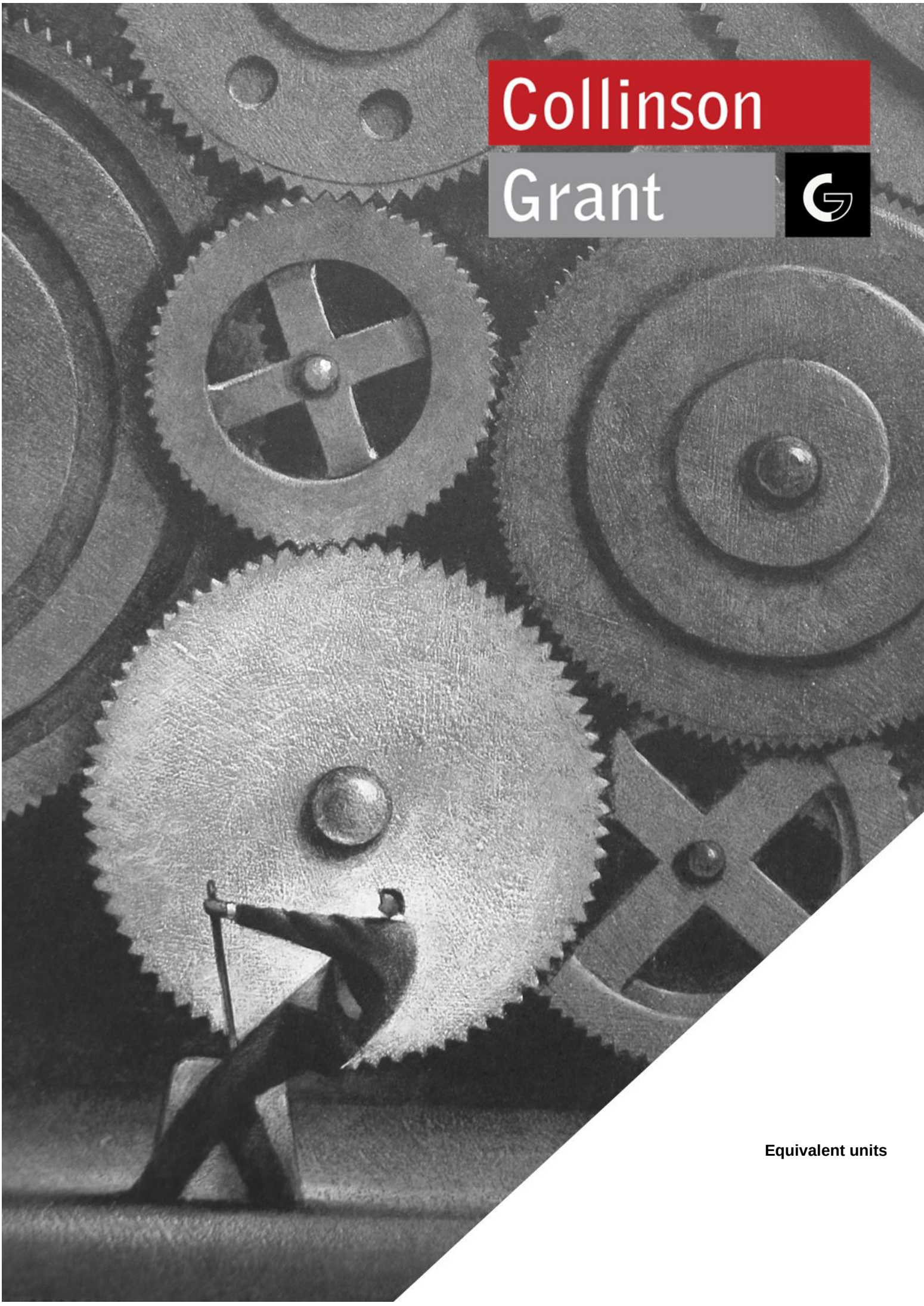

Equivalent units

Contents

Appendices

1 Introduction

Few managers realise the adverse impact on costs of flexibility in manufacturing. Those that do are often factory managers, who may attribute failure to achieve financial targets to variation in the mix of products.

In most businesses the detail of the budget is often out of date very soon after it has been agreed. Changes in overall volume may be recognised: changes to the specific mix of products rarely are. Detailed, incremental systems for measurement and costing cannot readily adapt to cope with changes in mix, and 'What you cannot measure you cannot control'. When changes are measured, this is often done through complex calculations that are opaque and rarely understood by people outside the Finance function.

Experience spanning several decades has enabled Collinson Grant to develop a system of measuring manufacturing performance independently of volume mix. It is essential in the continuing effort to keep manufacturing efficient in a commercial environment where:

- competition is international,
- products' lifecycles are shorter and
- manufacturing flexibility is higher than ever before.

This document:

- examines the reasons for using Equivalent Units (EUs)
- provides an overview of their construction
- uses an example to show the power of EUs
- provides, in outline, a plan for implementation.

2 Why Equivalent Units?

Some managers may know little about what is actually happening in the operations for which they are accountable. Others become complacent, protected by soft markets in which high margins often conceal poor or deteriorating productivity.

Measures of performance should be like beacons. They are the most visible signs of what managers believe is important. When they are also linked to financial incentives, the light shines so much more brightly and can become, mistakenly, the sole focus of attention. And if measures are too complex, inappropriately defined or administered poorly, they can adversely influence managers' decisions.

2.1 Managerial information in production and the costs of meeting demand

The mix of products is often not chosen by a factory manager. It can be driven by many factors: sales promotions; changes in sales strategy – often to develop low-volume, niche products; unforeseen responses from customers; and difficulties in the supply chain. A robust approach is necessary to isolate the performance and measurement of manufacturing from other factors external to the control of the factory manager.

In many businesses:

- sales volumes and margins (Revenue) are proportionate to volume: often 80%+ of the volume is generated by a small number of products, customers and transactions, *although*

- most of the costs are proportionate to transactions, and the greater part of the costs are attributable to the 50%+ of transactions that perhaps generate only 20% of volume.

Traditional costing methods ignore these phenomena. They allocate costs incrementally on the basis of volume and usually overstate the costs of successful, high-volume products. This is often not apparent when the high-volume products are already regarded as profitable. More importantly, the costs of lower-volume products will be understated – leading to false assumptions about their contributions to profit.

Experience shows that:

- detailed 'incremental' systems for measurement and costing are cumbersome and cannot readily adapt to cope with changes in the volume mix, and they inhibit rapid response to changes in the market

- elements of cost respond best to 'total' control within specific parts of the business, including manufacturing

- Equivalent Units improve the control available to, and measurement of, factory managers.

3 What are Equivalent Units?

Equivalent Units are a common 'currency', in which the conversion cost of different products can be recorded to provide an accurate figure of manufacturing output and efficiency, independently of the mix of products.

EUs supplement rather than replace accounting and control systems. They can be deployed as part of an integrated approach to Management Controls and Margin Improvement, but are still effective as a stand-alone control, provided that the organisational structure supports them.

The adoption of EUs can, but may not necessarily, also involve implementation of transfer pricing between operators (factory managers) and traders (sales managers).

EUs are established by calculating a ratio for each product's unit conversion cost referenced to the major product in the group, which is given a value of one. Total conversion costs for each product are calculated by analysing direct costs to products wherever possible and by applying activity-based accounting techniques to the allocation and apportionment of indirect costs.

The costs of operations are monitored in subsequent periods by the calculation of equivalent value for products processed, calculated by multiplying actual volume for each product by its EU and then totalling the EUs. The financial transfer value of the output is the actual volume of the product multiplied by the standard transfer price for each product. Comparisons are then made between current and base periods in respect of apparent change in volume, actual change in volume (based on EUs) and change in transfer value. The costs of labour are monitored through the use of target hour values for various products.

3.1 Example calculation of EUs

Item	Volumes in units	Conversation cost per thousand (Added value)	Equivalent unit
Product A	2,000	60.00	1.20
B	4,000	70.00	1.40
C	6,000	45.00	0.90
D	20,000	50.00	1.00
E	10,000	85.00	1.70
F	8,000	40.00	0.80

Notes: Product D has the largest output and is given the equivalent unit value of one. All other products' equivalent units are based on their unit conversion costs relative to product D

3.2 Organisation

An essential requirement for EUs is an organisational structure that has a clear demarcation of control and definition of:

Production/conversion activities

The manufacture of saleable goods or the provision of saleable services, including all the functions involved in the total operation – such as services related to administration, labour, maintenance engineering, quality assurance, accounting, materials control, and process development.

Trading activities

Marketing, sales, finished goods, warehousing, distribution and all activities involved between 'make' and 'purchase by customer'.

4 Implementation

To establish EUs, a reference accounting period is selected, in which products' unit conversion costs are calculated by comparing total conversion costs with volume output for each product.

The base year analysis for operations includes:

- unit output volumes for each product/product group
- product-related material costs for each product/product group
- calculation of target hours required for those activities (direct labour and direct support labour) that generate volumes analysed by product/ product group
- numbers of employees, paid hours and total employment costs, analysed by department or function. All employees on the payroll must be analysed, including all support service and factory administration. The payroll data must be arranged by operating department in order to reflect the relationship to products
- direct operatives

- direct support operatives
- indirect operatives
- the staff
- managers
- all relevant operating and overhead costs, allocated to defined areas of activity or cost pools.

Trading, strategic business unit or head office costs are kept separate from production costs. These costs are not to be allocated to products, but it is important that no cost associated with processing goods should be included in them.

A ratio is then established for each product's unit conversion cost by reference to the major product in the group, which is given a value of one. Total conversion costs for each product are calculated by analysing direct costs to products wherever possible and by applying activity-based accounting techniques to the allocation and apportionment of indirect costs.

The costs of operations are monitored in subsequent periods by the calculation of equivalent value for products processed, calculated by multiplying the actual volume for each product by its EU and then totalling the EUs.

The financial transfer value of the output is the actual volume of the product multiplied by the standard transfer price for each product. Comparisons are then made between current and base periods in respect of apparent change in volume, actual change in volume (based on EUs) and change in transfer value. The costs of labour are monitored through the use of target hour values for various products.

Subject to any significant and permanent changes in the mix of products, such as the development of a new major product, equivalent units remain fixed at the base year values. They are not updated annually or in response to improvements in cost or performance. This ensures valid measurement of overall trends - the goalposts are not moved.

5 Summary

With many factory managers facing the challenges of international procurement, it is essential to maintain tight measurement and control of costs, independently of the mix of products.

Badly constructed measures of performance encourage bad behaviour. The traditional approach of 'incremental' measurement and costing systems does not readily adapt to measuring the increased flexibility demanded of factory managers in an era of 'niche' products and short product lifecycles.

Elements of cost respond best to 'total' control within specific parts of a business, including manufacturing. What cannot be measured cannot be controlled. Properly implemented and maintained, Equivalent Units provide a reliable measure of factory productivity, independently of the mix of products.

6 Collinson Grant

Collinson Grant is a management consultancy with a history of profitable growth. We help large organisations all over Europe and in the United States to restructure, merge acquisitions, cut costs, increase performance and profit, and manage people. We build long-term relationships, and have worked for some clients for over thirty years.

Our emphasis is on implementation, results and value-for money. We expect to give a substantial return on the investment in us. So we do not recommend action unless we are sure that the outcome will be worth it. We are not afraid to give bad news, or to champion ideas that may not be welcome.

Most of our work is on three themes – organisation, costs and people. We use this simple framework to manage complex assignments – often with an international dimension – and to support managers on smaller, more focused projects. We help them:

- to restructure and integrate – following acquisitions or to improve profits
- to improve the supply chain. We examine every process and interface to improve efficiency and service
- to set up financial and managerial controls. We create robust systems to improve decision-making and reduce risks
- to refine business processes and introduce lean manufacturing. We analyse and improve how work is done, and use new ways to create change and make it stick
- to cut costs. We make systematic analyses of overheads, direct costs, and the profitability of customers and products. This helps managers to understand complexity, and to take firm steps to reduce it
- to manage people. We draw up pay schemes and put them into effect, guide managers on employee relations and employment law, get better performance from people, and manage redundancy.

Forecasts and recommendations in a proposal, report or letter are made in good faith and on the basis of the information before us at the time. Results depend on the effective co-operation of the client and the client's staff. Therefore, no statement in a proposal, report or letter is a representation, undertaking, warranty or contractual condition. This Company shall not be liable for any losses which were not reasonably foreseeable on acceptance of a proposal or for indirect or consequential losses including loss of revenue, expected profits and claims by third parties.

Case study

Imperial Tobacco Group

Over the last twenty years we have supported Imperial Tobacco Group (ITG) in its drive to maintain market leadership in costs and productivity. The organisational model is based on value-chain principles, flat structures, strong managerial controls and powerful incentives.

The model was originally designed to improve profits while managing declining volumes. It followed the announcement of a major strategy with the objective of making the company Europe's most efficient tobacco manufacturer. Because of the establishment of the Single European Market in 1993, Imperial's actions were not surprising. It had to improve efficiency and reduce production costs to compete with its European counterparts.

Such has been the success of Imperial's management team that the company has been able to acquire major competitors in Western Europe and has also expanded sales world-wide.

Equivalent Units have been a key component of the manufacturing strategy. We have worked alongside line managers to ensure that they understand the underlying principles and that rules are applied consistently in their implementation. Between 1987 and 1995 productivity almost trebled. When, in the earlier years, volumes were static or declining, EUs allowed the company to apply a downward ratchet on unit costs and create value for shareholders.

As ITG has expanded by acquisition throughout Europe and in Africa, we have supported the use of Equivalent Units as the baseline for ensuring that rigorous controls are maintained. The commitment of senior executives to a sustained approach has been rewarded by significantly increasing profitability in what remains a highly competitive market.

.

Ryecroft Aviary Road Worsley Manchester M28 2WF United Kingdom Telephone +44 161 703 5600 Facsimile +44 161 790 9177
33 St James's Square London SW1Y 4JS United Kingdom Telephone +44 20 7661 9382 Facsimile +44 20 7661 9400
Fort Business Centre Mriehel Bypass Birkirkara BKR 3000 Malta Telephone +356 2776 1710
Mainzer Landstraße 50 60325 Frankfurt am Main Germany Telephone +49 498 088 3356
12 place Saint Hubert 59000 Lille France Telephone +33 66 88 09 75
Web www.collinsongrant.com

081019