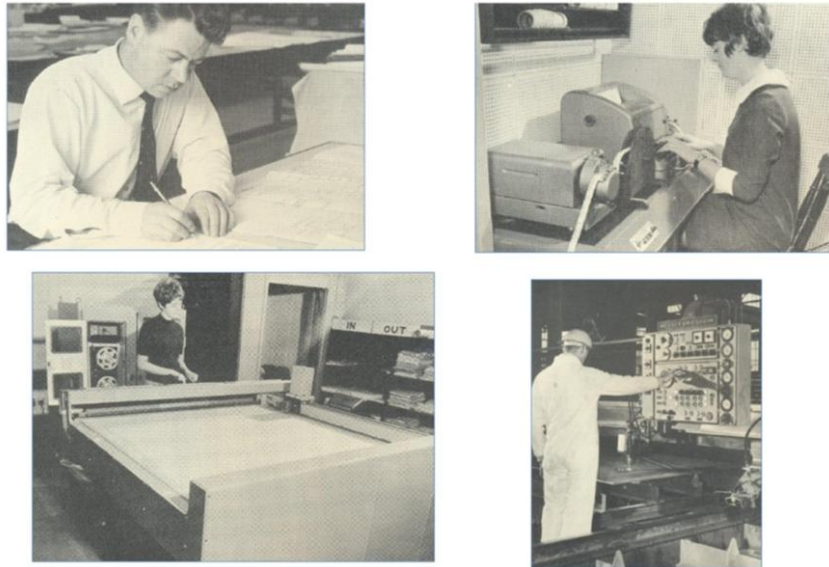


# Shipbuilding disruption key #2

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1970 Autokon – first productive CAM system



Hello and thanks to those following.

The photograph is taken from one of my lectures - on the subject of lofting, which is to say the (now largely redundant?) full scale development of shape from 2D scaled plans. It is taken from an early Autokon brochure and shows 'parts programming' for the cutting machine via punched tape. The predecessor was the scribe board, with shape defined full scale on a loft floor and transferred to the steel using wooden templates.

Things have moved on greatly since 1970 and we have the potential to use the digital twin for simulation and optimisation of assembly before production commences, as well as for direct machine control and thereby automation. **BUT ONLY** if we have sufficient pre-production time to enable this to happen. **MAXIMISATION OF PRE-PRODUCTION TIME** is my proposed second key that could disrupt shipbuilding.

There are two things that lead to an imperative to start cutting steel too early. One should be relatively easy to fix but the second is not.

The first problem is that commercial shipbuilding contracts normally peg payment to physical progress. Pre-production work does not count

as progress and is therefore not valued. Only by cutting steel and keel lay can you get paid.

A more difficult problem is that human capital needs work. Delayed production start risks an un-recoverable cost penalty: idle labour. There is only so much that hire and fire or subcontracting can do to avoid this and the reason that this risk is high in shipbuilding is the volatile nature of demand (<https://strategicmaritime.co.uk/text-book>).

So, even if we fixed the contract we are still likely to have to cut steel too early and compromise pre-production functions. I can't see any way around this apart from automation. We therefore reach something of a conundrum – we can only automate if we automate. There is no real halfway house.

Automation is by definition a shift of the balance from human to fixed capital. Investment will therefore be required but, in return, machinery can work 24/7/365 and if standing idle will not lead directly to a cash penalty in the way that idle labour does – in other words, automation would be a step forward in coping with volatility of demand as well as being a solution to the global labour shortage problem.