

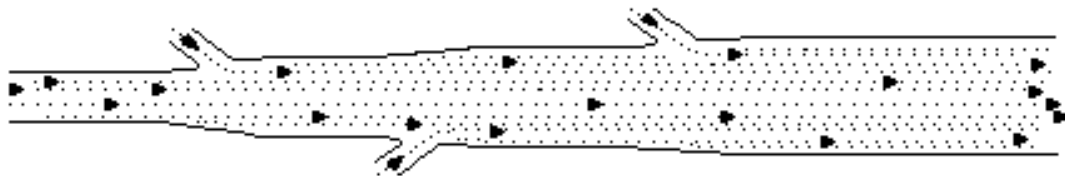


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articles

# Flow Production: why and how



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By Carlo Scodanibbio for The Sunday Times of Malta

Achieving a "Flow" type of Production is, or at least should be, a prime target for the Manufacturing Industry.

The basic idea is rather well known and easily understood: Flow Production means a smooth, regular (even continuous) flow of materials through the several stages of the productive process without significant build-ups of stocks.

The implications of organising the productive process in such a manner and the reasons why it should be organised in this way are less known.

Stock is another point of confusion: **Flow Production** is very often considered as "*Stockless Production*", where the stock situation is seen as the base (and the pre-requisite) to achieve Flow Production.

## *the concept*

To clarify all the points above we must go back to basics, using an appropriate comparison. I would rather avoid the spontaneous one that immediately comes to mind of a stream or a river. I'd rather go for the "pipeline model".

Under the right conditions (water pressure, pipe diameter, smoothness of inner surface, etc.) the water flow in a pipeline is smooth, regular, continuous and without turbulence. If we also imagine that, instead of having a gravity flow (or a pump working upstream) pushing water through the pipeline, we could rather have a pump on the downstream side "sucking" water out of the pipeline, the comparison would be perfectly centred.

Flow Production is in fact the most modern development of a "pull" type of production in which the manufacturing parameters are set "downstream" as far as possible, ideally by the market (".....the ocean pulls the river"....) - in any case in line with market demand.

The comparison fits all practical situations:

- the "Continuous Process" - type of productive system (with our "pump" running round the clock)
- the "Line" and "Batch" types (with our pump being switched on and off according to incoming orders)
- the "multiproduct" situation in which different pipelines conveying different liquids (different products) are kept operational by switching on the respective pumps (market demand)
- and even "project" situations like construction works (very typically "pull").

Moreover, as in all practical situations, the suppliers/sub-contractors network plays its operational role exactly like affluent pipelines do, conveying their respective liquids in the main pipeline.

To make our similitude more perfect, we can now visualise a main pipeline (our Factory or Productive Concern) sucking a liquid (raw materials) from the upstream inlet - increasing progressively its diameter to allow extra flow from affluent pipelines (suppliers) conveying different liquids (supplies of other raw materials, commercial components, semi-finished items and quasi-products....) mixing in the right proportion to obtain a compound liquid (the finished product) at the pipeline outlet (the market) according to set standards, at the set time and in the set quantity required.

If one tries to visualise this "ideal" pipeline situation and compares it with a real manufacturing situation, all the discrepancies between ideal and real come out sharp and clear:

- Unsuitable layouts cause anything but a smooth, regular, uni-directional flow of materials.
- Plant stoppages, or reduced speed, cause unbalances and inventory build-ups.
- Handling and conveying are equivalent to processing fresh air.
- Set-ups, change of production and re-tooling are other examples of irregular flow.
- Quality control with associated implications (rejects, re-working or degrading) disturbs the productive process.
- Multi-directional flow, or backflow - and all human related errors (misunderstandings, waiting, idling, processing wrong information, duplication of efforts, and the like) cause again all but a smooth, regular flow of materials along the productive process.

In our hydraulic example all the above irregularities would correspond to *losses*: friction losses due to wrong pipeline diameters or rough inner surface, losses due to wrong type of pipe bends, or uneven diameter changes, or wrong inlet angle of an affluent pipe, losses due to obstacles or partial occlusions in the pipeline, losses due to air bubbles in the mainstream, etc.

In a manufacturing concern we must call these losses by their true name: **WASTE**.

# Flow Production: why and how

## *the benefits*

## *the implications*

To achieve (or get as close as possible to) our ideal target of a flow-style production we need to review the whole production process in such a way that waste is reduced to minimal levels and materials flow at an optimum speed, smoothly, regularly and uni-directionally.

Finally, the productive process must do to the product being processed only what it is supposed to do: **ADD VALUE** to it.

From this angle of view, the market (our pump) should be seen as the driving force that puts and maintain into operation the productive process. This has to be organised in such a way that all waste is cut down to a bare minimum.

Certainly, if this could be achieved in full or in large part, our market should be satisfied.

This explains why Flow Production is today a strategic factor in a client-oriented environment. Clients want the products they need, how (with the quality parameters) they want, when they want, in the quantity and rate they want, and with a "value" they consider acceptable (or worth). On this basis they will gladly pay the associated price.

In a rapidly changing market, this dictates the need for Flow Production. It is the only way to achieve a productive process at a minimised cost which is "slender" (Lean Manufacturing), flexible, and gives more value-added to fulfil customers' explicit and implied expectations.

What are the implications of such a vision?

- TQM (Total Quality Management) - or at least, initially, an effective QA system - is a pre-requisite.
- There are, besides, essential "technical" conditions that must be met in order to achieve (or get close to) the ideal target.
- The most important one is "one-piece" flow referring to the condition in which each workpiece should be processed and passed along the production line by itself - simple enough in theory but still very difficult sometimes to put into practice. One-piece flow is the basic concept to uncover first and then to attack the bulk of evident and concealed waste in the production process (example: conveyance waste, movement waste, idle time waste, inspection waste, overproduction waste, defective production waste....).
- Another essential condition is that the factory (or production line) layout must be set according to the processing sequence. Again, this seems quite understandable in theory. But much less in practice when it involves a major revolution. Besides, the layout should be flexible enough to adapt rapidly to a varying range of products, product features, etc.
- Most important: Flow Production, as a technique, cannot simply be "imposed" top-down. There must be active, deep involvement of all those concerned in each production area undergoing the Lean transformation.
- which, in simple terms, means that the **Total Employee Involvement** discipline must be deeply practised.

Because, after all, Flow Production is made primarily by People.

## Flow Production: why and how



Carlo Scodanibbio, born in Macerata (Italy) in 1944, holds an Italian doctor degree in Electrical Engineering (Politecnico di Milano - 1970).

He has over 49 years of experience in Plant Engineering, Project Engineering and Project Management, as well as Industrial Engineering and Operations Management.

Free-lance Consultant since 1979, he has worked in a wide spectrum of companies and industries in many countries (Southern Africa - Italy - Cape Verde - Romania - Malta - Cyprus - Lebanon - Mauritius - Malaysia - Kenya - India - Saudi Arabia), and operates as an Independent Professional Consultant and Human Resources Trainer to industry.

His area of intervention is: World Class Performance for Small and Medium Enterprises in the Project, Manufacturing, and Service sectors.

His favourite area of action is: the "lean" area.

He has co-operated, inter-alia, with the Cyprus Chamber of Commerce, the Cyprus Productivity Centre, the Malta Federation of Industry, the Mauritius Employers' Federation, the Romanian Paper Industry Association, the United Nations Industrial Development Organisation and the University of Cape Town.

His courses and seminars, conducted in English, Italian and French, have been attended by well over 20.000 Entrepreneurs, Managers, Supervisors and Workers. They feature a very high level of interaction, and are rich in simulations, exercising and real case studies. The approach is invariably "hands-on" and addressed to immediate, practical application.

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