, the carriage system must be able to cope with the rigours of a vibrating, pulling, pushing, to some extent heaving and rolling, dredger, pivoting habitually round it. The combination of strength and mobility makes the spud carriage a considerably more complicated, and therefore more expensive, structure than a 'fixed' spud. In terms of time saved, however, it is an investment which pays for itself in a short

time. While increasing production of a cutter dredger by about 20%, and even 25% in a wheel dredger, the cost of a spud carriage system will be at most 15% of total investment in a new dredger. Hence the proliferation of spud carriage systems in the stationary dredging fleet in recent years. Even rather basic standard cutter dredgers nowadays have them. The efficiency improvement for wheel dredgers is such that these are delivered standard with spud carriage system.

Normally the spud carriage has four wheels, running on rails alongside a longitudinal well, on which it travels fore and aft, moved by a double-acting hydraulic ram. To absorb lateral forces, horizontal guide rollers and/or bearing strips are fitted to the carriage and to the well's sides. Depending on the lay-out, the spud's lifting gear may travel with the carriage, which of course complicates the arrangement. The auxiliary spud only needs basic surroundings aft of the craft, with hoisting equipment.

The dredging operation begins with the craft moored mid-channel, the working spud in the carriage in forward position, the auxiliary spud up. At the end of a completed swing, the dredger will be moved forward by pushing the carriage aft. After several such moves the carriage may have run its well's length whereupon the auxiliary spud will be dropped and the working spud raised to allow the carriage to be moved forward again, etc., all without outside help.



Flexible and automated

One of the many charms of the system is that it can be fitted in the smallest Beaver as well as in the biggest cutter dredger. For instance, the 22,795 kW Mashhour's 51 m long spuds weigh 160 tons each and need 350 kW winches for handling (see P&D 147). Mashhour's working spud sits, with hoisting arrangement et al, in a carriage which can travel 6 m up and down the fore-and-aft centreline.

Not only in size, but also in numbers and additional uses, the spud carriage system's flexibility is hard to match. This was proven recently in Sibelco's wheel mining dredger Heron (see also P&D 147). This shore-powered craft has one fixed spud aft and two spuds in carriages, which



allow it, in depths up to 18 m, to 'walk' or be kept stationary with no other means of anchoring.

In our computerised era, moving spuds in carriages is obviously rarely done from deck. Modern dredgers have automated systems in which actuating the spud carriage is integrated in the entire automated control cycle of swing winches, ladder inclination and power on the pumps.

Changing spuds after the carriage has reached its limit

will not be automated, though, but is usually guided by remote control from the dredgermaster's console.

In short: spud carriage systems, which may have been considered outrageous luxuries in small craft a few decennia ago, are today fully accepted equipment in even the smallest standard Beaver cutter dredger. With a production increase of about 20% one need not be a management consultant to calculate that a spud carriage will earn its investment back in the shortest possible time.