

On Some Basic Features of Earlier Costing: Schneider and Co. Around the 1840s (1)*

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The aim of this article is to shed light on some basic features of earlier costing. The words "basic features" are used to indicate the peculiarities of earlier costing distinct from today's. They further indicate that the concept of "costing" or "cost" itself in earlier costing is somewhat different from that of modern costing of today. This would perplex those who are used to the historical studies so far pursued regarding earlier costing, since all of these studies approached the earlier costing practices only today's cost or costing concept in mind and had never imagined the possibility of another costing. Therefore, to make its intent clear, this article begins its discussion by describing what costing phenomenon it is concerned with.

1. Main Framework

Investigating when and why costing began is not this article's concern. As S. Paul Garner noted, "almost from the very beginning of double-entry," in about the fourteenth century, "there is evidence that the records maintained by the firms of the day were tinged with a cost accounting point of view."¹⁾ Where there is double-entry bookkeeping there may be costing. This article

* The writing presented here is the first two thirds of the whole article. The remaining third will be inserted in the next volume.

1) S. Paul Garner, "Highlights in the Development of Cost Accounting," in *Contemporary Studies in the Evolution of Accounting Thought*, ed. Michael Chatfield (Belmont, Calif., 1968), 211.

uses the word costing in this sense. The costing practices this article is concerned with are nevertheless much later ones, those found in the epoch of the Industrial Revolution. The case of Schneider and Co., a French industrial enterprise, which comprises the main subject of this article, is treated as being illustrative of general costing features of this epoch. Indeed, as will be shown later, Schneider and Co. shared some common costing practices in critical matters with the US and UK companies of this epoch examined by the American and British authors: Lyman Mills by H. Thomas Johnson, Charlton Mills by Willard E. Stone, and the Lawrence Manufacturing Company treated by David M. Porter and, with rather critical view, Keith Hoskin and Richard Macve.²⁾ This does not mean this article agrees with their explanations of these earlier costing practices. In not the explanations but the data they provide can be found common features with Schneider and Co.

The most notable common feature between Schneider and Co. and the above American and British companies might be found in the use of the "trading account" within a double-entry recording process. The examination therefore begins by giving a preliminary explanation about this particular account. The trading account appeared historically under a variety of appellations in both mercantile and industrial accounting, therefore it has been referred to, explicitly or not, by a number of historical studies, but also by contemporary literature.

2) H. Thomas Johnson, "Early Cost Accounting for Internal Management Control: Lyman Mills in the 1850s," *Business History Review* (Winter 1972): 466-74; Willard E. Stone, "An Early English Cotton Mill Cost Accounting System: Charlton Mills, 1810-1889," *Accounting and Business Research* (Winter 1973): 71-78; David M. Porter, "The Waltham System and Early American Textile Cost Accounting, 1813-1848," *Accounting Historians Journal* (Spring 1980): 1-15; Keith Hoskin and Richard Macve, "The Lawrence Manufacturing Co.: a note on early cost accounting in US textile mills," *Accounting, Business and Financial History* (December 1996): 337-61.

The most rudimentary explanation of the nature of this account was given by a British writer, Dicksee, in his bookkeeping textbook first published in 1892.³⁾ The explanation is of traders' trading account, so the specimen trading account found in this book is that recording the movement of goods bought and sold. On its debit side are entered the beginning inventory (or "stock" in British terms), the purchases for the month, and the profit for the month; and on the credit side, the sales for the month and the ending inventory. The purchase is supposed to be made at a uniform price of 95 shillings, so the beginning and ending inventories are also priced at 95 shillings. The sale is supposed to be made at a uniform price of 100 shillings, and the sales recorded to the account are at this price. Therefore the resulting profit is credited to this account. It follows that the trading account shows both the ending inventory and profit as its balance. This particular feature of the trading account is explained by Dicksee as follows:

"The reader will now notice a distinguishing feature of the Trading Account: *At rest* (*i.e.* when balanced off) the Trading Account is a Real Account, the balance representing the value of stock on hand; but *in motion* (*i.e.* while the account is kept open for the record of further transactions) the Trading Account is a Composite Account — partly Real, and partly Nominal—the balance representing nothing definite, but being compounded of the value of the stock and the profit earned on the sales."

One will see that, if the goods sold were credited at the acquisition cost and on a daily basis, this account would be a usual merchandise inventory account under the perpetual inventory system. Therefore, "at rest the Trading Account is a Real Account." To such an account are credited the sales. By this the account becomes a "Composite Account" and its balance is "compounded of the

3) Lawrence R. Dicksee, *Bookkeeping for Accountants Students* (London, 8th edit., 1921), 93.

stock and the profit.”

Although the trading account as an inventory account is an account appropriate to the perpetual inventory system, “actual inspection and inventory” was necessary.⁴⁾ Through this physical count, the amount of the inventory on hand is determined, and by this all the items necessary to determine the profit appear in the trading account: the beginning inventory and purchases on the debit side; the sales and ending inventory on the credit side. The difference between the two sides is the profit. This profit computing method may be shown by the

Exhibit 1

Status of the Production & the Sales
Plates and Sheets Warehouse

Dr

There are on 30 April 1839 on the Forge ground	Kg 143,933	Fr 71,966.50
Manufacturing on 30 April 1840	Kg 1,218,523	Fr 546,920.86
Transportation & Discounts		Fr 49,267.89
Profit for Balance		Fr 112,419.80
	Kg 1,362,456	Fr 780,575.05

Prices on the Debit Side

Existences on 30 April 1839		Fr 500.00
Manufacturing on 30 April 1840		Fr 448.83
Transportation & Discounts		Fr 53.62
Average		Fr 454.24

Difference between the manufacturing price and the sale price Fr 82.51
Profit on a mouvement of Kg 1,362,456 Fr 112,419.80

Source: Schneider Collection. 187 AQ 2. Dossier de l'assemblée
Note: Translated by the author.

4) Ibid., 94.

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following equation (the item in parentheses is unknown quantity):

$$\text{BEGINNING INVENTORIES} + \text{PURCHASES} + (\text{PROFITS}) \\ = \text{SALES} + \text{ENDING INVENTORIES}$$

This trading account equation indicates that profit is determined without recourse to cost of sales, yet in accordance with the matching concept. This is the profit measurement method peculiar to the trading account.

The same basic features of the trading account are found in Schneider's accounts. The top of Exhibit 1 shows the summary of its plates and sheets

		Cr	
Invoiced to the works	Kg 321,498	Fr 190,625.45	
to Trade	Kg 918,748	Fr 526,889.10	
Existences on 30 April 1840 on the Forge ground	Kg 122,210	Fr 63,060.50	
	Kg 1,362,456	Fr 780,575.05	

Prices on the Credit Side

Plates & sheets delivered to the works		Fr 592.93
to Trade	Fr 573.48	
minus the Transportation	Fr 53.62	Fr 519.86
Existences on 30 April 1840		Fr 516.00
Average		Fr 536.75

générale du 4 mars 1841.

warehouse account for the year ending 30 April 1840, which may be regarded as corresponding to today's finished goods inventory account. On its debit side are recorded the beginning inventory, the cost of finished goods during the year, the shipping expense and discounts, and the profits; and on the credit side, the transfer of the department's finished goods to other departments within the Schneider Works, the sales, and the ending inventory. The account is basically an inventory account under the perpetual inventory system. This originally simple inventory account becomes a "composite account" because the sales are credited (therefore the shipping expense is also recorded). The profit measurement in this account might be shown by the following simplified equation (the item in parentheses is unknown quantity):

$$\begin{aligned} & \text{BEGINNING INVENTORIES} + \text{COST OF FINISHED GOODS} \\ & + (\text{PROFITS}) = \text{SALES} + \text{ENDING INVENTORIES} \end{aligned}$$

As in Dicksee's trading account, the above trading account equation indicates that profit is determined without using the revenue-minus-expense formula, yet in accordance with the matching concept.

Exhibit 1 is the reproduction with translation of that presented in the author's previous article written in French using the Schneider records.⁵⁾ The Schneider records are also used in the following sections of this article, so necessary comments to the records will be made in the next section. A sketch of Schneider and Co., its history and activities, will also be given in the next section. However, a brief outline of Schneider's activities and accounts is presented here as far as it concerns the above Schneider's trading account. Schneider's accounts had a characteristic as an industrial enterprise. Indeed,

5) Daijiro Fujimura, "*Méthode de calcul du bénéfice et vision économique de l'industriel du 19^e siècle: Schneider et Co. vers 1840,*" *Keizaigaku = Kenkyu (Journal of Political Economy)* of Kyushu University, Japan (Vol. 59 Nos. 3-4 integrated 1993): 163-92

the above Schneider's trading account is an account corresponding to the finished goods inventory account of today, not a merchandise account unlike the account Dicksee presented. This Schneider's plates and sheets warehouse account belonged to the department named "the Grand Forge (*la Grande Forge*)" responsible for puddling and rolling. The department had an account called by its factory name, the Grand Forge, and the following three warehouse accounts: one was the above plates and sheets account and the others were the bar iron and the rails account. The costs of finished products debited to the warehouse accounts were those transferred from the Grand Forge account. Therefore the Grand Forge account may be regarded as corresponding to today's work-in-process inventory account.

Schneider and Co. had three basic profit centers: the Workings of Coal, Iron Making and Mechanical Engineering Shops departments. To this second department did belong, as a sub-department, the Grand Forge department together with other sub-departments such as the Iron Mines, the Coke Ovens and the Blast Furnaces department. These latter departments were simple cost centers. The profits of the larger Iron Making department were calculated only in Grand Forge's warehouse trading accounts. The trading account, illustrated by Exhibit-1, provides the key to recognizing earlier costing. This will be clear from the discussion that follows.

As noted earlier, this article treats Schneider's costing practices as being illustrative of those of earlier times. The features found in Schneider's costing practices therefore explain what costing practices this article is concerned with. In order to make this article's intent clear, the notable features of Schneider's costing practices are outlined below over several points, which were partly described by the author's previous article and will be discussed in depth in the following sections. This would also facilitates examining the American and British cases noted earlier in comparative perspectives.

Point 1 — *Cost and financial accounting relationship.* Schneider's accounting system had the same feature that Basil S. Yamey noted about the early double entry system:

"In the early practice of double entry," in mercantile accounting, "the detailed composition of the total profits of an enterprise ... was to be found in the entries ... in the various 'trading' accounts in the ledger. This feature is somewhat comparable to that of modern cost accounting systems designed to disclose the separate profits or losses on each of many different production processes, departments or lines of production. (The early form of double entry in mercantile accounting proved to be readily adaptable to industrial accounting)" (the sentence in parentheses in the original).⁶⁾

Schneider's case exemplifies this adaptation to industrial accounting. In fact, Schneider and Co. recorded the profits of its different production processes (workings of coal, iron making, and mechanical engineering) and lines of production (iron plates and sheets, bar iron, and rails) in separate trading accounts. The trading account had such an effect. However, Schneider's accounts that included trading accounts were not mere cost accounts distinct from financial accounts. They had both cost and financial accounting functions. Indeed, the ending inventory entered in the trading account shown in Exhibit 1 was transferred, in accordance with the continental system, to the "Closing Balance (*Balance de Sortie*),"⁷⁾ and reproduced in the balance sheet. As regards the profit, it was transferred to the profit and loss account within the ledger together with the profits of the other trading

6) Basil S. Yamey, "Accounting and the Rise of Capitalism: Further Notes on a Theme by Sombart," *Journal of Accounting Research* (Autumn 1964), 128.

7) About the continental system, see Dicksee, *Bookkeeping for Accountant Students*, chap. VI.

accounts.⁸⁾ Schneider's trading accounts and related accounts were used for financial reporting purposes as well as for costing purposes. This means the cost and financial accounting functions coexisted within one single accounting area. The need to integrate cost and financial accounts, which characterizes modern accounting systems, had not yet arisen.

Point 2 — *The cost concept.* The costs determined in the Grand Forge account and transferred to the warehouse trading accounts were presented in terms of "total" cost as opposed to today's "total manufacturing" cost. The costs debited to the trading account in Exhibit 1 include not only factory overhead, but also marketing and general administrative costs and, indeed, interest (interest earned minus interest paid), of course, besides direct materials and labor. Here we encounter the fundamental difference between the earlier cost concept and that of today. Under today's accounting system, the distinction between product and period costs is of basic importance. Today's total cost means "total manufacturing" cost, which is treated as product costs and being inventoriable. On the other hand, marketing and general administrative costs are treated as period costs and being non-inventoriable. In contrast, earlier accounting systems made no distinction between the above inventoriable and non-inventoriable costs. Actual total costs did not necessarily cover all costs exhaustively. The emphasis is on that the total cost concept of earlier times did not make distinction between the product and period costs and was even capable of including financial expenses. It follows that when inventories were recorded at costs, marketing and general administrative costs were included in the inventories as part of the inventoried indirect expenses, although, as will

8) These recording processes are detailed in Fujimura, "*Méthode de calcul du bénéfice*," 166-69. This revelation is based on a later document *Journal Z* (see Section 2 of the present article). That the account in Exhibit 1 reflects the corresponding account in the ledger that is not available (see Section 2) was verified in this previous article.

be described below, inventory valuation at cost took place only in limited conditions in earlier times. Evidence of this total costing practice at Schneider and Co. will be provided in the following sections, but that at the American and British companies in question is given in this section.

Point 3 — *Inventory valuation.* Although costing was performed at Schneider and Co., inventories were not always valued at costs.

Point 3-a — *Valuation of finished goods.* Exhibit 1 reproduces a statement included in a package of documents prepared for the stockholders' general meeting of which an explanation will be presented in Section 2. As noted earlier, its top shows the summary of the entry in the iron plates and sheets warehouse trading account in the ledger, and its bottom shows the related costs and prices. The cost per kilogram, fr 448.83 (in fact fr 0.44883), is, as mentioned above (Point 2), presented in terms of total cost distinct from today's total manufacturing cost. The sale price, of course, represents the realized market prices, strictly their average. Notable is that the goods transferred to other departments, mostly to the Mechanical Engineering Shops department comprising another profit center, were valued at estimated market prices and that the ending and beginning inventories were also valued at estimated market prices. The reason that the transferred products price, fr 592.93, is much higher than the real sale price minus the freight and discounts is that Schneider and Co. produced a variety of iron plates and sheets having different prices. The prices shown in Exhibit 1 are the weighted averages and the difference in composition of product categories gives the different average prices. About the pricing of the inventories and goods transferred, a through examination was carried out in the author's previous article.⁹⁾

In any case, the inventories, as well as the goods transferred, were valued at market prices. Here we could note a harmonious relationship between total

9) *Ibid.*, 170-76.

costing and inventory valuation at market prices. As mentioned above (Point 2), under total costing, valuation of inventories at costs causes marketing and general administrative expenses to be inventoried. This means, from today's rules, that the expenses to be matched with revenues are underestimated and the inventories are overestimated. But, by valuing inventories at market prices, such underestimation and overestimation are avoided. Of course, in spite of such rationality, inventory valuation at market prices might be questionable from today's point of view. About this, a further discussion will be attempted later in this section.

Point 3-b — *Valuation of finished work-in-process available for transfer.* In other words, this is the matter of transfer prices, that is, pricing of departmental finished goods of simple cost centers. As noted above (Point 3-a), the Grand Forge department's finished goods transferred to other departments were valued at market prices. This is the case of transfer prices from one profit center to other responsibility centers. In contrast, when simple cost centers were concerned, departmental finished goods were valued at costs. For example, the finished goods of the Blast Furnaces department were transferred at costs to the Grand Forge department through a store account. The inventories remaining in the store account were therefore recorded at costs. However, it should be noted that, because of total costing (Point 2), the inventoried costs contained marketing and general administrative costs, and besides, interest expenses; that is, today's non-inventoriable costs were inventoried. About the costing practice of this category, evidence will be provided in the following sections.

Point 3-c — *Valuation or recording of unfinished work-in-process.* This relates to work-in-process inventories remaining in departments' accounts in an unfinished state. At Schneider and Co., unfinished work-in-process inventories in the Mechanical Engineering Shops department, where job order costing was

carried out, were valued at costs, but in the departments where process costing was executed, unfinished work-in-process was recorded only as materials. No other costs were added to such work-in-process. In fact, the unfinished work-in-process inventories in the Blast Furnaces department comprised only materials as their costs. They were recorded only as materials. This also constituted a remarkable feature of earlier costing. About Schneider's costing practices regarding unfinished work-in-process, under the job order and process costing systems, evidence will be provided in the following sections.

Point 4 — *The treatment of fixed assets.* Schneider and Co. opted to use the replacement accounting method instead of depreciation accounting. In addition it employed a method that can be called immediate depreciation. As it seems necessary about these issues to consider in the framework of an accounting system as a whole and this was done in the author's previous monograph over six pages,¹⁰⁾ only supplementary remarks will be made in this article.

The above summarizes the features found in Schneider's costing practices. As has been noted, of the above issues those mentioned as Point 2, Point 3-b, and Point 3-c remain to be proved, and this will be carried out in the following sections. In this section, this article attempts to reveal that similar features can be found in the costing practices at Lyman Mills treated by Johnson, Lawrence Mills by Porter and the coauthors Hoskin and Macve, and Charlton Mills by

10) Daijiro Fujimura, *A Lost Accounting System and Its Significance for Classical Capitalism: The Double Account System at Schneider and Company in the Mid-Nineteenth Century* (Monograph of the Institute for Advanced Studies, Vol. 106, Hiroshima Shudo University, Japan, 1998), 58–63. The “immediate depreciation” is a method writing off newly added fixed assets immediately. A similar practice was noted by Johnson about Lyman Mills. Johnson, “Early Cost Accounting,” 470-note 12. Also in H. Thomas Johnson and Robert S. Caplan, *Relevance Lost: The Rise and Fall of Management Accounting* (Boston Mass., 1987), 28.

Stone.

At first, the case of the Lyman Mills Corporation in the 1850s, an integrated cotton textile firm incorporated in Boston in 1854, is addressed, in which Johnson found “a relatively sophisticated cost accounting system.” Lyman Mills had “a double-entry general ledger ... which were kept by the treasurer at the home office in Boston, as well as a double-entry factory ledger ... which were kept by the mill agent in Holyoke.” Each ledger included two “mill accounts,” one for coarse goods and the other for fine goods, and the mill accounts were related to the respective “cotton accounts” designed to record materials purchased. The costs of all the production stages were recorded in the mill accounts, covering “picking, carding, warp weaving, weaving, etc.” There was no warehouse account specifically designed to record finished goods. Therefore the cost flow was shown only by two sorts of inventory accounts: cotton account and mill account.¹¹⁾ Every six months, to the “general ledger mill accounts” were debited, besides “cotton, factory labor, and factory overhead,” “nonmanufacturing payroll, insurance, and general (presumably Boston office) expenses.” Therefore it may be suspected that marketing and administrative costs were recorded in these accounts, along with manufacturing costs. In addition to these cost elements that, as a whole, represented the total costs, beginning inventories and profits were debited to the mill accounts in the general ledger. As regards the credit side, they recorded “sales of finished goods and ending inventory values.”¹²⁾

As the above shows, in the Lyman Mills’ general ledger mill accounts are found the basic features of the trading account. These accounts are originally inventory accounts under the perpetual inventory system with beginning and

11) Up to here, Johnson, “Early Cost Accounting,” 469–70.

12) Johnson and Caplan, *Relevance Lost*, 28 and an example general ledger mill account on page 26.

ending inventories. Credited with sales, they become trading accounts having profits and ending inventories as their balances. And the profits are determined according to the trading-account equation in match the same way with Schneider and Co. Here we can note fundamental similarity between Lyman Mills' and Schneider's accounting system, though there is one difference. Except the materials accounts, at Lyman Mills, cost flows were recorded in only one sort of account, the mill account, whereas at Schneider and Co., cost flows appeared in two sorts of accounts: an account having a factory name that corresponds to today's work-in process account and an account having a warehouse name that corresponds to today's finished goods account. It seems that Lyman Mills' mill account is an account closer to today's work-in-process account rather than to the finished goods account, for the materials debited to this account, together with other cost elements, are those transferred from the materials inventory account (cotton account). In fact, it may be perceived from Johnson's description about the "factory ledger" mill account that the ending inventories recorded in the "general ledger" mill account included not only finished goods but also work-in- process. In such an account were recorded sales, thereby it became a trading account. In spite of this difference, Lyman Mills' costing practices showed the same features as did those of Schneider and Co. First, as already noted, the costs debited to Lyman Mills general ledger mill account comprised total cost (Point 2). Second, as Johnson himself emphasized, the finished goods were valued at market prices (Point 3-a),¹³⁾ and third, the unfinished work-in-process inventories were recorded only as materials (Point 3-c).¹⁴⁾ Only the feature concerning cost transfer noted as Point 3-b did not appear in Lyman Mills' accounting system. Instead, Lyman Mills "work-in-process" trading account had an advantage that it detailed cost elements, thereby

13) Ibid., 131 and note 10.

14) Johnson, "Early Cost Accounting," 470.

specifying that the costs recorded represented total cost.

It might be said that the Lyman Mills general ledger mill accounts provide one of the excellent illustrations of earlier costing. However, Johnson paid much less attention to these general ledger mill accounts. He devoted most of his attention to the factory ledger mill accounts, where only manufacturing costs including factory overhead were recorded. He thought these latter accounts to be "work-in-process control accounts" and that the two couples of general and factory ledger mill accounts provided "the earliest example discovered to date of a completely integrated double-entry cost accounting system."¹⁵⁾ Thus he searched for the same scheme as today's in earlier accounting systems. Johnson's argument does not hold. First, the "factory" mill account is imperfect as an inventory account. As shown by the example factory ledger mill account inserted in the book written in collaboration with Robert S. Caplan,¹⁶⁾ neither beginning inventories nor ending inventories were recorded in the factory ledger mill account. It is an "inventory" account without having its balance. The complete mill account is represented only by the general ledger mill account. The factory ledger mill account was not an autonomous account. It recorded only part of the items recorded in the complete account.

Second, the relationship between the general and factory ledgers was not that of today's financial and cost accounts. As Johnson himself acknowledged,¹⁷⁾ there was no difference between the general and factory ledgers except that the former contained more accounts to record the company's all activities. The factory ledger was no more than the partial ledger of the complete ledger. The two ledgers constituted a whole where both financial and cost accounting elements were found. Thus the feature pointed out as Point 1 regarding

15) Ibid., 469 and passim.

16) Johnson and Caplan, *Relevance Lost*, 27.

17) Johnson, "Early Cost Accounting," 469.

Schneider's accounting system was also found in Lyman Mills' accounting system.

The cause of Johnson's failure lies in that he did not give serious attention to the general ledger mill accounts where the basic features of earlier costing were found. Earlier costing had its particular features distinct from today's. It is inappropriate to associate past accounting concepts with today's. Johnson himself acknowledged this fault later in the book written in collaboration with Kaplan and ceased identifying Lyman Mills' accounting system with today's. He went so far as to emphasize peculiarity of past practices. Nevertheless, his attention was not directed to the trading account, but only to inventory valuation. As has been noted, Lyman Mills' accounting system had no opportunity to record inventories at costs in contrast with Schneider's accounting system. Johnson concentrated his attention to this fact and, finally, he denied the use of costing "for financial reporting purposes" in earlier times.¹⁸⁾ As a result, Johnson came to take the same stand as Alfred D. Chandler, Jr.'s, which Johnson had once criticized.

Chandler clearly set out a negative view on earlier industrial accounting in the chapter titled "The Traditional Enterprise in Production" of his book *Visible Hand*.¹⁹⁾ Of his arguments there, the following two matters are taken:

1. Chandler acknowledges the use of the double entry system by the industrial enterprise and the plantation in those days. But he maintains that the double entry records kept by them were no more than "records of financial transactions" or "records of external transactions." It seems that Johnson does not necessarily agree with this view, but it is very likely that one sees records of external

18) Johnson and Kaplan, *Relevance Lost*, 28, 30, and 130-31. Incidentally, Johnson emphasizes the effectiveness of the cost records of Lyman Mills kept outside its double-entry records, but only double-entry records are the subject of this article.

19) Alfred D. Chandler, Jr., *The Visible Hand: The Managerial Revolution in American Business* (Cambridge, Mass., 1977), Chap. 2.

transaction in Lyman Mills' trading accounts. The trading account, together with total costing, may give such an impression. However, Schneider's trading account shown in Exhibit 1 does not have such ambiguity. As noted earlier, its debited total cost was that transferred from the account corresponding to today's work-in-process account. Moreover, valuation of inventories at costs was found at Schneider and Co. (see Points 3-b and c). Further examinations on Schneider's costing carried out in the following sections will permit to confirm the existence of costing in earlier times. This would help to explain that Lyman Mills' trading accounts also recorded very costs.

2. Chandler argues that there was very little impetus for costing in a competitive market because, there, the need for pricing products was scarce: prices "were determined by the forces of supply and demand." It is on this matter that Johnson finally agreed with Chandler.²⁰⁾ To support his view, Chandler noted: "Paul McGouldick, who reviewed the accounts of many Lowell mills, gained 'a strong impression that valuation [of cotton and cloth] at market (minus an arbitrary percentage as insurance against the fall of cloth prices) was customary'" (the words in brackets and parentheses are in Chandler's book).²¹⁾

The fact itself that finished goods inventories were valued at market prices is not surprising. Even today, "in certain extractive industries and agriculture *in which the commodities are immediately salable at quoted market prices ... Revenue is recognized before sale by valuing inventory of products on hand at market value*" (italics added).²²⁾ In competitive market settings of earlier times,

20) Johnson and Caplan, *Relevance Lost*, 30-31.

21) Chandler, *Visible Hand*, 70-71. The quoted work is, Paul F. Mc Goulrick, *New England Textiles in the Nineteenth Century: Profits and Investments* (Cambridge, Mass., 1968), 116. It was also cited by Johnson and Kaplan's book.

22) Henry R. Jaenicke and Gordian A. Ndubizu, "Revenues and Receivables," in *Accountants' Handbook*, ed. D. R. Carmichael, Steven B. Lilien and Martin Mellman (New York, 1991), Chap. 12, 7-8.

did exist a situation similar to that "in which the commodities are immediately salable at quoted market prices." This contrasts with today's oligopolistic market under the conditions of which finished products are valued at costs, namely at "total manufacturing" costs. Accounting systems should be understood in their historical settings. Earlier accounting had its historical character. Valuation of finished goods at market prices denotes an important historical feature of earlier accounting systems (Point 3-a). It should be also noted that total costing, another historical characteristic (Point 2), is fully consistent with this valuation at market. The valuation at market means that revenue is recognized at the point of completion of production. Therefore the distinction between expired costs (expenses) and inventoried costs (assets) is not necessary. This make it unnecessary to differentiate between product costs (Manufacturing costs) and period costs (marketing and general administrative costs). Total costing is effective and reasonable. This harmonious relationship between total costing and valuation of inventories at market prices should be recognized. Thus total costing provided industrialists of earlier times with data of crucial importance in acting in a competitive market. Indeed, with costing that enables matching expense with revenue, the market economy fully works. It is perfectly naturel that industrialists of earlier times had a keen interest in costs as well as in market prices. The costs and prices in Exhibit 1 and the comments at its extreme bottom give evidence of this interest. Economists since Adam Smith seem to have seen such industrialists who practiced such accounting when conceiving their theories, given that economic theories presuppose that the enterprise captures costs to determine profits.²³⁾ It is incomprehensible to think

23) "Perfect competition" would not have existed historically, but industrialists of earlier times seem to have shown the behavior that may support this hypothetical situation. Fujimura, "*méthode de calcul du bénéfice*" attempted to prove this, the emphasis of which was on valuation of finished goods at market prices. In contrast, the present article's emphasis is on total costing.

that costing did not exist in a competitive market.

However, Chandler thought of this incomprehensible matter as noted above. The reason for which he set out this unusual view may be searched for in his unusual market concept. Between the two chapters in his *Visible Hand* where he deals with earlier accounting, he talks of "market mechanisms" only in the chapter titled "The Traditional Enterprise in Commerce," but he never use the words "market mechanisms" in the other chapter titled "The Traditional Enterprise in Production." He conceived his "market mechanisms" concept being based only on mercantile enterprises' transaction activities between them, thereby arguing completely outside economists' paradigm of supply and demand. In fact, it is just after describing the formation of "a series of market transactions" born by traditional mercantile enterprises that he states: "The American economy of the 1840s provides a believable illustration of the working of the untrammelled market economy so eloquently described by Adam Smith."²⁴⁾ This is the "Adam Smith's invisible hand" of Chandler as opposed to that of economists.

Here is the summary of what have been being discussed:

1. About the method or the approach to earlier costing. Earlier costing should be recognized in its peculiarity, that is, in its historicity.
2. In earlier times cost and financial accounting were found in the same accounting area and both elements were summarized into the trading account, which was noted as Point 1.
3. The cost under earlier costing was total cost (Point 2), which did not distinguish between product costs (manufacturing costs) and period costs (marketing and general administrative costs).
4. There is no reason for feeling it necessary to explain why costing was practiced in competitive markets. Rather, what have to been asked is why the

24) Chandler, *Visible Hand*, 28.

distinction between inventoried and expired costs and that between product and periodic costs came to be made in modern accounting systems.

5. Under earlier costing, inventories were rarely valued at costs (see Points 3-a, b, and c). Lyman Mills did not even have such an opportunity. This makes it difficult to verify whether costs were really recognized as cost in earlier times, for cost recognition must be ascertained by the use of cost data for inventory valuation purposes. Further, the use of trading account also makes this difficult, for its records may seem like "records of external transactions."

All the above makes clear the focus of the following sections, where a closer examination of Schneider's costing is attempted. Inquiring into the evolution of costing will not be the subject. Neither will be comparing the costing practices of different countries. As it is now clear, it is too early to ask these questions. What should do at this moment is to verify the existence of costing in earlier times in keeping its historicity in mind. In the following sections also, the costing practices found at Schneider and Co. in the mid-nineteenth century will be treated as illustrating common practices of earlier times. It is supposed that similar practices were performed much earlier and in other developed countries in those days. In fact, this was found in Lyman Mills of the same period and will be seen in Lawrence Mills of the same period and Charlton Mills in the early 1810s. One more thing. As the distinctive features of earlier costing and its historicity have been already discussed, the emphasis in the following sections is on verifying the fact that cost data were actually used to value inventories. By this the existence of costing in earlier times will be confirmed.

Before entering into the above examination, some comments about the two other examples should be made. At first, the case of the Lawrence Manufacturing Company, an integrated cotton textile company that shared the same tradition of the New England textile industry with Lyman Mills, is addressed.

Lawrence Mills' accounting system was treated first by Porter and later by Hoskin and Macve. The examination here is limited to the ledger accounts and related schedules for the six months ending 12 February 1848, for the data necessary to reveal the Lawrence Mills' accounting system are provided only about this period by the authors, and this, mostly by Hoskin and Macve. A trading account was found in the ledger, labeled "cloth account." The account has the format of trading account that "the total 'cost of sales' is not shown."²⁵⁾ The debit side records the beginning inventories, costs, and profits; and the credit side, the sales and ending inventories, though the actual entries are more detailed. As "\$245,687.03," the figure representing the material used, "is the amount debited to cloth account and credited to cotton account,"²⁶⁾ the inventory flow is recorded only in the "cotton" and "cloth" accounts. This means that, as the cotton account is the account that records the materials purchased, the results of all of the spinning and weaving processes are summarized into the cloth account. In this respect, Lawrence Mills' cloth account resembles Lyman Mills' mill accounts. The "General Expenses," an item debited to the cloth account together with other cost items, "comprises ... sundry items, including printing, costs of money changing, taxes, clerk's salary, expenses of stores, travels, together with \$158,717.23 for 'Expenses at Lowell Manufacturing'," the factory site.²⁷⁾ Therefore the costs the cloth account shows represent total cost in the sense that inventoriable and non-inventoriable cost are not distinguished (Point 2). The unfinished work-in-process inventories must have been recorded in either the cotton or the cloth account. However, this issue escaped Hoskin and Macve completely. The description by

25) Hoskin and Macve, "The Lawrence Manufacturing Co.," 353.

26) Ibid., 351.

27) Ibid., 352. These "sundry items" are also taken into account in the cost calculation made for each of five mills that are shown by the schedule reproduced as Table 1 (Ibid., 342).

Hoskin and Macve implies that the cloth account's ending inventories are comprised of only finished goods (cloth), therefore unfinished work-in-process seems to have been recorded in the cotton account, as materials, together with raw materials purchased (Point 3-c). In this respect, Lawrence Mills' cloth account differs from Lyman Mills' mill accounts credited with unfinished work-in-process as well as finished goods as their inventories at the end of the period. Lawrence Mills did not even have a separate "factory" ledger unlike Lyman Mills. At Lawrence Mills also, financial and cost accounting were found in the same accounting area (Point 1).

Hoskin and Macve did not perceive the above mentioned features that the cloth account, together with the cotton account, showed. Neither did Porter. Their attention was concentrated on the schedules that were included in the semi-annual accounts and prepared outside the double-entry records.²⁸⁾ But none of them realized the schedules showed the same features that the ledger accounts did. In fact, these schedules are no more than those detailing the data in the cloth account, by each of nine variety of cloth and for each of five mills. Therefore the costs analyzed by the schedules are total costs and no records are found about the work-in-process. Similarly, the profit calculations shown by one of the schedules follow the trading account equation format. The only major difference is that the schedules show the costs and profits by up to each of nine types of cloth.

Hoskin and Macve, and Porter, had only attempted to seek similarities in appearance between the costing practices of today and those of Lawrence Mills. Consequently, regarding the valuation of finished goods inventories, their

28) The schedule "Analysis of the Profits on the Business of the Lawrence Manufacturing Company for the six months ending February 12th, 1848" is reproduced in Porter, "The Waltham System," 10-11. Other schedules, "Average of Cotton & Cloth Accounts" and "Cost of Lawrence Manufacturing Company's Goods Sold" for the same period, are in Hoskin and Macve, "The Lawrence Manufacturing Co.," 342-345.

interest was only in verifying whether the inventories were valued at costs or not. They had never imagined the rationality of valuation of finished goods at market (Point 3-a). They did not even realize the fact that, according to Lawrence Mills' costing practices, if inventories had been valued at costs, costs corresponding to today's periodic costs would have been inventoried because of total costing.²⁹⁾

Let us move on to the other case, Charlton Mills of Manchester, England, in the early 1810s, dealt with by Stone. It engaged only in spinning at that time. The inventory flow was shown by three sorts of accounts: "warehouse," five "carding rooms," and eight "spinning rooms." Row cotton purchased was recorded in the warehouse account "at purchase price plus freight-in." The

29) Hoskin and Macve compared the finished goods inventory prices and the costs per yard recorded in the schedules, regarding three of the nine types of cloth. And they concluded "a 'lower of cost and market' approach" seemed to be found out (Hoskin and Macve, "The Lawrence Manufacturing Co.," 353-356). Their conclusion should be reconsidered for the cost data recorded in the schedules have serious weakness. The data regarding cost per yard for each type of cloth are shown only with weighted averages (computed up to seven decimal places). On the other hand, the inventory prices are recorded with rounded numbers, and this, for each sort of cloth of each type of cloth. For example, the inventories of one of the nine types of cloth (cloth C) are valued at 6 c per yard for "Brown" and 8 c for "Blue." And the weighted average of cloth C is, according to Hoskin and Macve's calculation, 6.008 c, that is, almost 6 c. As this shows, weighted averages may largely vary. This explains the weakness of weighted averages in using them for comparison purposes and that of the cost data in the schedules that list only weighted averages. A mere comparison between weighted averages in one single period does not permit a serious conclusion. When using such data, it is desirable to follow the movement of related data over some periods. The schedules indicate that the ending inventory prices are slightly higher than the corresponding unit costs regarding five of the nine types of cloth. What this means would become clear by looking at the movements. An inventory price should not surpass cost if the inventory is valued at cost. When valued at a market price, an inventory price can surpass cost.

wages incurred in the cleaning process were also charged to the warehouse account. The cleaned cotton was transferred to the carding room accounts, and the finished goods were transferred from the spinning room accounts to the warehouse account. Thus the warehouse account carried out both materials and finished goods inventory account functions. On the other hand, the carding room and spinning room accounts functioned as work-in-process accounts. In the carding rooms cleaned cotton was converted into "soft, thick threads called *roving*." Using these intermediate products as materials, the spinning rooms produced "strong cotton thread known as *twist* or *weft*." It was these twists that were transferred to the warehouse account as finished goods.

Stone reproduces the entry of one of the above accounts, Spinning Room No. 2 from 15 February to 11 April 1812, which is illustrative of all other spinning and carding room accounts.³⁰⁾ The entry of this account shows basic features of earlier costing. On the debit side are recorded the beginning inventory, wages, general expenses, and materials (rovings) that are intermediate products transferred from carding room accounts. General expenses were transferred from "the general expense account ... charged with debits for containers, carting, advertising, legal expense, taxes and the London sales allowance."³¹⁾ Therefore the cost elements debited to this account represent total cost in the sense that costs corresponding to today's periodic costs are included (Point 2). On the credit side are recorded the finished goods (twists) and the ending inventories. The ending inventories are recorded as "Rovings" and at the same prices as the materials (rovings) that are recorded on the debit side. It is obvious that the unfinished work-in-process inventories are recorded only as materials (Point 3-c). Therefore all the conversion costs debited are absorbed by the finished

30) Stone, "An Early English Cotton Mill Cost Accounting System," 77.

31) *Ibid.*, 77. Factory overhead seems to be also entered in this account, though Stone said nothing about this.

goods that are credited. Nevertheless, the finished goods to be transferred to the warehouse account are not valued at its total cost, but are given "a intracompany price" that is slightly higher than the unit total cost. Consequently a small profit occurs, and it is recorded on the debit side. But it is minute, and, as Porter remarked, the carding and spinning rooms were essentially cost centers. In Porter's view, "an intracompany price ... was used to measure the manufacturing efficiency of the carding and spinning rooms." In any case, the intracompany price was not a market price for most of the profits, about 90% in this month, appeared in the warehouse account. The intracompany price was closely related to the cost (Point 3-b). The flows recorded by the carding and spinning room accounts are undoubtedly cost flows. Charlton Mills of England in the early 1810s differed from Lyman Mills and Lawrence Mills of USA in the mid-nineteenth century in that it possessed such accounts. However, it should be noted that, as regards costing methods themselves, there was no difference between the three mills, and between the three mills and Schneider and Co. They all used the same methods: total costing and recording of unfinished work-in-process only as materials.

Charlton Mills' accounting system comprised the "private ledger," "general ledger," and "mill ledger." The accounts recording inventory flows, including the warehouse account where profits were recorded, were included in the mill ledger. The general ledger contained the general expense account and customers' accounts, but had no accounts designed to record profits. The mill and general ledgers were working as a whole. For example, "the debits from the sales journal were posted to the customers' accounts in the general ledger but sales totals were posted bi-monthly to the warehouse" account in the mill ledger.³²⁾ Cost and financial accounting were carried out within one accounting area also at Charlton Mills (Point 1). As the finished goods, sales, and profits

32) Ibid., 72.

were recorded in it, the warehouse account constituted a trading account. Porter said nothing about how the finished goods inventories recorded in it were valued, which relates to Point 3-a.

The examination of the three examples in US and UK is finished. The concerns were not to trace evolution or make comparison between countries, but to find out common features. And this is done. The aim of this article and the focus of the following sections have already been mentioned. We are now ready to address the costing practices at Schneider and Co.

2. The History and Activities of Schneider and Co.

Schneider and Co. was established in 1836 as a *société en commandite par actions*, a type of corporation with one or more acting associates, called *gérants*, having unlimited liability. At first it was governed by two *gérants*, Adolphe and Eugène Schneider, and before the death in 1845 of the elder, Adolphe, it was called Schneider Brothers and Co. (*Schneider Frères et Cie*). Its initial capital amounted to four million francs, divided into eighty shares of fifty thousand francs each. The contract of the *société* started on 1 January 1837. Therefore the first accounting period started on this date and ended on 30 April 1838; and from the second period on, financial statements were prepared for a year ending on 30 April. The date of 1 January 1837 was also that on which Schneider and Co. formally acquired the establishment of Le Creusot, the origin of which went back to the Royal Foundry established just before the French Revolution. Le Creusot is located near Nivernais and the Saint-Etienne region which, including Le Creusot, comprised the French major metal industries zone when Schneider and Co. acquired the establishment of Le Creusot.³³⁾

33) Pierre Léon, "L'Affermissement du Phénomène d'Industrialisation," in *Histoire Economique et Social de la France*, ed. Fernand Braudel and Ernest Labrousse (Paris, 1976), 565.

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Exhibits 2-A & B: Profit and Loss Accounts of Schneider and Co.
(From 1 April 1844 to 30 March 1845)

Exhibit 2-A

Detail of Profit and Loss Account

Net Profit at the Works		Fr 862,039.38	A
Sum allocated by the Operations for the General Expenses of Paris		75,000.00	
Dividend of the Vernon's Bankruptcy (for coal)		178.57	
Whole (<i>Ensemble</i>)			Fr 937,217.95 B
Deduct			
1. The Balance of Interest & Discount		25,832.36	
2. id. of General Expenses		35,239.05	
3. Mitigating diverse Accounts in Dispute (<i>Pour atténuations de divers C^{tes} Litigieux</i>)		13,000.00	
Total to be deducted			Fr 74,071.41
Remain net profit to be distributed			Fr 863,146.54 C
Distribution			
Reserve Fund	15%	Fr 129,474.56	
Fees for <i>Gérance</i>	15%	129,471.98	
Stockholders	70%	604,200.00	
Equal Total		Fr 863,146.54	C

Exhibit 2-B

Detail of Profit and Loss Account

Workings of Coal		Fr 50,506.24	
Iron Making	Iron Plates & Sheets	86,784.62	433,586.87
	Bar Iron	16,765.98	
	Rails	330,036.27	
Railroad		13,902.77	
Mechanical Engineering Shops		340,487.32	
Revenues	Land	10,357.23	23,556.18
	Rents	13,198.95	
			862,039.38 A

Source: Schneider Collection 187 AQ 380 *Inventaire*

Note: Translated by the author. Signs A, B, and C are added by him.

The profit and loss account in Exhibit 2-B would give a picture of Schneider's activities of the time. It had three main activities: coal mining, iron making, and mechanical engineering. Le Creusot Works was located in the Blanzey-Le Creusot coal field. Le Creusot Works had a glorious history that the first French blast furnace to use coke had been set up. And just after its acquisition of the works, Schneider and Co. produced the first locomotive in France in 1838, and the first steam hammer in the world in 1840. Schneider and Co. was and continued to be a leading metal making and working company in France, but also in the world. The other items listed in the profit and loss account were of only secondary importance. The establishment of Le Creusot was located ten kilometers away from the Central Canal linking the Rhône and the Saône. The revenue from railroading listed in the profit and loss account was that from the company owned railroads between the works and the canal and between its branch colliery in Montluçon and the canal. The assets purchased by Schneider and Co. included several pieces of land scattered inside and outside Le Creusot, most of which had no connection with Schneider's main activities. The land revenues were mainly those from disposals of land carried out each year. The rent revenues were those from the company owned workers' cottages.

Schneider and Co. had its counting house in Paris, Paris House, but, in principle, all the operating activities including marketing and purchasing as well as extracting and manufacturing activities were assumed by Le Creusot Works and recorded in a group of accounts that can be called the operating account. The profit and loss account in Exhibit 2-B summarizes the results of the operating account. The total profit on the part of the operating account determined by its profit and loss account was transferred to the other group of accounts, which can be called the capital account, kept by Paris House, where owners' equity and noncurrent assets were recorded and the final profit to

be distributed was determined. The profit and loss account in Exhibit 2-A shows this. The relationship between these two accounting areas can be explained in the framework of an earlier accounting system known as the double account system. As this aspect of Schneider's accounting system and strong probability of a widespread use of the double account system in industrial enterprises were discussed at length in the author's monograph recently published,³⁴⁾ only the following remark is made here: the coexistence of the cost and financial accounting factors in one single accounting area, which was realized through the use of the trading account and was noted in the previous section as Point 1, is one of characterizing the operating account above mentioned. As noted in that section, the coexistence of the cost and financial accounting factors was also found in the US and UK cotton mills treated by Johnson, Hoskin and Macve, Porter, and Stone.³⁵⁾ They were virtually concerned with costing practices in a past particular accounting area, the operating account.

The trading account explains a particular feature of the operating account. When the operating account had two or more trading accounts, as in Schneider's case, the profit determined by each trading account was reproduced by a profit and loss account in such a manner as Exhibit 2-B illustrates. Because of the particular method of profit determination in the trading account noted earlier, neither related revenues nor expenses were listed. Only minor expense items might appear as Exhibit 2-A shows. The above features illustrated by

34) Fujimura, *A Lost Accounting System*.

35) Trevor Boyns, John Richard Edwards and Marc Nikitin, *The Birth of Industrial Accounting in France and Britain* (New York & London, 1997), 15-16, notes that "in both Britain and France during the eighteenth and nineteenth centuries, the calculation of costs ... was carried out within the same accounting system that was used for what would today be described as financial purposes." But their reserved view should be reconsidered because the same feature is found in the USA of the time.

Exhibits 2-A and B seem to have been commonly found in earlier profit and loss accounts.³⁶⁾

At Schneider and Co., two distinct profit and loss accounts were prepared, thereby the presence of the two accounting areas was uncovered by its performance statements. However, it should be noted that the two profit and loss accounts could be integrated into one. For example, all the data in Exhibit 2-B can be reproduced in Exhibit 2-A in place of the "Net Profit at the Works." In fact, Schneider and Co. prepared such an integrated type of profit and loss account in the first five years and only an integrated profit and loss account in the first two years. Preparing only an integrated profit and loss account listing both departmental profits and the final profit to be distributed seem to have been a more common practice in those days, which makes it difficult to recognize the presence of the double account system in the industrial enterprise.

The business records of Schneider and Co. used in this article are those housed in *Centre des Archives du Monde du Travail* in the city of Roubaix, France, as the *sous-série* 187 AQ, with many other company records taking part of the *série* AQ. This Schneider Collection includes complete series, from its founding year, of ledgers and journals of the capital account, but those of the operating account are lacking. In other words, the books of account that show the recording process attaining to the preparation of a profit and loss account like Exhibit 2-B are lacking. Instead, books of account of another type, *livres d'inventaire* (balance books), are available. This type of book is the one that is required to be kept under French accounting system together with the journal and ledger. The book, prepared annually, is generally composed of two parts: one comprises financial statements and the other, detailed and exhaustive data

36) For example, Haydn Jones, *Accounting, Costing and Cost Estimation — Welsh Industry: 1700–1830* (Cardiff, 1985), 109 and 275–276.

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on all balance sheet items. Schneider Collection includes a complete series of annual *Balance Books (Inventaires)*. They contain financial statements including profit and loss accounts such as Exhibits 2-A and B show and give detailed and exhaustive information about the assets and liabilities of both its capital and operating accounts. This second part includes, besides a section detailing the all the balance sheet items of the operating account where the complete list of inventory items is found, an extensive section where a elaborate description, over one or more pages even up to scores of pages, is given separately to each individual inventory item of the operating account. These inventory items may be supposed to roughly reflect the ledger accounts of the operating account. Thus the balance book, to compensate the lack of the operating account ledger, gives (1) information about what inventory accounts the operating account ledger was supposed to comprise, (2) elaborate data on each of the work-in-process and finished goods inventory items. Moreover, these inventory records, exceptionally, give information about costing and imply a profit calculation method regarding one of the three main activities, that is, mechanical engineering where job order costing was executed. The cost and profit calculation of this department are treated in the following section. However, apart from this exceptional situation, the inventory records, by nature, give no information about cost and profit calculation.

As regards the other activities, one document, by good fortune, survives that comprises two sets of statements: one shows elaborate cost data of the Working of Coal department and the minor Coke Ovens and Blast Furnaces departments for the 1840-41 period; the other is composed of six statements summarizing the entries in the Grand Forge department's three warehouse trading accounts for the 1839-40 and 1840-41 periods, an illustration of which is given by Exhibit 1. Using this document, as well as the inventory records in the balance book, costing practices regarding process costing are examined in the section that

follows the section devoted to job order costing.

The above document giving information about process costing is found in one of the files arranged in yearly order and named *Dossiers of the General Meetings (Dossiers des assemblées générales)* of the stockholders in the catalog of the archives. Each dossier includes *Gérants' Report (Rapport des gérants)*, later *Gérant's Report*, useful for complementing the above two sorts of main sources. Other complementary documents are also used. They are the capital account ledger and, much more frequently, a journal named *Journal Z* by Schneider and Co. designed to collect year-end entries of the operating account over many periods. Its first entries are devoted to those at the end of the 1849–50 period, but continuous recording started from the 1857–58 period. By mobilizing all of the above sources,³⁷⁾ evidence is given about the costing practices at Schneider and Co. that remain to be proved, namely those regarding Point 2, Point 3-b, and Point 3-c.

3. Inventory Valuation in Job Order Costing

Although the focus of this article is on process costing as shown by the discussion in Section 1, the practices about job order costing found in

37) Following is the list of the sources, with their reference numbers, used in this article:

1. *Inventaires* (this type of document, the *livre d'inventaire*, is referred to as *Balance Book* in the text) from the 1837–38 period to the 1863–64 period. 187 AQ 373 to 399.
2. A box containing *Dossiers of the General Meetings* over about first twenty years. 187 AQ 2. The document including cost data concerning process costing is filed into *Dossier of the General Meeting* on 4 March 1841 where the results of the 1839–40 period are presented. But it must be filed into *Dossier* of the next year. The reason of the error is not certain.
3. *Journal Z No.1* (1849–50 to 1877–78). 187 AQ 289.
4. *Grand livre A* (referred to as the capital account ledger in the text) the entries of which start 1 January 1837 and end 30 April 1847. 187 AQ 128.

Schneider's accounting system is addressed first in this section. This is because it is in this area that incontrovertible proof of the use of costing for inventory valuation purposes, evidence of cost recognition, is found in Schneider's records, namely in the inventory records in the balance book. Among the three main activities noted earlier, therefore, mechanical engineering is concerned in this section. This department was labeled Mechanical Engineering Shops (*Ateliers de Constructions Mécaniques*, generally abbreviated to *Ateliers de Constructions*). Reference to *Balance Books* from the first year (1837-38) to 1848-49 indicates that the following inventory items related to this major department, which suggests the presence of sub-departments:

Inventory No. 75: Grand Foundry (*Grande Fonderie*) that was an iron foundry.

Inventory No. 75: Copper and Brass Foundry (*Fonderie en Cuivre*) for copper (*cuivre rouge*), brass (*cuivre jaune*), and bronze.

Inventory No. 76: Fitting (*Ajustage*).

Inventory No. 76: Smiths' Shops (*Ateliers des forgerons*) that was to be subdivided with their expansion.

Inventory No. 76: Shipyard of Chalon (*Chantier de Chalon*) from the 1839-40 period.³⁸⁾

Inventory No. 77: Pattern-Makers' Shops (*Ateliers de Modeleurs*).

Inventory No. 81: Boilerworks (*Chaudronneries*). It was further sub-divided into two or three parts according to the periods, each being called by its foreman's or master boilermaker's (*maître-chaudronnier*) name.

38) After the acquisition of Le Creusot Works, a shipyard was constructed in Chalon, specifically Chalon-sur-Saône, located on the Saône, one of the principal rivers in France, and at an end of the Central Canal. Therefore access was easy from Le Creusot.

The following rearrangement would facilitate understanding the work flows:³⁹⁾

- The Pattern-Makers' Shops department that served the next department.
- The Foundries (iron and copper and brass) department that produced casings as machine parts.
- The Smiths' Shops department that made wrought iron parts.
- The Boilerworks department that completed boilers.
- The Shipyard of Chalon department that was responsible for hulls.
- And the most important department, Fitting. The inventory records indicate that this department was comprised of machining, fitting and erection shops. It is this department that is the focus of the examination in this section.

As noted in Section 2, the balance book comprised an extensive section where a detailed description was made for each inventory item. The inventory items were numbered. In fact, as shown above, some of the inventory items were further subdivided into two or more parts, and in many cases to each part was devoted an independent description. Such parts were practically independent items.⁴⁰⁾ The part devoted to the description of the Fitting department within

39) Such listing order is found, for example, in *Balance Book* 1842-43 in the section detailing the contents of the summarized balance sheet of the operating account. Grand Foundry and Copper and Brass Foundry, as well as Fitting, Smiths' Shops, and Shipyard of Chalon, are listed each as an independent item, and an inventory number is attached after each item, that is, on the right side. This is the usual format found also in other periods. Incidentally, in the first four years, Copper and Brass Foundry is not listed distinctively. But its presence from the first period can be confirmed from the records on the item No. 23. About this item, see Note 40.

40) Fixed asset items are also numbered. According to *Balance Book* of the first year, numbers 1 to 15 are devoted to the items labeled "*Immeubles*" that are land, building, and machinery. Mines and a railroad are also included. However, detailed descriptions are not given to these items. It seems that the details of these items were not of much importance because of a practice of replacement accounting (mentioned in Section 1 as Point 4). Numbers 16 to 49 are allocated to small machines, tools, and utensils. They are divided into two categories: "*Mobilier Industriel*" and "*Mobilier* ↗

the inventory No. 76 was the most voluminous, further voluminous than any other items or parts. In the first period only six pages was devoted, but generally scores of pages were allocated to this part. The part included the records on products at the end of the year, 30 April. They were classified into two categories. One related to substantially finished products and finished products requiring supplementary entries. The other concerned products in process of completion, namely pure and simple work-in-process. The records were kept by contracts. To each contract was devoted a detailed description. From these records we can know (1) what products were being produced by

↘ *meublant et ustensiles de l'Exploitation.*" The former items, relating to the production departments, are, naturally, treated as fixed assets and the total sum of these items and the above "*Immeubles*" is recorded as the value of the fixed assets in the balance sheet of the capital account. However, the latter items, relating to the office and service departments, are treated as if they were inventory items and are recorded, together with the inventory items, in the balance sheet of the operating account. These two sorts of items came to be grouped together under the label "*Mobilier et Approvisionnements affectés à l'Exploitation*" from *Balance Book* of the 1849–50 year when reorganization of the numbered items began. Incidentally, this *Balance Book* and *Balance Books* that follow indicate this group includes "*immeubles*" of small amount.

Numbers allocated to inventories are 50 to 84 or so, because there is some ambiguity. The item No. 84 strictly is not inventory but petty cash and bills. Among these numbered inventory items are those of a variety of service departments. It is not easy to obtain the exact number of inventory items for there are vacant numbers and, as illustrated in the text, some inventory numbers have, within each of them, two or more parts which may be regarded as independent items in many cases. Integration of numbered items is also made. Presumably the inventory numbers are those succeeded from the precedent company and Schneider and Co. reorganized inventory items within this framework, before starting the reorganization in 1849–50. In this year, to Fitting and Shipyard of Chalon were given each an independent number and to Smiths' Shops that had been divided into three parts were given three different numbers. In 1853–54, further reorganization started. By that, the inventory records of the old major department, Mechanical Engineering Shops, came to be summarized into two new inventory items: Mechanical Engineering Shops and Shipyard of Chalon.

Schneider and Co., (2) the inventory flows through the departments, (3) what costing was practiced and for what, (4) what entry was made in a related ledger account. Based on the Fitting department records of such importance, this section will expand on the above four issues.

The above mentioned records indicates that, already in its early years, Schneider and Co. produced a large variety of products: from 8, 12, 16, or 20 Horse steam engines, through 40, 50, 100, or 180 Horse engines, up to 220 and 450 Horse engines for the French Navy; locomotives and steam riverboats, as well as a variety of industrial machines including steam hammers. Engines and industrial machines were for both sale and its own use. The records further suggest that relatively a long period of time was needed to complete a contract that might include one product or a batch of products such as two, four, five, nine, or ten locomotives. It was not rare that the product or batch of products of a contract recorded as work-in-process in one year appeared, in the next year, in the other category as substantially finished product or products, though more products appeared only in one year in either of the two categories. Besides, completion of the work at the shops did not mean completion of a contract. Erection was carried out at the shops, but the records refer to it as "*montage préparatoire* (preparatory erection)." The products thus finished at the shops were transported and erected at the destination (locomotives too were erected at the destination). Such products, finished but not yet completed as a contract, were recorded together with substantially finished products.

The records also say that Schneider and Co. as a contractor usually received advances from the customers. Therefore, in order to determine and record the amounts to be registered as assets or liabilities at the end of the year of such contracts, accounts were set up within the part devoted to the Fitting department, and this, in principle, one account to each contract. Earlier mentioned "a detailed description" devoted to each contract, in fact, referred to this account.

Round about twenty accounts were registered in the first six periods and afterwards their number increased gradually.

The accounts contain narrative explanations, especially those belonging to the category comprising substantially finished products and substantially finished contracts (henceforth this category is called substantially completed contract with the abbreviation SCC). The above mentioned process attaining to completion of a contract was obtained from explanations found in the SCC accounts.

The accounts of both categories list items necessary to determine the amounts to be recorded as assets or liabilities at the end of the year in report form. The entries are recorded differently between the two categories. Let us begin with the SCC accounts. In this category, the entry of an account starts by stating the "selling price (*prix de vente*).” This means the profit of a contract is recognized. Such recognition of income is also performed under the contract method of today. Under this today’s method, "income ordinarily is recognized when performance is substantially completed and accepted,"⁴¹⁾ therefore before fully completed. Schneider’s practice was not so different. After a selling price, items to be deducted from the selling price are listed with their amounts: first, amounts already billed (referred to as "*facturé*"); and second, a series of other items. Among them, besides diverse items such as provisions, are "transportation costs (*frais de transport*)" and "erection costs at the destination (*frais de montage à destination*).” And from the eighth period (1844–45), among them do appear records on work remaining to be performed at the shops at the balance sheet date with its cost data: various materials, labor, and indirect expenses referred to as "general expenses (*frais généraux*)."⁴²⁾ The above items

41) Richard J. Behrens and Price Waterhouse, "Real Estate and Construction," in *Accountants' Handbook*, Chap. 21, 37.

42) Examples recording labor are found one in 1841–42 and one in 1842–43. Record- ↗

are recorded according to the extent of progress toward completion of each of the related contracts. The entry ends by listing the final amount thus obtained that is to be recorded as an asset at the end of the period. Overestimation or underestimation of income is thus avoided. The above illustrates representative cases. There are also special or exceptional cases.⁴³⁾ There are, of course, cases where final amounts show liabilities. The recording principles described above were maintained long after, but records concerning detailed cost data disappeared from the 1853-54 period.

The entries in the WIP accounts are, in contrast, mainly comprised of cost data. When billings were charged to customers, their amounts were recorded in related accounts. The difference of the two elements in an account is the amount to be recorded as an asset or liability at the end of the year. This mode of determining the amount to be recorded as an asset or liability is perfectly identical to that used under today's completed contract method, though today's method does not do this within one account. In this category, cost data over materials, labor, and general expenses appeared one year earlier, in 1843-44. However, cost data, limited to only materials, did appear much earlier. In this earlier period, the difference between material costs and billings was the amount to be recorded as an asset or liability. If no advance was received, the amount to be recorded as an asset was determined only by costs, in this case by material costs. This was the same for the costs comprised of materials, labor, and general expenses; from 1843-44. The cost data recorded in the WIP accounts provide eminent evidence of the use of costing for inventory valuation purposes, evidence of cost recognition, while the SCC accounts imply the use of

↘ ing of unfinished work starts before the 1844-45 period. In 1843-44, regarding one example the work of which in the shops is completed, detailed cost data with materials, labor and general expenses are recorded.

43) Among them are returns, rentals, change orders, claims.

costing for profit calculation. Therefore the following examination about costing practices will be centered on the WIP accounts.

In the first two years, the accounts of both categories almost filled with narrative explanations. It is in the third period (1839–40) that the WIP accounts began to record detailed data on materials, namely lists of the parts transferred from other departments. And in 1843–44, besides materials, the accounts began to record labor and general expenses, in the following manner:

Labor of lathe, fitting & erection F 2,245.00

(*Main d'Œuvre de tour, ajustage & montage*)

General Expenses 110% F 2,469.50

The word “lathe”, in fact, indicates not only turning but also other machining activities, since the Fitting shops had a variety of machine tools.⁴⁴⁾ The above general expenses rate expressed by 110% represents a rate of 1 franc 10 centimes per 1 franc of labor. The rate, generally, changed each year. In the next year, for example, it is 104%. In this year, the recording of labor and general expenses began in the records of Boilerworks. Its general expenses rate is stated as 60% this year. Sometimes labor and general expenses of Smiths’ Shops were recorded in the Fitting shops accounts for supplementary work. In this same year, its rate is 80%. Thus a different rate is applied to each department. From 1847–48, the labor in the records of Fitting was divided into “work by tool (*travail à l’outil*)” and “work by hand (*travail à la main*)” and a different rate was applied to each work. In this year the rates are 165% for the former and 65% for the latter. The above illustrations show that fairly elaborate application of general expenses was being performed. However, the emphasis here is on the fact that materials, labor, and general expenses, all of these were recognized as cost elements and used to value inventories. Costing

44) This is obvious from the records included in the category “*Mobilier Industriel*.” About this category, see note 40.

was actually used to value inventories. This means that cost recognition did exist.

As noted earlier, in the years from 1839–40 to 1842–43, the inventories in the WIP accounts were recorded only as materials. This means that recording of inventories at only material cost or whole cost was at least optional. In Section 1, the necessity of differentiating two sorts of work-in-process was emphasized: work-in-process as departmental finished goods (Point 3-b) and unfinished work-in-process (Point 3-c). The WIP accounts now concerned show the costs of unfinished work-in-process remaining in the Fitting department. In this case the above two methods could be optional. Presumably the reason that Schneider and Co., from the 1843–44 year, came to select valuation at costs, whole cost, was that a relatively a long period of time was needed to complete products.

As regards the materials recorded in the accounts, they are departmental finished goods transferred from other departments, namely the parts made by other departments. The materials record in each individual account comprises a list of parts, each line of which contains information such as the following:

4 Rings (*Anneaux*) 5/10 iron K 6.00 at 2.00 fr Fr 12.00

This example is taken from an account of the 1839–40 period when the recording of materials started. The information it provides is: the number and name of the parts; the extent of progress in machining work⁴⁵); the material used that indicates the transferring department, in this case, Smiths' Shops; the weight, rate per unit weight (1 kilogram), and total amount. Thus, it

45) It was used to estimate how many filings (*limaille*) were produced. This is obvious from the explanation made in the accounts in 1843–44. Filings were seen as a by-product. Filings were called by a variety of names: *déchets*, *rendements*, or, of course, *limaille*. Incidentally, the treatment of this by-product is omitted from the examination here.

shows the transfer price using a rate per unit weight. This way of pricing was also used at Soho Foundry of James Watt, Jr.⁴⁶⁾ The lists including such information are very long, extending over one, a few, or, sometimes more than five pages, each page having forty lines. One correlation might be noted that the length of a list is in proportion to the extent of progress in the transferring departments. Completed products would have had longer lists. The lists include, among others, iron casting parts made by Iron Foundry, wrought iron parts by Smiths' Shops, and, sometimes boilers completed by Boilerworks. Various rates are set to the parts made by the first two departments.

There is no significant difference between the accounts of the period 1839–40 to 1842–43 and of after this period about the content and length of lists. The detailed lists disappeared in 1846–47. The presence of such lists in the period 1839–40 to 1842–43 suggests that the recording of inventories only as materials never means attention was not paid to costing. It further indicates that, as to unfinished work-in-process, this inventory valuation method was not unusual. Indeed, in Section 1, we saw this method had been used in US and UK cotton mills.

It should also be noted that it is very likely that the materials, therefore their costs, mentioned above, include labor and general expenses applied when they were in the transferring departments. In fact, the wrought iron and iron casting parts show much higher rates per kilogram than those of the bar iron and cast iron registered as finished or purchased goods in the inventory records belonging to the Iron Making department. For example, the rate of 2 fr of the parts quoted earlier to illustrate the content of the material records is much higher than the rates of the finished bar iron in the same year (1839–40) that are

46) See Robert B. Williams, *Accounting for Steam and Cotton: Two Eighteenth Century Case Studies* (New York & London, 1997), 180–184.

0,27 and 0,3 fr.⁴⁷⁾ The difference of 1,73 or 1,7 fr might be supposed to indicate labor and general expenses incurred in Smiths' Shops. It is very likely that even when they were recorded only as materials, the inventories included labor costs and general expenses incurred inside Schneider and Co.⁴⁸⁾ Labor and general expenses were not necessarily ignored in such a case as we have just seen.⁴⁹⁾

47) Other rates for the wrought iron parts in the quoted case that is the record of a batch of three locomotives are 1.50, 1.75, 1.80, 2.20, 2.50, 3.00, and 3.50.

48) The author has attempted an investigation. That is the comparison, based on the data in the balance book of each year, between the rates of wrought iron parts and of bar iron. He did this differentiating the period 1839-40 to 1842-43 and the period 1843-44 to 1845-46. In both periods, the rates of wrought iron parts were sufficiently higher. It should also be noted that almost all bar iron used to manufacture wrought iron parts was being made inside Le Creusot Works, namely in the Iron Making department. Therefore, in these materials were already included labor and general expenses incurred in this department, besides those of the Workings of Coal department. Departmental profits were also included. Incidentally, the records of the Smiths' Shops and Foundries departments, in principle, do not register their work-in-process as such, nor their finished goods.

49) The examination of costing itself is finished here. In order to give a more concrete picture of the cost records, the whole entry of one account is presented here, without adding the original French words. Below is the reproduction of an account belonging to the WIP category inserted in *Balance Book* 1846-47. From this year, the materials list is shown this way. A similar format is found in the SCC accounts.

The heading is the account title, a pair of engines for a French Navy ship "*Mogador*." This account appears as a SCC account next year and lists a selling price of fr 975,000.00. The total amount of the current year indicates that the account records only part of the whole cost. It is clear that the general expenses rate applied this year is 112%. The small amount of labor suggests that many of the parts recorded here remain intact. Therefore filings are not yet recorded. The materials recorded here reflect the extent of progress of the transferring departments, for parts were transferred to the Fitting department as soon as they were completed. With progress of the work in the transferring departments, the weight to record for each corresponding rate (transfer price) must become heavier and other rates must be added. Besides, other ↗

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As it is already clear, the material records in the accounts of both the two categories indicates that the following items are transferred to the Fitting department from the other departments within the Mechanical Engineering Shops department: parts from Foundries and Smiths' Shops and boilers from

1 Pair of 650 H Engines No. 38 — Mogador

The work on these Engines only just started. No invoice has been sent out, and the whole inventory value on 30 April is on the Credit of this inventory.

		K 34,470	0.40	F 13,788.00		
Iron Casting	K	59,870	0.36	F 21,553.20	K 95,314	F 35,652.90
	K	974	0.32	F 311.70		
	K	409	2.50	F 1,022.50		
Forged Parts	K	612	2.00	F 1,224.00	K 76,735	F 78,471.15
	K	13,538	1.50	F 20,307.00		
	K	4,787	1.25	F 5,983.75		
	K	29,702	1.00	F 29,702.00		
	K	8,510	0.80	F 6,808.00		
	K	19,177	0.70	F 13,423.90		
Worked Plates		K 2,062	1.10	F 2,268.20		
Brass Casting		K 17,764	2.50	F 44,410.00		
Costs of Patterns				F 4,079.00		
Labor of Fitting				F 14,180.00		
General Expenses				F 15,881.60		
Total on the Credit of the inventory						F 194,942.85

items must be added. As a result, the materials list must become longer. Reference to other cases in this year indicates that the materials list must become more than two times longer. (Please imagine the materials lists before this year from the above causalities). The item "Worked Plates" indicates boilers. The rate shows the transfer price of this year of completed boilers manufactured in the Boilerworks department. However, the recorded weight suggests that the boilers are far from completion. As you see, the cost of patterns are separately recorded. Therefore the rates of the casting parts do not include them. The expression "on the Credit of the inventory" indicates that the amount is credited to this account; that is, it is recorded as a positive amount. According to other cases, the entry of interim billings is made as a debit; that is, their total amount is recorded as a negative amount. The debit-credit rules at Schneider and Co. will be explained later in the text.

Boilerworks. Costs of patterns (*Frais de Modèles*) of Pattern-Makers' Shops are recorded separately, therefore not included in the transfer prices from Foundries. Thus all the activities in the Mechanical Engineering Shops department are eventually summarized into the Fitting department records.⁵⁰⁾ From the 1842-43 period, the Fitting department records began to comprise a schedule summarizing the entries in the accounts of both the two categories in a form similar to that of the trial balance of today. The entering of amounts billed in the WIP accounts that was mentioned earlier, in fact, started with the appearance of a schedule of this type, though the mode of entry applied to the SCC accounts that was also mentioned earlier had been established earlier. The schedule of the 1842-43 period is a listing of the positive and the negative amount of each account. The accounts listed are twenty three. Regarding the WIP accounts that are nine, the inventory value of each account is entered on the credit side and the amount of billings of each related account is entered on the debit side. Thus the entries are made in the way contrary to the regular debit-credit rules. As to the SCC accounts, the selling price of each account is credited and the amount to be deducted from the selling price is debited. The latter amount is, as mentioned earlier, the total sum of the interim billings and the costs to be recorded after the balance sheet date. When accounts of this category list only amounts to be recorded as assets or liabilities, only either debits or credits are made. In these cases, the amount to be recorded as an asset of each related account is recorded on the credit side and the amount to be recorded as a liability of each related account, on the debit side. This means consistent debit-credit rules are applied to both categories. However, the

50) The records of the Shipyard of Chalon department show particular features indicating some independence as a shipbuilder. Although the Fitting department records indicate that they eventually summarize the activities of Shipyard of Chalon, Shipyard of Chalon is omitted from the discussions in this article.

entries in the SCC accounts are questionable. Because their amounts recorded on the debit side include billings already charged to the customers and costs to be recorded after the balance sheet date, billings and costs are treated as items to be recorded on the same side, while billings and costs must be recorded on opposite sides. This further means that the entries in the SCC accounts are inconsistent with those in the WIP accounts in which billings and costs are recorded on opposite sides. These two defects of the entries in the SCC accounts explain well that the accounts opened within the balance book are not accounts in the strict sense. In fact, as mentioned earlier, their entries were being made in the report form. They might be qualified as quasi accounts. By this fact, however, they could be summarized into the schedule established in a form similar to today's trial balance.

The schedule lists also inventories that are not recorded in the accounts, including parts not yet recorded in the accounts. They are recorded in accordance with the debit-credit rules mentioned above, that is, on the credit side. Naturally, the schedule presents its balance, a credit balance showing the amount to be recorded as an asset. The credit balance is reproduced in the balance detailing the balance sheet items and is eventually reproduced in the summarized balance sheet that is to be disclosed.⁵¹⁾ From the 1843-44 period on, the schedule of each year listed only the balance of the accounts. The recording of the other items was continued. Its final balance was reproduced by the balance and balance sheet each year. The gravity of this last fact should be noted. The costing described earlier was actually used to determine an

51) In fact, the Fitting department records contain one more part distinct from the part that has been being dealt with. That part is designed to record supplies as well as materials other than those from Foundries and Smiths' Shops. The two parts are separately recorded in the balance detailing the balance sheet items, but in the summarized balance sheet is recorded the total amount of the two parts. Incidentally, the balance sheet followed the regular debit-credit rules.

amount to be recorded to the balance sheet.

The year when the schedule in a form similar to today's trial balance first appeared is the last year of the period when only material costs were being recorded in the WIP accounts. Even before this year, the final amount to be recorded in the balance sheet was calculated in the same way as the schedule did and was included in the Fitting department records, except the first year. The amount thus obtained of each year was reproduced by the balance and balance sheet. The gravity of this fact should also be recognized. The recording of unfinished work-in-process inventories only as materials was not unusual. These records were actually and formally used to determine an amount to be recorded to the balance sheet.

In 1853-54, large scale reorganization of the inventory items started. By this the departments comprising the larger Mechanical Engineering Shops department were integrated into one inventory item, Mechanical Engineering Shops, except the Shipyard of Chalon department. Accordingly, the accounts of the Fitting department became those of the Mechanical Engineering Shops department. The new accounts no longer recorded breakdowns of costs,⁵²⁾ although the recording principles used to determine the amounts to be recorded as assets or liabilities were maintained for both the two categories. They add no further information about costing. Instead, some notable descriptions began to appear. As early as the 1853-54 year, the (quasi) account that has been being called so by the author was explicitly labeled an "account (*compte*)" and the entries were recorded with the headings "Debit (*Doit*)" and "Credit (*Avoir*)."
Furthermore, the narrative explanations in the accounts began to indicate that their entries were based on the entries in "the account opened in the ledger

52) Nevertheless, in 1853-54, breakdowns of costs were still shown as to boilers. In 1854-55 and 1855-56, simplified breakdowns of costs were shown as to the WIP accounts.

(*le compte ouvert au grand-livre*)." And in 1858–59, the following comment began to appear at the outset of the part devoted to the WIP accounts group:

"The drawing-up of the accounts will consist in crediting the Inventory with the summary of the expenditures on 30 April, and in debiting it with the returns on manufacture, as well as the paid bills.

"This mode of processing is confined to reproducing the Debit and the Credit of the account opened in the ledger; ..."⁵³⁾

It should be noted, first, that the first sentence reconfirms the recording principles in the WIP accounts. The words "the returns on manufacture (*les rendements de fabrication*)" indicate filings treated as a by-product. Second, "the accounts" written in the plural form are the accounts in the balance book, on the other hand "the account opened in the ledger" is written in the singular form. This suggests that in the ledger, there was only one corresponding account. Third, the second sentence further indicates that this ledger account recorded the same entries that the accounts in the balance book did, at least in their contents. The above quotation let us know the presence of such an account in the ledger. It also suggests the relationship between the ledger account and the accounts in the balance book. It seems that the ledger account did not record the costs and billings of each individual contract separately or in a easily perceivable manner. The *raison d'être* of the accounts in the balance book might be found in this. It seems that they represented the only records that showed the status of each individual contract at the end of the year.

By the way, the expression "reproducing the Debit and the Credit of the account opened in the Ledger" seems irrelevant. First, if the ledger account

53 "*L'établissement des comptes consistera à créditer l'Inventaire du résumé des dépenses au 30 Avril, et à le débiter des rendements de fabrication, ainsi que des factures réglées. "Ce mode de procéder se borne à reproduire le Doit et l'Avoir du compte ouvert au Grand livre;"*

dictated what costs and billings had to be classed as those before or after the balance sheet date, it seems that the accounts in the balance book did not depend on the ledger account about the data, especially before the 1853–54 year. Before this year, the entries in the accounts in the balance book must have been further more detailed than those in the ledger account.⁵⁴⁾ Second, it is certain that the ledger account recorded accounting transactions in accordance with the regular debit-credit rules, that is, costs on the debit side and billings on the credit side. In fact, the narrative explanations in the accounts within *Balance Books* before the 1853–54 year sometimes indicate that costs were debited and billings were credited in the ledger account called “the fitting account (*le compte ajustage*)” or simply “the fitting (*l’ajustage*).”⁵⁵⁾ This account must have been the then corresponding account.

The author mentioned earlier that the entries in the SCC accounts were defective. It is unthinkable that such entries were made in the ledger account, in this regular account. It seems that when a contract came to be classed in this category, only a credit entry of profit was added in the ledger account. In other words, as to this category, the ledger account recorded costs and profits on the debit side and billings on the credit side in much the same way with the entries found in the trading account. It should be noted that this recording method of

54) The narrative explanations in the accounts within the balance book indicate that they depend on “the book of manufacture (*le livre de fabrication*),” particularly in the records of 1847–48, 1848–49 and 1853–54.

55) In particular in the records in and after the 1845–46 period. Besides, the following comment is found in *Balance Book* of the 1863–64 period: “We will ... reproduce the Debit and the Credit of the account: one, the Debit, representing the manufacturing expenditures, will be registered on the Credit of the inventory; the other, the Credit, comprising the paid bills, will appear on its Debit (*Nous allons ... reproduire le Doit et l’Avoir du compte: l’un, le Doit, représentant les dépenses de fabrication, sera inscrit à l’Avoir de l’inventaire; l’autre, l’Avoir, comprenant les factures encaissées, figurera à son Doit.*)”

the ledger account and the defective method of the SCC accounts, both obtain the same balance.⁵⁶⁾ This means that however defective, the entries in the accounts in the balance book are not irrelevant. The fact that profit was debited to the corresponding ledger account is indicated by another book, *Journal Z*, for which an explanation was given in Section 2. *Journal Z* shows that, in its entries on 30 April 1850, profit was debited to the "Fitting (*Ajustage*)" account to be transferred to the credit of the "Profit and Loss" account and that, in its entries from the 1857-58 period, profit was debited to the "Mechanical Engineering Shops (*Ateliers de Constructions*)" account to be transferred to the "Profit and Loss" account. It is clear that the corresponding ledger account was an account corresponding to today's work-in-process inventory account since it recorded work-in-process. In this account, entries would have been continued for each contract until it was fully completed and the related billings were fully charged to the customer. To such an account were debited costs and profits and credited billings. Thus the corresponding ledger account presented features that may be found in the trading account. Nevertheless, unlike the ordinary trading account, the profits recorded in it were determined outside it, since not all the billings recorded in it indicated the

56) Following may be a demonstration. Let us use the following symbols: B for billings before the balance sheet date, B' for billings after this date, C for costs before this date, C' for costs after this date, P for profit, and S for selling price.

S and P can be shown as:

$$S = B + B'$$

$$P = B + B' - C - C'$$

The computing process shown in the SCC accounts in the balance book is:

$$S - B - C' = (B + B') - B - C' = B' - C'$$

The corresponding process in the ledger account is:

$$C + P - B = C + (B + B' - C - C') - B = B' - C'$$

Therefore the following equation holds good:

$$S - B - C' = C + P - B$$

realized or recognized revenues and part of the recognized revenues were not recorded.

The nature of the accounts within the balance book is now clear. They served the balance sheet by giving the details of an item recorded in it. They also served as a kind of subsidiary ledger. Therefore the cost records examined in this section were not those prepared for cost management purposes. To know what cost data were being prepared at Schneider and Co. for cost management purposes, it is necessary to seek another accounting records that are not available. The cost records in the balance book provide no such information. Instead, they show the use of cost records for financial accounting purposes. The importance of cost records of this type should be recognized. The cost records in the balance book provide incontrovertible evidence that costing was actually and formally used to value inventories. By this, they give evidence that cost recognition did exist.