

International Comparison Program

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Machinery and Equipment

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1. CATEGORIES OF MACHINES AND EQUIPMENT ITEMS

1. In the ICP classification, the category “machinery and equipment” is broken down into two groups, “metal products and equipment” and “transport equipment,” and these are further disaggregated into eight basic headings. Countries are required to collect the prices of several specified items within most of these basic headings.

A. BASIC HEADINGS

2. The eight basic headings for machinery and equipment include 5 basic headings related to metal products and equipment:
 - Fabricated metal products, except machinery and equipment
 - General purpose machinery
 - Special purpose machinery
 - Electrical and optical equipment
 - Other manufactured goods n.e.c.
3. And 3 basic headings for transport equipment:
 - Motor vehicles, trailers and semi-trailers
 - Other road transport
 - Other transport equipment
4. “Fabricated metal products, except machinery and equipment” include prefabricated buildings of metal; bridges, bridge sections, towers, and lattice masts of iron or steel; reservoirs, tanks, vats, and similar containers of iron, steel, or aluminum for all materials; etc.
5. “General-purpose machinery” includes engines and turbines except aircraft, vehicle, and cycle engines; pumps and compressors; ovens other than bakery ovens; furnaces, furnace burners, and incinerators; etc.
6. “Special-purpose machinery” items are intended for specific industries such as agricultural and forestry metallurgy, mining, quarrying, and construction; etc.
7. “Electrical and optical equipment” includes word processing machines, printing machinery, computers and related equipment, electric motors, lighting equipment, radio and television equipment, etc.
8. “Other manufactured goods n.e.c. (not elsewhere classified)” include office, shop, and hotel furniture, etc. Computer software that a producer expects to use in production for more than one year are also included here.

9. "Motor vehicles, trailers, and semitrailers" range from passenger cars, taxi cabs, vans, buses, coaches, to specialized parts, and engines.
10. "Other transport equipment" includes cruise ships, excursion boats, ferry boats, ships, tankers, fishing vessels, oil rigs, all railway and tramway locomotives, airplanes, helicopters, including their specialized parts and engines.

B. SPECIFIC ASPECTS OF MACHINERY AND EQUIPMENT

11. Structured product descriptions (SPDs) are developed for each equipment item. The technical characteristics that determine the performance of a machine or piece of equipment are very important in the product specifications.

2. SUMMARY OF PILOT STUDY

12. The initial stage of the program is a pilot study. It was the first step of a number of phases that culminates with the start of the main survey. Pilot study work was based on an initial list of investment products which was drawn from results of similar exercises in different parts of the world. The list comprised products and items and it was also divided into two main parts, generic and specified items.
13. Prior to the pilot work, all items on the list were checked and were all current based on various sources. However, availability of products may vary across countries, e.g. new models may be introduced at different times in different countries.
14. The pilot was a research exercise, the objective of which was to determine the availability of the products and items on the list. It was carried out in selected nine countries.
15. Following the pilot work, the objective is to analyze the results and then prepare a "global" list that would reflect – as far as possible - markets in all the participating countries.

3. THE PRODUCT LIST

16. The product and item list is the principal document of the survey is the product and item list. Details can be found in Annex "A". A summary of the list is provided below:

BH No.	Code of BH	Title of Basic Heading	2011 survey			
			Products			Items
			Total	Generic	Specified	Total
1	1501111	Fabricated metal products, except machinery and equipment	6	3	3	12
2	1501121	General purpose machinery	14	6	8	21
3	1501131	Special purpose machinery	38	18	20	56
4	1501141	Electrical and optical equipment	35	15	20	60
5	1501151	Other manufactured goods n.e.c.	6	3	3	8
6	1501211	Motor vehicles, trailers and semi-trailers	7	3	4	16
7	1501212	Other road transport	1	0	1	3
8	1503111	Other products	10	2	8	15
Total			117	50	67	191

17. As indicated above, the list comprises seven different product groups called Basic Headings (1 through 8). Each Basic Heading is divided into:

Products and items:

- A product defines a group of specific pieces of machinery or equipment.
- An item is a sub-division and a variation of a product (e.g. a particular model and/or make of a product).

Generic and specified products/items:

- A generic product or item is one for which the specification gives a set of parameters that will define it but without a make or model.
- A specific product or item is one where the specification includes the make and model.

18. The list includes a total of 118 products and 191 items. Each item comprises one sheet (in Excel) that gives the details including the technical parameters. These are contained in the Data Tool.

4. OBJECTIVE

19. The main objective of the survey is to find and price as many of the products and items on the list as possible.
20. In addition, the number of identical and important items priced within the list is expected to be maximized. When products are not identical, yet are similar to the given specifications, they are to be priced and classified as equivalent. (Progress can be tracked in the Data Tool).

5. WORKING METHODS

21. The results of priced items should be recorded on the technical sheets in the Data Tool. The following alternatives exist:

- For generic items – products that match as closely the given technical specifications as possible should be selected and priced. (Products may be an identical match).
- For specific items – the exact product and model should be researched and priced.
- For specific items – an equivalent should be chosen (e.g. an item of the same make but a different model) if the exact make and model is not found. A different make and model may also be selected given it matches the particular specification.

A. GENERIC ITEMS

22. The objective is to identify items that nearly match the given specification. Makes and models of products are to be provided and the technical parameters are expected to be completed. (The parameters are approximately ranked in importance.)

23. For most generic items the technical specifications are based on a specific make and model. If a particular item exactly matches the given technical parameters – it is to be classified as identical. If differences exist, then the item is classified as equivalent.

24. When a priced product matches both the make and model as one of the specific items – it can then be recorded in either of the two positions (generic and specific).

25. Since it is generally better to price well-known makes of products, the makes and models most commonly used for the specific type of products are to be priced in the respective countries.

B. SPECIFIC ITEMS

26. Items that match the exact make and model are to be classified as identical. In some instances, although the make and model are the same, differences may exist in terms of technical parameters (e.g. because of national rules and regulations). Therefore such items are to be classified as equivalent. If the same make is identified, however there is a difference in the model, the item is to be submitted as equivalent.

6. STANDARD METHOD FOR PRICING EQUIPMENT GOODS

27. The standard method for pricing equipment goods is similar to that followed for consumer goods and services; countries collect prices for identical or very similar products—sometimes referred to as “specification pricing.”

A. PRICING RULES

28. To be consistent with the national accounts, countries are required to provide prices for equipment goods that are consistent with the valuation of those goods as fixed capital assets in the national accounts. Thus the prices must include import duties and other product taxes actually paid by the purchaser, costs of transporting the asset to the place where it will be used, and any charges for installing the asset so that it ready for use in production. Deducted from the price is any of the discounts generally available to most producers.

29. The following rules should be observed in reporting prices for equipment goods:

- *Transport costs.* When the prices of equipment goods do not include transport costs, these costs should be estimated by countries. They would determine the average distance over which the items are transported from the factory where they are made or, for imports, the port of entry.
- *Installation costs.* Costs are usually associated with the installation of fixed equipment, and these costs are included in the gross fixed capital formation (GFCF) in the national accounts. Installation charges include not only those paid by the purchaser for physical installation of an item at a factory or other site but also any charges for testing or calibrating the equipment. In the case of transport equipment, there are usually no installation costs.
- *Product taxes.* The price should only include nondeductible product taxes. Countries that levy a value added tax (VAT) normally allow purchasers to deduct the full amount of the tax on capital goods. Sales and other product taxes, and sometimes import duties, may also be fully or partly deductible on capital goods.
- *Discounts.* The price should refer to the purchase of a single item so that it is not affected by discounts that may be available for large orders. The price of the single item should be reported after deducting any discount that is customarily available to most purchasers and that is available for most of the year.

30. The national average prices are required. Country experts follow two guidelines in deciding how these prices are to be collected. First, in some small countries it may be sufficient to collect prices in only a single location such as the capital city or the largest industrial or commercial town. Second, in larger countries that have several centers of significant industrial and commercial activity, prices will have to be collected in several of these centers in order to calculate a national average price.

31. In many countries, a single dealer has the rights to sell the specified type of equipment. In this case, a single price observation will be sufficient. In other countries, however, there may be several distributors of the specified type of equipment, and in this case several price

observations will be required to establish the average national price. The decision as to whether one or more price observations are necessary is left to the national experts.

32. The prices reported should be the average prices for the reference year—that is, they should be the average of the prices collected at regular intervals throughout the year. However, experience shows that if all countries price equipment goods during the same period, there is no need to collect prices throughout the year. Price collection at midyear is recommended for the 2011 ICP.

A. SECOND HAND ITEMS

33. A significant proportion of the GFCF in equipment goods in some countries consists of imports of second-hand goods, some of which may have been reconditioned. Second-hand goods that are comparable for pricing purposes are difficult to find. Substantial quality adjustments may be necessary to make the prices comparable, and such quality adjustments are presently not feasible. Thus in the 2005 ICP price collection was confined to new equipment goods. The prices of second-hand equipment goods were not used even when those goods were actually more representative than new goods. Second-hand goods will also be omitted from pricing in the 2011 ICP.

B. SOURCES OF PRICE INFORMATION

34. The prices of equipment goods can be obtained directly from producers, importers, or distributors or from their catalogues. Prices will be collected by the method or combination of methods that countries deem the most convenient such as personal visit, telephone, letter, or Internet. However, the prices had to be adjusted to conform to the valuation principles in terms of taking into account transport charges, installation costs, product taxes, and discounts.

35. The sources most often used for collecting the price information are the following:

- *Within a national statistical office.* Those who compile a producer price or an import price index are likely to have the most familiarity with the types of goods being compared for these basic headings. For some items such as automobiles and computers, the comparisons used for household consumption are also relevant to equipment, although the prices collected for the household consumption expenditure had to be adjusted by subtracting the value added taxes and other product taxes that are payable by households but usually can be deducted by enterprises.
- *From dealers within the country.* Equipment distributors and dealers know which models are available, their detailed characteristics, and prices. When prices were obtained from dealers, countries had to ensure that all product taxes and installation charges were included.

Government departments purchase transport and other equipment on a regular basis. Such purchases are often centralized under a “public works” or “central supply”

department. They may buy directly from manufacturers, but often they will also use local dealers and distributors.

- *Internet.* Specialized Web sites of equipment goods manufacturers are also very useful. They often also provide the names and contact information for dealers and distributors. However, the price information obtained from Web sites had to be adjusted to conform to the valuation principles just outlined for taking into account transport charges, installation costs, product taxes, and discounts.

7. PRICING GUIDELINES

36. Reported prices are required to be:

- Purchasers' prices (however, without any VAT)
- National average prices
- Prices of the survey data collection period

37. Purchaser prices should include trade margins, transport and delivery cost, and assembly and installation cost and general discounts. VAT should not be included. However, other non-deductible taxes are to be included into the purchasers' price. They may be special national taxes on certain equipment (e.g. for environmental reasons or to protect national producers of equipment goods).

38. National average prices should reflect the national average and not only certain locations or suppliers. Reported prices should be the ones observed during the survey period. No adjustments to annual average prices are required.

39. In addition to the list prices of items, other relevant components of the cost are also to be considered, such as additional delivery and/or installation costs, etc. These components will be added to the list price of items. Similarly, there may be applicable discounts which should be taken off the list price. These aspects will be taken into account by the Data Tool.

40. Additional aspects to be considered include:

Used Equipment

41. All the products specified for this survey are for new items. In a number of countries, however, a significant proportion of investment equipment consists of imports of second-hand goods, some of which may have been reconditioned. Experimental pricing of second-hand equipment goods shows that there is considerable variation in the quality of the goods priced by different countries. It is very difficult to find second-hand goods that are comparable for pricing purposes. Substantial quality adjustments may be necessary to make

the prices comparable and such quality adjustments are not feasible in practice at the present time. Therefore, this survey is confined to new equipment goods. Prices of second-hand goods are not acceptable, even when second-hand equipment goods are more important than new goods.

Number of price observations

42. In many countries there will be a single dealer with the rights to sell the specified type of equipment and in this case a single price observation will be sufficient. In other countries, however, there may be several distributors of the specified type of equipment; therefore several price observations are required to establish the average national price. The decision as to whether one or more price observations are necessary is left to the national experts.

A. COLLECTION AND RECORDING OF DATA

43. The various points addressed in the following section are directly related to the parameters in the specification sheets in the Data Tool.

Country

44. The country box will be completed by the Data Tool automatically, when you have completed the introductory questions in the setup box.

Make and model

45. When you have found and priced an item these details should be inserted. For some generic items there will be no model. You can insert "unspecified."

Technical parameters

46. The technical parameters for an item should be completed, according to the list given in the specification sheet. They can be completed either in metric or imperial units. You can choose either in the setup box in the Data Tool.
47. Please also complete the technical parameters for all items, even when these are identical to those given.

Order quantity

48. Normally the order quantity for an item is one. However, for some items it will be realistic to take more than one. For example, it is unusual for fire extinguishers to be ordered as one. In commercial situations, an order of say ten will be normal. This aspect can affect the unit price.

Currency

49. The currency box will be completed by the Data Tool automatically, when you have completed the introductory questions in the setup box.

Unit price

50. The unit price should be submitted, regardless of the order quantity.

Installation costs

51. As mentioned in section 8.1 above, for some items it may be relevant to include installation costs. Installation charges include not only any charges that the purchaser pays for the item to be physically installed at the factory or other site but also any costs for testing, running-in or calibrating the equipment. In the case of transport equipment there are usually no installation costs. This aspect will be covered in the Data Tool.

Transport and delivery costs

52. As a component of the total price the delivery cost should be included. For some items this will be included in the price. For others an allowance should be taken into account. When items do not include transport and delivery costs, these should be estimated by countries selecting their own average distance over which the items are transported and delivered. This aspect will be covered in the Data Tool.

Discounts

53. The price should refer to the purchase of a single item so that it is not affected by discounts that may be available for large orders. However, the price of the single item should be reported after deducting any discount that is customarily available to most purchasers and that is available for most of the year. This aspect will be covered in the Data Tool.

Non-deductible taxes

54. Finally, the price should only include non-deductible product taxes. Countries that levy value added taxes normally allow purchasers to deduct the full amount of tax on capital goods. Sales and other product taxes and sometimes import duties may also be fully or partly deductible on capital goods. This aspect will be covered in the Data Tool.

Importance

55. For each item priced, you are asked to classify it as important or less important. This is a difficult concept and it is partly subjective.

56. In formal terms, important is a concept that relates to individual products within a basic heading. It has had to be introduced because there are no expenditure weights below the basic heading level with which to determine the relative importance of the various products priced within a basic heading. To ensure that there are enough prices to be compared between countries, participating countries are required to price both important products and less important products within each basic heading.

57. Important products normally have a lower price level than less important products and, if this is not taken into account when calculating the PPPs for a basic heading, the PPPs will be

biased. To avoid this, participating countries are required to identify which of the products they have priced within a basic heading are important when reporting their prices.

58. In practical terms for the survey you should try to find important items. Such an item should be typical within the market for that product in your country. An example might help: take a fire extinguisher. This is a common item and is in wide use in all countries. It is an important product within its basic heading. Next, you may find a particular make and model that is sold in widely use in the fire extinguisher market in your country. This will be typical in that market. Such an item will be important.

Comparability

59. For each item priced, you are asked to classify it whether it is identical or equivalent. If you have found the exact item given in the specification then the item will be probably identical. Where you have priced a similar - but not exact - item, then it will be equivalent.
60. However, you may find that even when the make and model are identical to that given, there may be some differences in the technical parameters. Where these are minor and where they are not price determinants then the items can be still be classified as identical. It is necessary to be flexible on this aspect. It will be up to your judgment.

APPENDIX 1: MACHINERY AND EQUIPMENT: LIST OF PRODUCTS AND ITEMS

BH & Items Code	Description	Make	Model
1501111	Fabricated metal products, except machinery and equipment		
150111101	Single skinned horiz. cyl. storage tank	Unspecified	100 cu. m.
150111102	Double skinned horiz. cyl. storage tank	Unspecified	100 cu. m.
150111103	Double skinned horiz. cyl. storage tank	Unspecified	50 cu. m.
150111104	Stainless steel beer keg	Unspecified	50 litre standard
150111105	Packaged steam boiler	Viessmann (Germany)	Vitomax 200 HS, model 237
150111106	Packaged steam boiler	Viessmann (Germany)	Vitomax 200 HS, model 237
150111107	Packaged steam boiler	Viessmann (Germany)	Vitoplex 200 SX2 1950 kW
150111108	Packaged steam boiler	Viessmann (Germany)	Vitoplex 200 SX2 1950 kW
150111109	Hacksaw	Stanley (USA)	Multiposition hacksaw 15-120
150111110	Hacksaw	Stanley (USA)	High-Tension Hacksaw
150111111	Hacksaw	USAG (Italy)	200 S
150111112	Automotive tool set	Facom (France)	Tool set BT.11A
1501121	General purpose machinery		
150112101	Portable screw compressor	Unspecified	-
150112102	Portable screw compressor	Atlas Copco (USA)	XAS 67 Dd Series 7

BH & Items Code	Description	Make	Model
150112103	Portable screw compressor	Atlas Copco (USA)	XAS 77 Dd Series 7
150112104	Diesel engine (general purpose)	Unspecified	-
150112105	Diesel engine (general purpose)	Yanmar (Japan)	3TNV88-DSA
150112106	Industrial petrol engine	Honda (Japan)	GX 270 SWC 4
150112107	Industrial petrol engine	Honda (Japan)	GX 160 SX 4
150112108	Water pump (stationary)	Unspecified	-
150112109	Water pump (stationary)	Grundfos (Denmark)	TP 32-320/2
150112110	Water pump (stationary)	Grundfos (Denmark)	TP 32-380/2
150112111	Water pump (portable)	Honda (Japan)	WB 20 X
150112112	Fork lift truck	Unspecified	-
150112113	Diesel fork lift truck	Jungheinrich (Germany)	DFG 425 s
150112114	Diesel fork lift truck	Doosan (Korea)	Pro 5 series; D25S-5
150112115	Diesel fork lift truck	Toyota (Japan)	02-8FDF25
150112116	Dry powder fire extinguisher	Unspecified	-
150112117	Dry powder fire extinguisher	Sicli (France)	Silice 2000 P6
150112118	Dry powder fire extinguisher	Gloria (Germany)	P2GM
150112119	Dry powder fire extinguisher	Gloria (Germany)	PD 6 GA
150112120	Digital computing scale	Unspecified	-
150112121	Digital computing scale	Berkel (USA)	FX 220
1501131	Special purpose machinery		
150113101	Tractor	Unspecified	-
150113102	Diesel tractor: small	Massey Ferguson	MF 1540 (Agricultural

BH & Items Code	Description	Make	Model
		(USA)	series)
150113103	Diesel tractor: small	New Holland (Italy)	TD 5040
150113104	Self-propelled combine harvester	New Holland (Italy)	CX 8030
150113105	Self-propelled combine harvester	John Deere (USA)	1470
150113106	Self-propelled combine harvester	Claas (Germany)	Lexion 650
150113107	Combine harvester	Unspecified	-
150113108	Blower	Unspecified	-
150113109	Backpack leaf blower	Husqvarna (Sweden)	356 BTx
150113110	Welding equipment	Unspecified	-
150113111	Welding equipment	Esab (Sweden)	Origo Arc 410c
150113112	Welding equipment	Esab (Sweden)	Aristo Arc 4000i
150113113	Welding equipment	Esab (Sweden)	Origo Arc 650c
150113114	Welding equipment	Esab (Sweden)	Origo Tig 3000 i, TA 23
150113115	Electronic orbital sander	Unspecified	-
150113116	Electronic orbital sander	DeWalt (USA)	D 26420
150113117	Electronic orbital sander	DeWalt (USA)	D 26441 Palm sander
150113118	Heavy duty cordless combi	Unspecified	-
150113119	Heavy duty cordless combi	Bosch (Germany)	GSB 24 VE-2 Professional
150113120	Wheeled loader and excavator	Unspecified	-
150113121	Wheeled loader and excavator	JCB (UK)	3CX Sitemaster backhoe loader
150113122	Wheeled loader and excavator	JCB (UK)	3CX Super Sitemaster backhoe loader

BH & Items Code	Description	Make	Model
150113123	Tracked tractor (crawler dozer)	Unspecified	-
150113124	Tracked tractor (crawler dozer)	Caterpillar (USA)	D6T Standard
150113125	Tracked tractor (crawler dozer)	Caterpillar (USA)	D6N XL
150113126	Tracked tractor (crawler dozer)	Komatsu (Japan)	D65EX-16
150113127	Skid steer loader	Unspecified	-
150113128	Skid steer loader	Bobcat IR (Canada)	S 220
150113129	Skid steer loader	Bobcat IR (Canada)	S 175
150113130	Skid steer loader	Komatsu (Japan)	SK 818-5 with standard bucket
150113131	Tandem vibrating roller	Bomag (Germany)	BW 80 ADH-2
150113132	Compact track loader	Bobcat IR (Canada)	T190
150113133	Warm whole milk separator	Unspecified	-
150113134	Warm whole milk separator	Tetrapak (Sweden)	Tetra Centri H618 HGV
150113135	Warm whole milk separator	Tetrapak (Sweden)	Tetra Centri H610
150113136	Pizza oven	Unspecified	-
150113137	Pizza oven	Moretti Forni (Italy)	P120C18Z (Description P120EA)
150113138	Open fryer: double well	Unspecified	-
150113139	Open fryer: double well	Henny Penny (USA)	OEA-322
150113140	Open fryer: single well	Henny Penny (USA)	OEA-321
150113141	Single thread chainstitch button sewing machine	Unspecified	-
150113142	Single thread chainstitch button sewing machine	Juki (Japan)	MB-1373
150113143	Centrifugal washer/extractor	Unspecified	-

BH & Items Code	Description	Make	Model
150113144	Centrifugal washer/extractor	Kanngiesser (Germany)	Favorit plus FA 2250
150113145	Centrifugal washer/extractor	Electrolux (Sweden)	W 4240 H
150113146	Centrifugal washer/extractor	Lavamac (Belgium)	LH 400
150113147	Dry cleaning machine	Unspecified	-
150113148	Dry cleaning machine	Renzacci (Italy)	Hygena 380
150113149	Compact platesetter	Unspecified	-
150113150	Compact platesetter	Heidelberg (Germany)	Suprasetter A75
150113151	Solar panel	Unspecified	-
150113152	Solar panel (collector)	Viessmann (Germany)	Vitosol 200-T Type SD2A
150113153	Solar panel (collector)	Viessmann (Germany)	Vitosol 100-F Type SH1
150113154	Pin pad	Unspecified	-
150113155	Pin pad	Ingenico (France)	iPP320
150113156	Pin pad	Thyron Systems (UK)	MPT500-GPRS
1501141	Electrical and optical equipment		
150114101	Calculator	Unspecified	-
150114102	Calculator	Hewlett Packard (USA)	HP17bII+
150114103	Calculator	Casio (Japan)	FX 992 S
150114104	Calculator	Texas Instruments (USA)	TI-84 PL Graphic
150114105	Digital photo copier colour	Unspecified	-
150114106	Digital photo copier colour	Canon (Japan)	iRC 4080 i
150114107	Horizontal bar code scanner	Unspecified	-

BH & Items Code	Description	Make	Model
150114108	Horizontal bar code scanner	Symbol Technologies (USA)	Laser Scan LS 7808
150114109	Horizontal bar code scanner	Scantech (Netherlands)	Castor C-5010
150114110	Desktop computer	Unspecified	-
150114111	Desktop computer	Hewlett Packard/Compaq (USA)	6005 Pro Small Form Factor PC
150114112	Desktop computer	Dell (USA)	OptiPlex 960 Desktop Mini-Tower
150114113	Desktop computer	Apple (USA)	Mac Pro
150114114	Laptop computer	Unspecified	-
150114115	Laptop computer	Dell (USA)	Latitude E6510
150114116	Laptop computer	Hewlett Packard/Compaq (USA)	HP 625 Notebook PC
150114117	Laptop computer	IBM/Lenovo (China)	ThinkPad T510
150114118	Laptop computer	Apple (USA)	MacBook Pro
150114119	Laser printer: colour	Unspecified	-
150114120	Laser printer: colour	Hewlett Packard (USA)	LaserJet 4700
150114121	Laser printer: colour	Hewlett Packard (USA)	LaserJet CP2025dn
150114122	Laser printer: colour	Canon (Japan)	LBP5970
150114123	Scanner	Hewlett Packard (USA)	Scanjet 7650
150114124	Scanner	Canon (Japan)	CanoScan 4400 F
150114125	Desktop monitor	Dell (USA)	E190S flat panel monitor

BH & Items Code	Description	Make	Model
150114126	Desktop monitor	Hewlett Packard (USA)	HP s2031
150114127	Desktop monitor	LG (Korea)	L1718S
150114128	Diesel generating set	Unspecified	-
150114129	Diesel generating set for stand-by use	Caterpillar (USA)	Olympian GEH 250
150114130	Diesel generating set for stand-by use	Atlas Copco (USA)	QAX 20
150114131	Three phase electric motor	Unspecified	-
150114132	Three phase electric motor (aluminium frame)	Asea Brown Boveri (Sweden)	ABB M2AA 160 L - 4
150114133	Three phase electric motor (cast iron frame)	Asea Brown Boveri (Sweden)	ABB-M3BP 160 L - 4
150114134	Moving head light	Unspecified	-
150114135	Moving head light	Martin (Denmark)	MAC 250 Krypton
150114136	Portable generator	Honda (Japan)	EC 3600
150114137	Portable walky - talky radio	Unspecified	-
150114138	Portable walky - talky radio	Motorola (USA)	GP 340
150114139	Portable walky - talky radio	Maxon (South Korea)	SL 55 V2
150114140	Portable walky - talky radio	Kenwood (USA)	TK-3301
150114141	LCD display	Unspecified	-
150114142	LCD display	Samsung (Japan)	SyncMaster 913 TM
150114143	LCD display	Philips (Netherlands)	BDL 4231 C/00
150114144	LCD display	Philips (Netherlands)	BDL 3231 C/00
150114145	Professional mixer	Unspecified	-
150114146	Professional mixer	Pioneer (Japan)	DJM-800

BH & Items Code	Description	Make	Model
150114147	Analogue/digital combi oscilloscope	Unspecified	-
150114148	Analogue/digital combi oscilloscope	Hameg (Germany)	HM 1508-2
150114149	Analogue/digital combi oscilloscope	Hameg (Germany)	HM 1008-2
150114150	Blood pressure monitor for professional use	Unspecified	-
150114151	Blood pressure monitor for professional use	Omron (Japan)	HEM-907
150114152	Digital projector	Unspecified	-
150114153	Digital projector	NEC (Japan)	NP410
150114154	Digital projector	Epson (Japan)	EMP - S4
150114155	Digital projector	Epson (Japan)	EMP-822H (V11H304040)
150114156	Electronic digital theodolite	Nikon (Japan)	NE-100
150114157	Electronic digital theodolite	Topcon (Japan)	DT - 202
150114158	Electronic digital theodolite	Leica (Swiss)	Builder 100 M Power
150114159	Professional digital camera	Canon (Japan)	EOS 60 D
150114160	Professional digital camera	Canon (Japan)	EOS 50 D
1501151	Other manufactured goods n.e.c.		
150115101	Office desk: wood/steel	Ikea (Sweden)	Galant
150115102	Office desk	Unspecified	-
150115103	Exercise equipment: bicycle	Unspecified	-
150115104	Exercise equipment: bicycle	Kettler (Germany)	Golf ST Pro
150115105	Exercise equipment: bicycle	Precor (USA)	846 i-R Experience

BH & Items Code	Description	Make	Model
150115106	Electronic keyboard	Unspecified	-
150115107	Electronic keyboard	Yamaha (Japan)	Tyros 3
150115108	Electronic keyboard	Roland (Japan)	RD 700 GX
1501211	Motor vehicles, trailers and semi-trailers		
150121101	Van	Unspecified	-
150121102	Van	Mercedes Benz (Germany)	Sprinter 313 CDI
150121103	Van	Ford (USA)	Transit 260 SWB Medium Roof
150121104	Van	V W (Germany)	T 30
150121105	Double cab pick-up	Toyota (Japan)	Hilux HL 2 Double Cab 4WD
150121106	Diesel minibus	Unspecified	-
150121107	Diesel minibus	Mercedes Benz (Germany)	Vito Traveliner
150121108	Diesel minibus	V W (Germany)	Caravelle
150121109	Lorry chassis cab	Mercedes Benz (Germany)	Sprinter 516 CDI
150121110	Lorry chassis cab	Volvo (Sweden)	FLL 240 HP 4X2 Rigid
150121111	Lorry chassis cab	Ford (USA)	Transit 350 LWB DRW RWD
150121112	Lorry chassis cab	V W (Germany)	Crafter CR 35
150121113	Tractor unit	Unspecified	-
150121114	Tractor unit	Mercedes Benz (Germany)	Actros 2644 S 6x4 LS
150121115	Tractor unit	Mercedes Benz	Actros 1844 LS 4x2

BH & Items Code	Description	Make	Model
		(Germany)	
150121116	Tractor unit	Scania (Sweden)	R 400 LA 4x2 MNA
1501212	Other road transport		
150121201	Delivery scooter	Yamaha (Japan)	Vity
150121202	Delivery scooter	Honda (Japan)	ANF 125i Innova
150121203	Delivery scooter	TGB (Taiwan)	Delivery
1503111	Other products		
150311101	Computer operating system	Unspecified	-
150311102	Computer operating system (English language)	Microsoft (USA)	MS Windows XP Professional
150311103	Computer operating system (English language)	Microsoft (USA)	MS Windows Vista Business, full version, 32-bit
150311104	Computer operating system (English language)	Microsoft (USA)	MS Windows 7
150311105	Computer operating system (English language)	Apple Mac (USA)	MacOS X v. 10.6 Snow Leopard
150311106	Computer software	Unspecified	-
150311107	Computer software (1)	Microsoft (USA)	MS Office 2007 Professional (English language)
150311108	Computer software (1)	Microsoft (USA)	MS Office 2007 Professional (National language)
150311109	Computer software (2)	Microsoft (USA)	Microsoft Visual Studio Pro 2008
150311110	Computer software (3)	Adobe (USA)	Photoshop CS 4 (Win)

BH & Items Code	Description	Make	Model
150311111	Computer software (3)	Adobe (USA)	Adobe Flash CS4 Professional
150311112	Computer software (4)	Symantec/Veritas (USA)	Backup Exec. Version 12.5 Windows servers
150311113	Computer software (5)	Sun (USA)	StarOffice Office Suite Version 9
150311114	Anti-virus software	McAfee (USA)	Active Virus Defense SMB Edition
150311115	Anti-virus software	Symantec (USA)	Norton Internet Security™ 2009

APPENDIX 2: NOTES ON SELECTED BHs AND PRODUCTS

I. BH 1: 1501111: FABRICATED METAL PRODUCTS, EXCEPT MACHINERY AND EQUIPMENT

1) Cylindrical Storage Tanks

There are very few international makes in this market. Most products are of domestic manufacture. This is not perhaps surprising as in essence tanks are relatively simple fabrications and it is uneconomic to trade them internationally.

All are essentially tanks, with the only differences being in the materials from which they are made - which are in turn related to the applications for which they are to be used - and the various features and options incorporated.

It is perhaps for these reasons that they all give rise to similar problems when specifying and pricing. Where possible there is a need to rely on the application of international standards to find comparable items in different countries, but this is not always possible.

Background

There are two tanks in the sample: one single skinned for the storage of e.g. chemicals or fuel oil above ground and the other double skinned for the underground storage of petrol.

Double skinned tanks are a more recent development and tend to be the more successful of the two in European surveys.

Being concerned with the storage of hazardous goods there are international standards that must be adhered to for the underground double skinned variant.

In addition the customers for double skinned tanks customers are largely multi-national oil companies, a fact which tends to promote uniformity and the application of standard specifications in different countries, particularly in terms of characteristics such as capacity, etc.

There are two double skinned tanks in the sample, one of 50 cu.m. capacity and the other of 100 cu. m. Some oil companies have said that they latter is rather large for petrol storage.

Processes

- Construction

These products are typically made on a Deuma automated assembly and welding facility. Using close tolerance steel plate, this ensures that tanks are accurate in terms of concentricity and straightness.

Submerged-arc welding inside and out ensures high quality and maximum weld integrity, resulting in higher finished product strength.

This quality is consistent from one tank to the next.

Tanks are designed and manufactured to EN 12285 part 1, the accepted standard for Europe and many countries worldwide. Other certifying authorities include: KIWA, TUV, UDT and AIB.

- Coating

For a 30 year minimum life expectancy, the materials of construction and manufacturing methods need to be supplemented by high quality surface finish and coating.

All underground tanks are blast cleaned to Sa2.5 followed by coating with Endoprene solvent-free polyurethane to a minimum thickness of 800 microns.

Epoxy or bitumen coatings can also be provided to suit national requirements or specific ground conditions and materials of backfill.

Permacor high build epoxy system, approved by KIWA is another type of coating.

All coatings, regardless of material type, are 100% pinhole checked and thickness checked prior to dispatch.

Other features of the tanks include the following:

- Multi-compartment tanks: to offer flexibility of use, tanks can be built with more than one compartment to provide multi-fuel usage.
- Ancillary Items: it is possible for a comprehensive range of ancillary items to accompany tanks.

Internally:

- Suction pipes and fill pipes can be provided, complete with overfill prevention valves.

Externally:

- Manway access chambers (polyethylene or GRIP) complete with corbelled top,

Ground covers, dipsticks and holding down straps, which can all be delivered with the tanks. (In the case of the holding down straps these can be delivered prior to the tanks if required)

Leak detection

Supplied with the double skin tank is the LAG14ER leak detection system which provides 24 hour monitoring of the inner containment tank and the secondary skin. The interstitial space is filled with a mono-propylene glycol solution, which contains both anti-corrosive and low temperature properties, and is also an environmentally friendly liquid.

An alternative means of leak detection in the form of a pressure system can also be provided. This system, known as the DL-4000, holds the interstitial space under a small pressure during operation. Both the pressure and the liquid systems are simple in operation and totally effective.

Specification Summary

The following are the typical characteristics that make up the specifications of tanks:

- Capacity Range 5,000 to 100,000 Litres
- Tank Diameters 1250 mm, 1500 mm, 1900 mm, 2000 mm, 2500 mm, 2743 mm, 3000 mm
- Tank Length: flexible
- Single or multi-compartment
- Both skins tested and certified on completion
- Specification EN 12285 part 1
- Externally blast cleaned and coated
- External Coatings Polyurethane, Epoxy, Bitumen
- Internal Linings Epoxy
- Testing Pneumatic or Hydraulic
- 100% pin-hole test on finished coating
-

2) 12.4.9 Stainless Steel Beer Keg

Product description

Stainless steel beer kegs are well known products in terms of appearance and application. They are used by almost all breweries for the storage and transportation of beer. Wooden barrels have almost totally disappeared.

They are generally manufactured to standard specifications and differ only in the finish, livery, labelling and painting, etc.

There is little branding in the market but it was hoped that the common specification would enable comparable products to be found.

One make is Portinox. This is a major Spanish manufacturer whose products are widely distributed throughout Europe and across the world.

There are of course other manufacturers but not that many. It is a product field that is typified by long production runs (up to 40,000 being not uncommon) and where there are significant economies of scale.

The model selected was a 50-litre stainless steel keg made to a Euronorm specification, details of which were given on the product specification sheet.

However, further discussions with Portinox indicated that there is also a DIN standard for a 50-litre keg. This is very similar to the Euronorm but is not the same. Particular differences between the two are:

The diameter of the Euronorm keg is 395 mm. while that of the DIN standard is 363 mm.

The height of the Euronorm keg is 490 mm. while the equivalent measurement for the DIN standard is 570 mm.

The Euronorm is generally preferred by the major international breweries such as for example Heineken, while the DIN keg tends to be the choice of smaller local breweries particularly in Germany.

Particular features of the kegs include the following:

- ergonomic hand-holds
- drain hole
- rolling rims
- top and bottom chimes
- In addition kegs to both specifications are stackable

3) 1.3 Packaged steam boilers

These are well-established products in the sample and the number of items included has grown over the years, in an attempt to cover makes which are representative in as many different countries as possible.

Product description

As a product, boilers should be well understood in terms of their function and application. The make represented is the German company Viessmann.

In terms of the specifications there is a fundamental choice between oil and gas fired types. The representativity of the different fuels clearly will vary from country to country.

There is however one important difference between the items which should be clarified and which countries should take account of when doing their pricing: most of the boilers in the sample are for raising steam but there is one which is for hot water.

The exception is the Viessmann Vitoplex, 01.03(j). This boiler is used for generating hot water and is used for heating applications in buildings.

All the other models are steam boilers and have industrial applications, typically in the process, chemical and food industries.

A further consideration is that for the Viessmann boilers the burners are of a different make. Viessmann say that they regard these as specialized items of equipment that they prefer to leave to experts in that field.

Care should be taken to ensure that the burners of the type and make specified are included in the specifications when collecting the survey data as later they can have a significant influence on the price.

4) 1.4 Hacksaw

The hacksaw was included for the first time in the 2007 European survey. It was considered that a relatively small item of modest unit price would be relatively easy to find in all countries and was selected taking particular account of the WBC.

In addition it also presented the possible opportunity to specify a branded product that was likely to be found in a significant number of countries.

There was also the possibility that the model selected last time was not the most appropriate, so a change was proposed and this has already been incorporated into the pre-survey.

According to the manufacturers it is a model that is widely distributed throughout Europe.

Product description

As a product the hacksaw should be clearly understood and does not call for further detailed description. It is a saw for cutting metal and other materials and is in widespread commercial use, typically by plumbers and other tradesmen. It features a replaceable blade.

The make selected for the previous Machinery and Equipment Goods survey was Stanley. This is a major manufacturer of a complete range of tools aimed at both the DIY and professional markets.

Stanley is an American company but has very widespread distribution throughout Europe. In addition to a large UK operation it also has a distribution centre in Mechelen in Belgium.

According to the company's UK office the same range of products is distributed in all countries, mainly via wholesalers and retailers.

The model selected for the earlier surveys was a 12-inch high tension saw (no. 15-113). Further discussion with the manufacturer indicated that this may not have been a typical saw that is in widespread use but may have been too specialized.

It was therefore proposed to select another model which according to Stanley is very typical of a saw that is in general commercial use. It is the model 15-120 with the following key characteristics:

- Made from heavy galvanized steel
- Made of strong rigid tubular steel for ease of use
- With integrated blade storage
- With tension guide on handle lever
- Overall length: 450 mm.
- No of teeth per cm: 0.94
- No. of cutting positions: 8
- Blade length: 300 mm.
- Maximum capacity: 110 mm

2. BH 2: 1501121: GENERAL PURPOSE MACHINERY

Engines, turbines, compressors and pumps is a category with mature technology and can be compared with a straightforward set specifications. Overall, engines and turbines generate power,

noise and pollution and they are measured on the basis of power density for the application. Compressors are easy to compare because their performance is based on the gas laws of physics. Price is a matter of scale based on volume of the gas medium delivered at a specified pressure.

Compressors and pumps must be compared for the medium they transmit; that is, an air compressor is made with less exotic material than an ammonia compressor. Obviously, the same logic applies to pumps. Pumps are also measured on volume delivered at a specified pressure. Because pumps are transmitting a practically incompressible medium, the design must accommodate not only the steady state pressure and volume, but also effectively deal with transient motion and the resulting stress rise within the pump.

Engines: the primary purpose of engines is to convert fuel to power as efficiently as possible. Engines are measured in terms of power density. Power density is the amount of net power generated by an occupied volume and weight. It is necessary to determine the reliability before finalizing the power density determination. Reliability and life will increase volume and weight of an engine. Simply stated, two engines with identical power ratings will differ significantly if one is designed for 1000 hours at rated power and the second is designed to operate 10000 hours at rated power. No attempt was made in this PS/SPD series to describe packaged power units. In the functional section, there is a request to describe power take-off possibilities, starting options, air-charging methods and emission certification. Engine productivity is largely controlled by fuel quality and fuel management systems. Once an engine is integrated into a machine, the productivity engine productivity control is submerged into the machine systems. Engine technology is specific and very competitive. Three technologies are constantly under pressure for refinement; combustion science, fuel management and emission reduction (exhaust and noise). Engine diagnosis both at rest and in running state is a growing preference by users. Engine management systems can be linked through CANBUS to IT onboard systems that use satellite communication.

Air Compressors are used globally. Since they are power absorbers they require a power source. All five characteristics are involved in describing the value of an air compressor regardless of size. The measured output is volume of air at pressure with respect to time.

Water Pumps: Like compressors, water pumps are power absorbers and require a power source. Hence, the five characteristics are necessary to describe value regardless of size or installation. The measured output is volume of water (fluid) at pressure with respect to time just like an air compressor.

Websites

www.ingersoll-rand.com (cranes, compressors)
www.cat.com (engines, gas turbines)
www.johndeere.com (diesel engines)
www.komatsu.com (diesel engine, forklift)
www.cummins.com (engines)
www.lindelifttruck.com (forklift)

www.jlg.com (forklift)
www.manitou-na.com (forklift)
www.mit-lift.com (forklift)
www.mustangmfg.com (forklift)
www.yale.com (forklift)

II. BH 3: 1501131: SPECIAL PURPOSE MACHINERY

1) 3.1 Agricultural machinery

Agricultural Machinery is evolving from regional (ABNT, ASAE, BSI, CSA, CEN, GOST, etc.) to global standards under ISO4254. A major driver for globalization is the acceptance of common practices and the consolidation of agricultural equipment manufacturers. Currently, three companies provide a full line of equipment through global distribution networks for food and fibre production. In fact, only two of these three companies offer specialized harvesting machines for cotton, cane, grapes and coffee. These three companies are supported regionally through short line suppliers, many of them actually using a full line manufacturer's distribution network locally. The regional product is generally similar in function or modifies an existing product for localized conditions.

At first glance, this category looks formidable to compare due to the broad range of models. In reality, industry has provided consistent grouping of categories in order to utilize manufacturing efficiencies. The product architecture within a specific product is comparable globally. Thus a pre-sorting exercise can reduce the sample size without negatively impacting the survey results.

Websites

www.agcocorp.com (agricultural machinery brands- Challenger, Fendt, Massey-Ferguson, Valtra, Gleaner, Hesston, New Idea, Ideal, Sunflower, White planters, RoGator, Terra Gator, Spra-Coupe, Farmhand, Glencoe, Sisu Diesel, TYE, Fieldstar, Lor*al, Soilteq, Willmar)

www.cat.com (earthmoving, mining, quarrying, material handling)

www.cnh.com (agricultural machinery brands-CASE IH, New Holland, Steyr) (construction machinery-CASE, New Holland, Kobelco)

www.johndeere.com (agricultural, earthmoving, forestry and lawn care)
www.unverferth.com (agricultural trailers)
www.balzerinc.com (liquid manure haulers)
www.rotomix.com (semi solid manure hauler)

2) 3.2 Machine tools

Machine Tools are commodities that can be priced by performance, accuracy and technology. Comparison of individual machine tools can be done with precision by restricting the function for comparison. For example, an engine lathe is the same globally, and differs only in capacity and technology.

Websites

www.makita.com (power woodworking tools)
www.black&decker.com (power woodworking tools)
www.ryobi.com (power woodworking tools)
www.portercable.com (power woodworking tools)
www.dewalt.com (power woodworking tools)
www.bosch.com (power woodworking tools)
www.milwaukee.com (power woodworking tools)
www.skil.com (power woodworking tools)
www.hilti.com (power woodworking tools)
www.hitachi.com (power woodworking tools)
www.metabo.com (metal working tools)
www.ridgid.com (metal working tools)
www.grizzley.com (power woodworking tools)
www.festool.com (power woodworking tools)
www.craftsman.com (power woodworking tools)
www.chicagopneumatic.com (power Tools)
www.universaltool.com (power tools)
www.woodworker.com (power woodworking tools)
www.jettool.com (power woodworking tools)
www.hobart.com (welding machines)
www.lincoln.com (welding machinery)
www.mitrowskiwelding.com (welding machinery)
www.thermadyne.com (welding and plasma cutting machines)

3) Welding equipment

Esab is a dominant international company in the market for welding equipment and its products are very widely available. They are in widespread use and therefore not difficult to price.

They are good examples of branded products at the “heavier” industrial end of this BH.

These products are influenced by technological developments and need to keep careful track of them to ensure that the products selected are up-to-date and representative.

Background

Welding is a fabrication or sculptural process that joins materials, usually metals or thermoplastics, by causing coalescence. This is often done by melting the work pieces and adding a filler material to form a pool of molten material (the weld pool) that cools to become a strong joint, with pressure sometimes used in conjunction with heat, or by itself, to produce the weld.

This is in contrast with soldering and brazing, which involve melting a lower-melting-point material between the work pieces to form a bond between them, without melting the work pieces.

Many different energy sources can be used for welding, including a gas flame, an electric arc, a laser, an electron beam, friction, and ultrasound. While often an industrial process, welding can be done in many different environments, including open air, under water and in outer space. Regardless of location, however, welding remains dangerous, and precautions must be taken to avoid burns, electric shock, eye damage, poisonous fumes, and overexposure to ultraviolet light.

Until the end of the 19th century, the only welding process was forge welding, which blacksmiths had used for centuries to join metals by heating and pounding them. Arc welding and oxyfuel welding were among the first processes to develop late in the century, and resistance welding followed soon after. Welding technology advanced quickly during the early 20th century as World War I and World War II drove the demand for reliable and inexpensive joining methods. Following the wars, several modern welding techniques were developed, including manual methods like shielded metal arc welding, now one of the most popular welding methods, as well as semi-automatic and automatic processes such as gas metal arc welding, submerged arc welding, flux-cored arc welding and electroslag welding.

Developments continued with the invention of laser beam welding and electron beam welding in the latter half of the century. Today, the science continues to advance. Robot welding is becoming more commonplace in industrial settings, and researchers continue to develop new welding methods and gain greater understanding of weld quality and properties.

These processes use a welding power supply to create and maintain an electric arc between an electrode and the base material to melt metals at the welding point. They can use either direct (DC) or alternating (AC) current, and consumable or non-consumable electrodes. The welding region is sometimes protected by some type of inert or semi-inert gas, known as a shielding gas, and filler material is sometimes used as well.

4) Power supplies

To supply the electrical energy necessary for arc welding processes, a number of different power supplies can be used. The most common welding power supplies are constant current power supplies and constant voltage power supplies. In arc welding, the length of the arc is directly related to the voltage, and the amount of heat input is related to the current.

Constant current power supplies are most often used for manual welding processes such as gas tungsten arc welding and shielded metal arc welding, because they maintain a relatively constant current even as the voltage varies. This is important because in manual welding, it can be difficult to hold the electrode perfectly steady, and as a result, the arc length and thus voltage tend to fluctuate.

Constant voltage power supplies hold the voltage constant and vary the current, and as a result, are most often used for automated welding processes such as gas metal arc welding, flux cored arc welding, and submerged arc welding. In these processes, arc length is kept constant, since any fluctuation in the distance between the wire and the base material is quickly rectified by a large change in current.

For example, if the wire and the base material get too close, the current will rapidly increase, which in turn causes the heat to increase and the tip of the wire to melt, returning it to its original separation distance.

The type of current used in arc welding also plays an important role in welding. Consumable electrode processes such as shielded metal arc welding and gas metal arc welding generally use direct current, but the electrode can be charged either positively or negatively. In welding, the positively charged anode will have a greater heat concentration, and as a result, changing the polarity of the electrode has an impact on weld properties. If the electrode is positively charged, the base metal will be hotter, increasing weld penetration and welding speed. Alternatively, a negatively charged electrode results in more shallow welds.

Non-consumable electrode processes, such as gas tungsten arc welding, can use either type of direct current, as well as alternating current. However, with direct current, because the electrode only creates the arc and does not provide filler material, a positively charged electrode causes shallow welds, while a negatively charged electrode makes deeper welds.[14] Alternating current rapidly moves between these two, resulting in medium-penetration welds. One disadvantage of AC, the fact that the arc must be re-ignited after every zero crossing, has been addressed with the invention of special power units that produce a square wave pattern instead of the normal sine wave, making rapid zero crossings possible and minimizing the effects of the problem.[15]

Processes

- Shielded metal arc welding

One of the most common types of arc welding is shielded metal arc welding (SMAW), which is also known as manual metal arc welding (MMA) or stick welding. Electric current is used to strike an arc between the base material and consumable electrode rod, which is made of steel and is covered with a flux that protects the weld area from oxidation and contamination by producing CO₂ gas during the welding process. The electrode core itself acts as filler material, making a separate filler unnecessary.

The process is versatile and can be performed with relatively inexpensive equipment, making it well suited to shop jobs and field work.[16] An operator can become reasonably proficient with a modest amount of training and can achieve mastery with experience. Weld times are rather slow, since the consumable electrodes must be frequently replaced and because slag, the residue from the flux, must be chipped away after welding.[17] Furthermore, the process is generally limited to welding ferrous materials, though special electrodes have made possible the welding of cast iron, nickel, aluminium, copper, and other metals. Inexperienced operators may find it difficult to make good out-of-position welds with this process.

- Gas metal arc welding

Gas metal arc welding (GMAW), also known as metal inert gas or MIG welding, is a semi-automatic or automatic process that uses a continuous wire feed as an electrode and an inert or semi-inert gas mixture to protect the weld from contamination. As with SMAW, reasonable operator proficiency

can be achieved with modest training. Since the electrode is continuous, welding speeds are greater for GMAW than for SMAW. Also, the smaller arc size compared to the shielded metal arc welding process makes it easier to make out-of-position welds (e.g., overhead joints, as would be welded underneath a structure).

The equipment required to perform the GMAW process is more complex and expensive than that required for SMAW, and requires a more complex setup procedure. Therefore, GMAW is less portable and versatile, and due to the use of a separate shielding gas, is not particularly suitable for outdoor work. However, owing to the higher average rate at which welds can be completed, GMAW is well suited to production welding. The process can be applied to a wide variety of metals, both ferrous and non-ferrous.

- Flux-cored arc welding

A related process, flux-cored arc welding (FCAW), uses similar equipment but uses wire consisting of a steel electrode surrounding a powder fill material. This cored wire is more expensive than the standard solid wire and can generate fumes and/or slag, but it permits even higher welding speed and greater metal penetration.

- Gas tungsten arc welding/tungsten inert gas (TIG) welding

Gas tungsten arc welding (GTAW), also known as tungsten inert gas (TIG) welding, is an arc welding process that uses a non-consumable tungsten electrode to produce the weld. The weld area is protected from atmospheric contamination by a shielding gas (usually an inert gas such as argon), and a filler metal is normally used, though some welds, known as autogenously welds, do not require it.

A constant-current welding power supply produces energy, which is conducted across the arc through a column of highly ionized gas and metal vapours known as a plasma. Especially useful for welding thin materials, this method is characterized by a stable arc and high quality welds, but it requires significant operator skill and can only be accomplished at relatively low speeds.

TIG can be used on nearly all weldable metals, though it is most often applied to stainless steel and light metals. It is often used when quality welds are extremely important, such as in bicycle, aircraft and naval applications.

TIG is most commonly used to weld thin sections of stainless steel and light metals such as aluminium, magnesium, and copper alloys. The process grants the operator greater control over the weld than competing procedures such as shielded metal arc welding and gas metal arc welding, allowing for stronger, higher quality welds. However, TIG is comparatively more complex and difficult to master, and furthermore, it is significantly slower than most other welding techniques.

Because of its stable current, the method can be used on a wider range of material thicknesses than can the GTAW process, and furthermore, it is much faster. It can be applied to all of the same materials as GTAW except magnesium, and automated welding of stainless steel is one important

application of the process. A variation of the process is plasma cutting, an efficient steel cutting process.

- Submerged arc welding

Submerged arc welding (SAW) is a high-productivity welding method in which the arc is struck beneath a covering layer of flux. This increases arc quality, since contaminants in the atmosphere are blocked by the flux. The slag that forms on the weld generally comes off by itself, and combined with the use of a continuous wire feed, the weld deposition rate is high. Working conditions are much improved over other arc welding processes, since the flux hides the arc and almost no smoke is produced. The process is commonly used in industry, especially for large products and in the manufacture of welded pressure.

Development

After the discovery of the electric arc in 1800 by Humphrey Davy, arc welding developed slowly. C. L. Coffin had the idea of welding in an inert gas atmosphere in 1890, but even in the early 1900s, welding non-ferrous materials like aluminium and magnesium remained difficult, because these metals reacted rapidly with the air, resulting in porous and dross-filled welds.[2] Processes using flux-covered electrodes did not satisfactorily protect the weld area from contamination. To solve the problem, bottled inert gases were used in the beginning of the 1930s. A few years later, a direct current, gas-shielded welding process emerged in the aircraft industry for welding magnesium.

This process was perfected in 1941, and became known as heliarc or tungsten inert gas welding, because it utilized a tungsten electrode and helium as a shielding gas. Initially, the electrode overheated quickly, and in spite of tungsten's high melting temperature, particles of tungsten were transferred to the weld. To address this problem, the polarity of the electrode was changed from positive to negative, but this made it unsuitable for welding many non-ferrous materials. Finally, the development of alternating current units made it possible to stabilize the arc and produce high quality aluminum and magnesium welds.]

Developments continued during the following decades. Linde Air Products developed water-cooled torches that helped to prevent overheating when welding with high currents. Additionally, during the 1950s, as the process continued to gain popularity, some users turned to carbon dioxide as an alternative to the more expensive welding atmospheres consisting of argon and helium. However, this proved unacceptable for welding aluminium and magnesium because it reduced weld quality, and as a result, it is rarely used with GTAW today.

In 1953, a new process based on GTAW was developed, called plasma arc welding. It affords greater control and improves weld quality by using a nozzle to focus the electric arc, but is largely limited to automated systems, whereas GTAW remains primarily a manual, hand-held method.

Development within the GTAW process has continued as well, and today a number of variations exist. Among the most popular are the pulsed-current, manual programmed, hot-wire, dabber, and increased penetration GTAW methods.

Operation

Manual gas tungsten arc welding is often considered the most difficult of all the welding processes commonly used in industry. Because the welder must maintain a short arc length, great care and skill are required to prevent contact between the electrode and the work piece. Unlike most other welding processes, GTAW normally requires two hands, since most applications require that the welder manually feed a filler metal into the weld area with one hand while manipulating the welding torch in the other. However, some welds combining thin materials (known as autogenously or fusion welds) can be accomplished without filler metal; most notably edge, corner, and butt joints.

To strike the welding arc, a high frequency generator provides a path for the welding current through the shielding gas, allowing the arc to be struck when the separation between the electrode and the work piece is approximately 1.5–3 mm (0.06–0.12 in). Bringing the two into contact in a "touch start" ("scratch start") also serves to strike an arc. This technique can cause contamination of the weld and electrode. Once the arc is struck, the welder moves the torch in a small circle to create a welding pool, the size of which depends on the size of the electrode and the amount of current. While maintaining a constant separation between the electrode and the work piece, the operator then moves the torch back slightly and tilts it backward about 10–15 degrees from vertical. Filler metal is added manually to the front end of the weld pool as it is needed.

Welders often develop a technique of rapidly alternating between moving the torch forward (to advance the weld pool) and adding filler metal. The filler rod is withdrawn from the weld pool each time the electrode advances, but it is never removed from the gas shield to prevent oxidation of its surface and contamination of the weld. Filler rods composed of metals with low melting temperature, such as aluminium, require that the operator maintain some distance from the arc while staying inside the gas shield. If held too close to the arc, the filler rod can melt before it makes contact with the weld puddle. As the weld nears completion, the arc current is often gradually reduced to allow the weld crater to solidify and prevent the formation of crater cracks at the end of the weld.

GTAW can use a positive direct current, negative direct current or an alternating current, depending on the power supply set up. A negative direct current from the electrode causes a stream of electrons to collide with the surface, generating large amounts of heat at the weld region. This creates a deep, narrow weld. In the opposite process where the electrode is connected to the positive power supply terminal, positively charged ions flow from the tip of the electrode instead, so the heating action of the electrons is mostly on the electrode.

This mode also helps to remove oxide layers from the surface of the region to be welded, which is good for metals such as aluminium or magnesium. A shallow, wide weld is produced from this mode, with minimum heat input. Alternating current gives a combination of negative and positive modes, giving a cleaning effect and imparts a lot of heat as well.

Products in the list

The Esab two products in the survey both use the same sort of power supply. However the TIG welder is a much more sophisticated type of process and finds applications in the aircraft industry. It also embodies more complex control features and is used where high accuracy is required. TIG welding also uses a higher frequency compared to the Origo Arc. The Origo Arc machine is for MMA (manual metal arc) welding. General product details are set out below.

- Origo™ Arc 410c/650c/810c

The Origo™ Arc 410c, 650c and 810c are sturdy and robust switching converter (chopper) power sources intended for manual heavy duty MMA welding with coated electrodes, TIG welding and Air Carbon Arc Gouging. Well proven technology with a high level of reliability, outstanding weld performance, a strong metal housing and large wheels for ease of handling, make this range of machines ideal for use in the toughest of industrial environments.

- Origo™ Tig 3000i, TA23
 - The sturdy design makes the Origo™ Tig 3000i suitable for welding anywhere.
 - It is easy to use and reliable in operation.
 - Sturdy and robust design - the machine can be brought anywhere where welding needs to be done.
 - It is easy to use. Basic functionality will produce a TIG weld with high productivity.
 - For MMA welding - handles all electrodes up to 5 mm.
 - Specification includes: 5 m of mains cable, 2 m. of gas hose with 2 hose clamps, return cable 4.5 m.

- 5) Half-sheet orbital sander

This product is relatively straightforward to specify. It is in widespread commercial use and the specification is simple. It is however an item of low unit value.

DeWalt is a major multi-national manufacturer of products of this type and they are distributed worldwide.

Product description

A sander is a power tool used to smooth wood and automotive or wood finishes. Sanders have a means to attach the sandpaper that does the work. Woodworking sanders are usually operated by electrical power while the ones used in auto-body repair work on compressed air. There are many different types of these machines.

Woodworking sanders include:

- Orbital sander: a hand-held sander that vibrates in small circles, or "orbits." Mostly used for fine sanding or where a large amount of removal is not needed. The term "half sheet" defines the size of the sander
- Straight-line sander: a sander that vibrates in a straight line, instead of in circles. Good for places where hand sanding is tedious. Mostly they are air-powered, but there are a select few that are electric.

- Belt sander (hand-held or stationary)
- Disc sander: a disc sander is most commonly known as a stationary machine that consists of replaceable circular shaped sandpaper attached to a wheel being electrically spun around. The usually wooden work piece, (although other materials can be shaped and worked on such as plastics and other soft materials, even aluminium), is sat on a front bench that can be adjusted to various angles. It can be used for rough or fine sanding depending on the sanding grit used.
- Oscillating spindle sander: A sander mounted on a rotating spindle, but also moves up and down at the same time. Good for sanding curves and contours that would be difficult with hand sanding or orbital sanding.
- Random orbital sander
- Detail Sander: A hand-held sander that uses a vibrating head with a triangular piece of sandpaper attached. Used for sanding corners and very tight spaces. Also known as "Mouse" or "corner" sanders.
- Stroke sander: large production sander that uses a hand-operated platen on a standard sanding belt to apply pressure. For large projects like tabletops, doors, and cabinets.
- Drum sander: a large sander that uses a rotating sanding drum. Like a planer, the operator adjusts feed rollers to send the wood inside the machine. The sander smooths it and sends it out the other side. Good for sanding large surfaces for finishing.
- Wide-belt sander: a large sander that is similar in concept to a planer, but is much larger, uses a large sanding belt head instead of a knife cutter head, and requires air from a separate source to tension the belt. For rough sanding large surfaces or finishing. Found mainly in furniture shops or cabinet production factories.

DeWalt

The principal features of the DeWalt model D26420 include the following:

- Variable speed control 12,000-22,000 orbits per minute
- High performance motor with aluminum bearing seats for continuous use and a long life
- Small orbit size for a smooth finish
- Efficient dust collection using integrated dust bag or external dust extractor for a better sanding performance and sheet life
- Sturdy, easy action abrasive sheet clips that securely hold the sheet and are also inset to avoid contact with adjacent surfaces
- Optional hook and loop base pad included to enable fast sanding sheet changes

Two points should be taken into consideration when specifying this item:

- These products have a relatively short product life and models change quite frequently; it is therefore important to check that the item selected is current. This situation may vary from country to country.
- They are frequently sold via wholesalers and are often discounted. It may therefore be a good idea to shop around to obtain the best prices.

6) Construction equipment

Specifying the earthmoving machinery group should be straightforward. The industry adopted strategies for global standards under ISO TC127 over 30 years ago and has built a standards portfolio exceeding 100 global standards. Construction machinery is a generic name for a large segment of infrastructure creation.

Websites

www.ingersol-rand.com (earthmoving)
www.volvo.com (earthmoving)
www.komatsu.com (earthmoving)
www.kawasaki.com (earthmoving)
www.jcb.com (earthmoving, agriculture, forklifts)
www.liebherr.com (earthmoving)
www.linkbelt.com (earthmoving)
www.mustang.com (earthmoving)
www.gehl.com (earthmoving)
www.ditchwitch.com (earthmoving)
www.vermeer.com (earthmoving)

7) Machinery for food, beverage processing

Machinery for food, beverage and tobacco processing is more difficult to compare because the individual machines are organized into a system using several machines in a continuous operation.

8) Machinery for textile, etc. production

Production of machinery for textile, apparel and leather working has been concentrated in low-cost labour markets. The textile and apparel machinery in North America is out-dated, due to the shift to production sites around the globe. The machinery has often been sold, moved offshore, and modified. It is a global industry dominated by Asia and the comparison will best be accomplished in that region.

- Sewing machines

Sewing machines and other machines that make raw cloth from thread are measurable. Some regions will find this not relevant as this manufacturing process has migrated to low-wage regions. Sewing machines can be commercial or domestic. The performance of either type is measured in the same manner. Technology of domestic units is equal to or exceeds commercial units. Domestic units are now available in software-driven versions that permit the user to design original creations.

Textile machinery accounts for the largest component of the products in this BH but is increasingly faced with difficulties owing to the decline of the textile manufacturing industry in most European countries.

This not only makes the machinery difficult to find but also means that the items are becoming increasingly less representative.

However at the moment there is sufficient of an industry remaining to warrant the retention of these products. There is a small making-up business at the upper end of the markets in most countries while there is also a repairing and alteration sector.

For the purposes of this research they have been treated as a group as it is not realistic to deal with them individually.

Product description

Although they have not performed badly in the European surveys, these machines are very difficult to specify. This is principally because they exist in countless different versions, with relatively minor differences in specifications depending on the precise nature of the operation they are intended to perform.

For example the Yamato range of machinery, which is designed primarily but not exclusively for working knitted fabrics (i.e. any fabrics with stretch), comprises about 40 different stand-alone items. However these 40 may then be divided into about 100 sub-classes and a further 100 sub-sub-classes, again depending on the operations they are required to perform.

And classification by type of stitch is also not very meaningful, as there are many stitch variants and certain operations can be carried out using different stitch types. For example Durkopp offer over 200 different lockstitch machines.

A further example concerns the Pfaff 335 cylinder arm machine. Initial options include for example, walking or non-walking foot type, and needle definitions but the final specification may contain nine digits (and any combination of these nine) but still be a Pfaff 335 machine.

Overall it can be said that for many machines the common overlap in specification is about 20% with variations in the remaining 80%. For example, a lockstitch can be used on fabric types from chiffon to canvas.

And there are complexities in operations as well: there are over 32 separate steps that are involved in the making up of a pair of trousers. A single type of machine may cover a significant number of these operations but each will require a slightly different configuration. For example the fly of a trouser requires nine different operations.

As an example a button sewing machine can be thought of as a piece of equipment for a specific operation. But again there are many variants:

- Will the button be sewn using chain stitch or lock stitch?
- Will shank buttons or flat buttons be used?
- Are the buttons two or four hole?
- Will they be sewn in a cross-stitch or square pattern?

And further, buttonholes for jackets, for example, require totally different operations from buttonholes for shirts.

Additional variables include needles, bobbins and different makes and applications for a given type of machine.

Scalloping machines similarly exist in many different variants: they can be cut and stitched in curves (the Italian Barratto machine) or may be stitched in a zigzag configuration to give fluted edges.

All in all these machines are very difficult if not impossible to specify in isolation. They must be related to a specific making-up process and to a specific type of garment, and a specific type of garment with a particular specification.

A further commercial complication concerns the German manufacturer Pfaff, who have recently gone into receivership. (This is the third time in about 10 years, but in the past they had managed to recover, although they were probably underfunded. On one occasion they were “rescued” by a Hong Kong businessman called James Ting whose methods were said to be very dubious.)

The reasons for their demise are not clear but it is said that their product range was out of date (most designs being at least 30 years old), they did not keep pace with technological developments and their products were over-priced.

The company has been bought by a Chinese Group. A new range of products will be launched using the Pfaff name but it will be manufactured in China. All manufacturing in Germany will cease.

The timing of these developments is not clear. However there is a large trade fair in Germany in April and it is likely that they will be launched there.

This development is generally in line with industry trends: manufacturing of standard machines is increasingly shifting to the Far East with only low volume high value activities remaining in Europe.

The existing product range may still be available but it is no longer being manufactured.

9) Dry cleaning machines

The inclusion of a dry cleaning machine to expand the products in this BH was fairly obvious. Equipment of this type is in widespread use and is found in all countries.

The object was to price equipment of the type used in dry cleaning retail outlets. The Italian make Renzacci has been selected.

Dry cleaning was invented in Paris in 1825. A Frenchman named M. Jolly knocked over a lamp spilling spirits of turpentine on the tablecloth. He noticed that when the oil evaporated the area of the cloth was cleaner. He then immersed the whole cloth in the turpentine and he was so pleased with the discovery that he then started a dry-cleaning business.

A wide range of solvents have been used for the process of dry-cleaning. However, the major solvent used worldwide continues to be Perchloroethylene, which is sometimes referred to as "Perc".

Dry-cleaning machinery has changed significantly since the early days of the industry. Most machines are now of the totally enclosed type. These have provided additional benefits in the form of improved workplace conditions and significantly reduced solvent consumption.

The difference between dry-cleaning and aqueous is that natural fibres do not distort in solvents unlike water.

In the recent past Italy has emerged as the leading supplier of dry-cleaning machinery with most of the major manufacturers located there. Other companies – all Italian - other than Renzacci – include:

- Firbimatic
- Union
- Realstar

Typical characteristics for dry cleaning machines are as follows:

- Electrically or steam heated
- Two tanks with self cleaning glasses
- New Videotron fully programmable microprocessor control
- Autocheck diagnostics control system operating in real time
- Computerised Inverter Drive controller allowing precise drum control and energy saving
- Stainless Steel drum with Multipoint extraction system
- Digital dry thermostat
- Graphical display of drying inlet & outlet, wash solvent and condenser temperatures
- Built in maintenance programmes
- WindJet Automatic drying sensor preventing over-drying and under-drying
- Mini-Micron self cleaning powder less solvent filter
- Carbon Tower colour bleed filter
- Global Wash back plate, spider and drum cleaning system
- Air Jet automatic air filter cleaning system
- Ice Care refrigerated solvent cooling system
- Ecowaste distillation waste pump out system
- Ecowater second water separator with active carbon filtration bed
- Ecovision Air filter and button trap covers are transparent; easy to inspect
- Quiet Scroll type high efficiency 2.6 kw refrigeration compressor with heat pump
- Still condenser fabricated in special guaranteed anticorrosive material
- Double thermodynamic water saving valves
- Automatic soap dosing pump system
- Double air filtration system
- Air fresh door opening suction into active carbon

- Button trap drying system
- Safety switches on button trap, air filter and still doors
- Built-in 0.35 kw air compressor
- Dual-energy stainless steel distillation unit with 145 litre capacity
- Automatic distillation waste drying system
- Recovery, button trap, loading door, drum and filter housings in stainless steel
- Environmentally Friendly complying and exceeding all current SED requirements
- Set-up ready to accept Multisorb consorber unit
- Solvent containment tray
- Utilising Perchloroethylene solvent

Explanation of the main features and benefits

- Videotron microprocessor control

This system is the most advanced available in today's market, offering full real time colour display including graphical display of all processes being carried out in the dry-cleaning machine and also where a fault or anomaly might be located on a schematic drawing of your dry-cleaning machine as well as a full explanation of the problem in the LCD display.

The computer can be set to control programmes automatically, which will take care of all soap injections at the correct time of the cycle and the correct quantity, as well as controlling the temperature of the solvent cooling system (Icecare), control of the drum rotation speeds (both washing and extraction), action of the drum (rotating or cradle rocking is infinitely adjustable) and the drying process (Rotodrying). There is also a facility to override times, rotations, speeds, temperatures whilst the computer programme is running should you require a standard programme but want to do something a bit different for that particular cycle.

In addition, the computer can automatically perform many maintenance tasks for you such as still drying, automatic sludge pumping from the still (Ecowaste), Filter cleaning (Mini-Micron Ecofilter), rear of the drum cleaning (Global Wash), automatic air filter cleaning (Air Jet) and even pipe washing.

The computer can also be set up to be able to remind users when important tasks need to be carried out for example when to clean the main filters (Mini-Micron Ecofilter.) In addition, programs are not only stored on the main computer but also on a USB Memory Key, which allows a back-up to be made as well as a useful tool for allowing Renzacci to add programs and send them to customers to upload onto their computers. Alternatively, programs can be modified by Renzacci and emailed for uploading by the client onto the Videotron using a USB MemoryKey.

The computer can also be controlled manually, so instead of it taking care of running the programs automatically, the user can have complete control over the wash processes, and in addition, also manually oversee soap injections, the temperature of the solvent cooling system during the wash cycle (Icecare), control of the drum speeds and agitation and the drying process (Rotodrying). All in

all, this computer is designed to make the operation of the dry-cleaning machine as simple as possible.

- Computerized Inverter Driver

This device controls the main motor for the drum with a precision not achieved by any other method, and this option is offered as standard. The Inverter can control the drum rotation to offer control over the action of the drum, allowing both aggressive and gentle washing (and anything in between) to be carried out.

The speeds of the wash cycle and extraction can be programmed into an individual programme or controlled manually when using the machine in manual mode. Delicate garments such as chiffons, wedding dresses, sequined garments and suchlike can be cleaned with far more certainty and control than ever before, leading to improved and consistent results.

The inverter also controls the spin cycle, “ramping up” the speed of the drum to full speed in a controlled and progressive manner. By gradually increasing spin speed, the finishing department will notice far less creasing and damage to delicate clothes and the finishing process will be faster. In addition, as there is far less strain to the dry-cleaning machine drive components, belt and bearing wear and tear is drastically reduced when compared to conventional contactor operated wash and spin cycles. A spin cycle which is the result of the control by an inverter also means that energy costs for running the machine are reduced, as the extraction phase prior to drying is far better and more efficient, leading to shorter drying times, and less crushing and balling of garments.

- Rotodrying

This is the name given to the complete drying system. The Progress dry-cleaning machine range features a far greater airflow volume and less restriction of the airflow due to the CAD/CAM design. This results in a faster and more even drying process, and coupled to the drying sensor, which is computer, controlled; your garments should be dried in a highly efficient manner.

In addition, this system has but two air filters, significantly reducing the “linting” of the garments, which is a time consuming and wasteful labour resource as the finishing department has to de-lint the garments prior to packaging or pressing. The two air filters of which one is a fine gauge stainless steel mesh coupled to a foam filter and the other being a large foam filter, are also cleaned by simply pulling out the filters and brushing them – no hoovering of bags or washing lint screens.

- Mini-Micron Ecofilter

This filter system requires no filter powder and is a highly efficient series of 18 disks, which have holes in to a diameter of 13 microns. These disks filter out all solid impurities in the solvent returning from the wash, and therefore leave the solvent clean. Maintenance free, these filters are automatically cleaned by simply selecting the Filter Cleaning programme from the computer. A reminder can also be configured into the computer indicating when the filters should be cleaned.

- Carbon Tower color bleed filter

Supplied as standard, the colour bleed filter contains an active carbon core, which will help to reduce the effects of a colour run. It absorbs colour from the solvent, helping to leave the solvent pure and ready for another process. This filter can be selected on or off; depending upon whether the operator believes there is going to be a colour run risk load.

- Global Wash back plate, spider and drum cleaning system

This system has been designed to alleviate the problem of the spider and drum being clogged up with lint, which over time compresses to form a hard mass. This eventually results in odours being produced from the drum, which are virtually impossible to remove. Using this system, the operator can select an automatic program which will clean the back of the drum with a high pressure jet of solvent, removing any lint build up and depositing this in the button trap for easy removal.

- Air Jet automatic air-filter cleaning system

This system is supplied as standard, and can be configured to clean the primary air filter at the beginning of the wash cycle. Any lint build up on this filter is then deposited in the button trap for easy removal by the operator at the end of the cycle.

- Ice Care refrigerated solvent cooling system

Supplied as standard and utilizing the very powerful scroll type refrigeration compressor, the computer continually monitors the temperature of the solvent that is actually being used in the wash cycle. This system is preferential to cheaper methods such as cooling the tanks with water coils as no energy or water is wasted.

It can be operated either in the automatic modes where the required temperature of the solvent is stored within the program (but can be over-ridden if required) or manual modes to the temperature the operator selects. This is particularly useful for delicate loads such as sequined garments or garments containing beading, which often melt in higher temperatures of solvent.

- EcoWaste distillation waste pump-out system

This system, which is standard on both the two and three tank Progress dry-cleaning machines, allows the operator to minimize contact with the waste that is produced by the dry-cleaning machine in the distillation system. The Renzacci Ecowaste system utilizes a pump to continually clean the inside of the distillation unit, and coupled to the clever design of the distillation unit, which funnels all waste to the front of the distillation unit, allows for a far more efficient distillation process, as well as reducing energy costs.

Renzacci has designed a system where the Ecowaste pump is hermetically connected to a sludge barrel. The system will alert the operator to when the barrel is nearly full and needs changing, and then when the barrel is full, without the operator opening the sludge container to inspect the level of the waste visually. Utilising the Ecowaste system, the operator can reduce the amount of times the distillation unit has to be physically cleaned by 70%.

- EcoWater second water separator with active carbon

This second water separator is recommended in order to comply with the Solvent Emissions Directive Guidance Notes 6/46(04) and is fitted after the primary water separator. The wastewater flows over a bed of carbon ensuring that there is virtually no Perchloroethylene solvent left in the contact water.

- Quiet Scroll type high efficiency refrigeration compressor with heat pump

This new and high-grade refrigeration compressor is quite in operation and far superior to the cheaper and less efficient systems employed in other makes of machine. Renzacci purposely has used this form of compressor to allow the operation of the Ice Care® system, with no further requirement for an additional compressor. An added benefit of this unit is that it is far more reliable and quieter in operation.

- Double water saving valves

Used in both the refrigeration and distillation system, these valves reduce the consumption of water by about 30%. They work by continually monitoring the water requirements of the refrigeration and the distillation units, and allow only the required water to flow through the machine, no more, no less.

- Automatic soap pumping system

This system allows the computer to introduce the soap into the wash cycle at the precise time required at exactly the correct dose. This reduced wastage, and improves the quality of the wash. In addition, the operator has the option to also dose the wash if they are operating the machine manually. This system is supplied as standard.

- Door opening suction into active carbon

Any solvent vapour (which is minimal and below required levels anyhow) left in the drum at the end of the cycle are removed through the back of the drum through an active carbon hopper, which strips the vapours from the air. This means that there should be a significant reduction in solvent ppm.

- Button-trap drying system

This system dries the button trap at the end of the cycle allowing the safe removal of lint from the button trap cage.

- Safety switches on button trap, air filter and still doors

The switches prevent the operation of the dry-cleaning machine if any of the above access ports are left open and the machine is attempted to be started. A visual indication is displayed on the dry-cleaning machine schematic panel as well as text in the LCD display alerting the operator to which of the access doors has been left open.

- Built-in air compressor

An air compressor which caters for the pneumatic requirements of the dry-cleaning machine is supplied as standard.

- EcoVision Air filter and button trap covers are transparent

Operators do not have to physically open the doors to the button trap or air filter to see if they are blocked. All they have to do is to look through the thick glass covers to see if the air-filter or button-trap needs cleaning. This reduces the exposure to solvent vapour and allows the filters to be cleaned at the right time, allowing you to have a more efficient machine.

Quality of construction: Renzacci only uses the finest quality materials and the latest manufacturing techniques. The machine has been designed by highly skilled engineers to allow easy access to all components and therefore to reduce servicing times. High-grade stainless steel is generously used throughout the dry-cleaning machine and the machine is catered to cope with the most demanding of workloads. All components used are tried and tested, and of the very best manufacturers.

Other equipment, which is also widely used in dry-cleaning shops, could also be considered, is the following:

- Finishing cabinet with boiler
- Vacuum/Blowing/Steaming Table
- Cold Spotting Table
- Polybagger
- Air Compressor
- Drum Connection Kit
- Blow-down Vessel

Other points are as follows:

- The machinery and installation should comply with the Solvent Emissions Directive, Guidance Notes 6(46)/04
- The machinery supplier should be a signatory of the SLEAT Code of Conduct, a scheme set up to protect levels of service and support
- Project implementation may be provided
- Training is a necessary component
- Other support can be provided (both mechanical and dry cleaning process)

Websites

www.bernina.com (sewing machines and sergers)

www.pfaff.com (sewing machines and sergers)

www.singer.com (sewing machines and sergers)

www.brother.com (sewing machines and sergers)

10) Plate making machine

A product of this type has been in the sample for many years. There are two pieces of equipment in the sample, both manufactured by the German company Heidelberg, which is the market leader.

The product has yielded good results: in the last survey of Machinery and Equipment Goods each item was priced by around 20 countries.

Some states however have problems in obtaining the co-operation of Heidelberg and are unable to provide prices. This gives rise to difficulties in meeting targets in this BH, as it contains three Heidelberg products.

Product description

Although well established in the sample, this area of printing and publishing is one in which there has been tremendous technological development with the increasing application of electronics and digital techniques.

It is therefore important to be aware of the latest developments and to be sure that current models are included as the product life spans tend to be relatively short.

For example the model Suprasetter A74, which was included in previous samples, has recently been superseded by the A75, which it is proposed to include in the survey.

The product is used for the production of plates, which can then be used for printing on an offset litho press.

Smaller print shops and businesses are increasingly investing in in-house "computer-to-plate" (CtP)-based production. The reasons for this are many. CtP offers exceptional process reliability, daylight operation and optimal imaging quality. Film copies become a thing of the past.

Businesses are using CtP to strengthen their market positions. The technology enables them to gain greater independence from suppliers and increase their flexibility towards customers. At the same time they can raise reliability levels for their entire production.

With the Suprasetter series Heidelberg has developed a new generation of units. They are attractive both for newcomers to thermal platesetter technology and seasoned CtP users looking to fully exploit the benefits of thermal plate production, including the small format sector

The Most Space-Saving and Successful CtP Platesetter of Its Class

One of the impressive points about the small and medium-format Suprasetter is how compact it is. Whilst the basic manual feed CtP has a very small footprint, a Suprasetter A52/A75 with auto plate loading system is by far the smallest platesetter in its class. The small footprint allows easy integration in most print shops - the ideal pre-condition for being able to invest in Computer-to-Plate (CtP) production. The entry version, which is fully equipped with the technology of a high-end machine, offers outstanding performance features.

The Suprasetter A52/A75 uses the same proven laser technology as all the other models in the Suprasetter series. Production reliability is ensured through the Intelligent Diode System (IDS). This means that if a diode fails, operation can continue. The laser systems developed exclusively by Heidelberg deliver reliable imaging quality.

Compact Full Automation for Small and Medium Formats

With an optional Auto Top Loader (ATL), (not included in the specification) a manual Suprasetter A52/A75 provides fully automated plate loading with slip-sheet removal. The ATL can be easily installed on the basic unit. The cassette integrated in the ATL holds between 50 and 100 plates depending on the plate thickness. Plate types and formats from 240 × 240 millimetres (9.45 x 9.45 inches) to 676 × 530 millimeters (26.61 × 20.87 inches) or 676 × 760 millimeters (26.61 × 29.92 inches) can be processed. The investment in an ATL pays off in no time due to mostly unattended operation.

11) Pin pad

Product description

The use of pin-pads to analyze pin numbers, to establish identity and authorize credit card payments is increasing and should be well understood.

The fact that the product did not perform well could have been due to the fact that the equipment selected was of the type that is connected to a cash register in some way. This pre-supposes that the pin-pad manufacturer has already formally linked the equipment so that it is recognized, there is an interface and the input accepted. Thus, for example, the manufacturer Thyron said that they have established connections to cash register manufacturers such as Micro Fidelio, Geller, Toshiba, and Uniwell etc.

A further consideration is the fact that the security levels are being constantly upgraded and the item currently on the list – while still available – are nearing the end of its life and most will be soon superseded.

It is therefore proposed to change the product and to adopt a stand-alone type of machine that is, for example, brought to the table in restaurants for processing credit card payments.

Following the input of the security details the unit is directly connected to the bank or credit card company (via a base docking cradle) for authorization and clearance. No cash registers are involved and the unit effectively functions independently.

This equipment can work either with GPRS, Wi-fi or as part of an IP network.

It is considered that it will be easier to price a stand-alone unit, in contrast to the pin-pad previously taken which was effectively integrated with the cash register. Another potential

advantage is that stand-alone units are often purchased individually (e.g. for a restaurant) whereas pin-pads tended to be bought in multiple quantities, e.g. by retail chains.

The product proposed is the Thyron MPT 500 GSM/GPRS Mobile Chip and PIN payment terminal. Thyron are a major manufacturer and the model is claimed to be representative.

This unit is the ideal choice for merchants who want to accept payment in a mobile environment. The MPT500 communicates to the banking network via the GSM and the GPRS network enabling payment to be accepted in any location where there is network coverage. Thyron's unrivalled relationship with the mobile network operators ensures that the MPT500 operates with optimal speed, reliability and transaction security.

Key features of the MPT500 include:

- A choice of mobile networks
- Optional Integrated Contactless Technology
- Optional Bluetooth interface for integration to a PDA
- Optional web-based transaction reporting
- Integrated secure PIN Entry Device (PED) - fully Chip & PIN certified
- 32bit ARM processor
- Smart battery technology
- Easy load printer
- Compact and lightweight design

III. BH 4: 1501141: ELECTRICAL AND OPTICAL EQUIPMENT

1) Computers and information equipment

This group of products is large and clearly one of increasing importance. But at the same time it is one that gives rise to particular difficulties. The principal problem arises because of the pace of technological change and development in the market.

In practice, this means that in many instances the models change between the time of the pre-survey and the main survey – causing obvious complications.

The question is not so much the definition of the items as it is with the software, it more the fact that the items do not last long in the marketplace.

Another factor is the many different item variants that exist; in particular the sometimes minor differences in specification that occur in different countries.

To some extent these problems will always be with us, but every effort should be made to minimise their impact.

Equivalent – rather than identical - specifications were found in many countries and all had to be included.

The provisional list proposed certain products and items. But then at the pre-survey results stage many variants were produced by countries. They may have found a certain model but there were small variations in the spec. This happened in many countries and of course there was no basis for accepting the variant from one country but rejecting it from another.

Thus the list of variants expanded greatly. There was no other possibility.

- Discussion of the problem

Looking at the final list for previous surveys there were clearly too many items. The policy should ideally be one of increasing the number of products but reducing the number of items.

Another aspect to avoid in a fast changing market is the addition of extra prices at the validation stage. This can adversely affect the comparison in a market such as computers. Prices should all be measured at the same time.

But we can take steps to minimize their impact to which will in turn facilitate the price measurement and facilitate comparison and improve the quality of the prices.

- International marketing policies

One of the factors that influence the ability to find comparable products internationally is the availability of the same items, with identical specifications, in different countries, together with the policies of the manufacturers regarding the naming and description of models and their related part numbers.

In order to shed some light on this subject discussions were held with those manufacturers whose products were represented in the previous sample regarding their international marketing policies.

*Some contrasting results were obtained

Dell and Apple said that the same products are basically available in all European countries as a matter of policy. (Of course there will be some minor differences such as keyboard layouts, etc.)

With these two manufacturers there are certain options that are selected at the time of purchase – but these options are the same in all countries. They can be specified on-line from the same website (with only language differences.) It should therefore be possible for countries to find comparable products.

For example with an iMac (all-in-one desktop) there are certain options regarding the size of the memory, the hard disk and the type of keyboard, mouse (e.g. connected or wireless.) These choices are made on-line and an immediate quote can be obtained.

The same is true for Dell: it is also the case that options are the same across countries and can be specified on-line and an immediate quote obtained.

Thus for these two makes it should be possible to obtain good international comparisons.

Apart from obvious differences such as language these manufacturers said that their websites are essentially the same in all European countries.

In stark contrast to the above, Toshiba (who only make laptops now) said that as a matter of policy there are differences in model specifications between almost every country. There is no attempt to market identical ranges in different countries. Rather the policy is to tailor the specifications to meet different national requirements, at least as they are perceived.

Acer said that the models are called the same in different countries and where appropriate the numbers are the same. However in some cases there may be minor variations in the specifications, in which case they will be assigned different part numbers.

HP said that almost the same ranges are marketed in all European countries except that there will be some minor differences in the specifications. For example printer cartridges in Germany are not compatible with those used in the UK. Therefore the printers themselves will be slightly modified to reflect this difference and part numbers will be country specific. As a hypothetical example, a printer model number 4000 might be called 4001 in France and 4002 in Germany. However, the basic specifications of the models will be the same in terms of characteristics and performance.

This argues for maintaining the strong presence of HP products, including computers and other equipment, in the list.

- Numbering

Following on from the above the manufacturers were also asked about their product and part numbering policies.

Although it is somewhat difficult to generalize, the consensus view was that there may be differences in numbering between countries, even when the product is the same.

Sometimes this difference may relate only to a code number or letter that denotes the country. In other cases - and as referred to above - there may be minor differences, for example the layout of the keyboard, for what are essentially the same products. Again in these instances the part numbers may vary between countries.

In the case of HP, the different printer cartridges used in different countries may mean that the numbering is slightly different.

In the past the view has been taken that to assign a part number to the product was to define it absolutely. It transpires that this is not the case and therefore that the interpretation of part numbers should be treated with caution.

- Stability of ranges

Having established those makes that are more likely to market the same model ranges across different countries and given the experience with the last survey, it would be advantageous to include makes that are more stable in terms of model changes and updates.

There does appear to be some variation in this respect: for example based on the results of previous surveys, the number of model variants for Toshiba was very large. In contrast the number of base models in the, say, Apple range seems to be rather less. The same also appears to be true for Dell.

It is therefore proposed to remove Toshiba from the list completely and to place more emphasis on Apple and Dell, both of whom have more stable product platforms.

2) Electrical machinery and apparatus

This heading is a diverse group of equipment and devices. Lighting is an electrical device that is measured by the five characteristics, with the performance characteristic measuring the lumens per unit of input electricity. Four categories were created under lighting, because each category has advantages and disadvantages.

Electric Motors and Generators are rotating equipment for utilizing electricity or generating it. It is not practical to compare all the possible variants of electric motors. Size and use provide measurement guidelines in terms of power density and cost for unit of power used /generated. Increasing cost per unit weight accompanied by diminished output is an indicator of longevity and reliability.

Websites:

www.leviton.com (switching devices)
www.squared.com (control and switching devices)
www.sylvania.com (controls, switching devices, lights)
www.siemens.com (controls, switching devices, lights, transformers, motors, medical devices)
www.westinghouse.com (controls switching devices, lights, motors)
www.basler.com (transformer, switching gear)
www.kirloskar.com (generators)
www.marathonelectric.com (generators)
www.onan.com (generators)
www.lightinguniverse.com (lighting)

3) Medical, precision instruments, etc

Medical devices are measured by the information they give for diagnosis or the control provided for medicine monitoring. Devices are also part of patient recovery monitoring vital signs 24/7.

Websites

www.ge.com (controls, switching devices, motors, generators, transformers, lights, medical devices)

IV. BH 6: 1501211: MOTOR VEHICLES, TRAILERS AND SEMI-TRAILERS

The vehicles in this heading are concentrated in the on-highway category. There is an optional ability to operate off-highway, when additional optional drive trains are included to provide all wheel propulsion.

Pick-up trucks are popular in most regions with the exception of Europe. This form of transport vehicle provides a means for small contractors and landscapers to transport their tools of trade and small amounts of material. When equipped with a hitch, the user can increase the transport load by adding a trailer. They have also gained acceptance as towing vehicles for recreation such as boats and mobile homes (caravans in Europe).

Vans, cab/chassis, tractors, hauling-unit trailers and semi-trailers are universal throughout the regions. Small regional differences will be found to meet local traffic legislation and bridge load limits, but they will be recognizable and will function in the same manner.

Hauling units have been separated from the cab/chassis because the cab/chassis units are common until the hauling unit is added to create a purpose built hauler. Thus the value of the cab/chassis and hauling unit can be combined to make a value measurement of specific haulers such as fuel trucks, dump trucks, etc. In virtually all regions, a hauling unit is transferred to the new cab/chassis unit when the old cab/chassis unit is discarded. Now the total value of the unit is a combination of new and used content, yielding yet a different value for the hauler.

Tractors are often treated like capital goods and are remanufactured to restore performance rather than expending the additional 40 to 50 percent more for a new tractor. Trailers and semi-trailers often survive the tractor population by a wide margin because forwarding companies disconnect the tractor and hitch it to another trailer to maximize tractor utilization. The trailer sits until it is unloaded and reloaded, before being hitched to yet another tractor.

Vans are closed vehicles used primarily for inter-city deliveries. They differ greatly in scale, but not in function.

Websites

www.mack.com (cab/chassis, tractor)

www.paccar.com (truck/tractor brands-Kenworth, DAF, Leyland, Peterbilt, Foden)

www.navistar.com (cab/chassis, tractors)

www.gmc.com (cab/chassis, van, pickup)

www.isuzu.com (cab/chassis, tractor, van, pickup)

www.mitsubishi.com (cab/chassis, tractor, van, pickup)

www.ford.com (cab/chassis, van, pickup)
www.zil.com (cab/chassis, tractor)
www.tatra.com (cab chassis, tractor)
www.renault.com (cab/chassis, tractor)
www.iveco.com (cab/chassis, tractor)
www.freightliner.com (van, cab/chassis, tractor)
www.sterling.com (cab/chassis, tractor)
www.dodge.com (van, pickup)
www.scania.com (cab/chassis, tractor)
www.volvo.com (cab/chassis, tractor)
www.eastmfg.com (semi-trailer, trailer)
www.fontainespecialized.com (semi-trailers)
www.haletrailer.com (trailers)
www.mausersteel.com (semi-trailers)
www.vancotrailers.com (trailers)
www.wabashnational.com (trailers)
www.fruefauf.com (trailers)
www.nelsontrailers.com (trailers)
www.heil.com (truck hauling units)
www.johnsontruckbodies.com (truck hauling units)
www.knapheide.com (truck hauling units)

V. BH 7: 1501212: OTHER ROAD TRANSPORT

The vehicles in this heading comprise motorcycles, side cars, scooters, bicycles, invalid carriages, including their specialized parts and engines.

VI. BH 8: 1503111: OTHER PRODUCTS

1) Software

This important BH has always caused problems. The difficulties lay not in the ability to find the products – software is probably distributed internationally on a wider scale than any other product group in the survey – but in the number of versions available, the complex marketing arrangements and the licensing arrangements.

It is of course a field in which there is rapid technological development but the problem of constantly changing products is not as acute as with computers. In general the market situation is more stable.

Discussion of the problem

In theory price comparison for software should be relatively straightforward. The products are in widespread use, they are interchangeable and as mentioned above they do not change as frequently as other IT products.

However in practice this proposition is not so easy. For example for Microsoft Vista OS the following editions are available:

- Home Basic
- Home Premium
- Business
- Ultimate

Further for each of the above there is a Full and an Upgrade Version. In addition each is available in either Retail or OEM versions.

Also there are Service Pack versions and editions with or without Internet Explorer or Media Player, while yet another variable is the choice for all products between 32-bit and 64-bit versions.

Next there is the problem of licensing and the number of authorized users that are covered by any one purchase. Larger corporate buyers do not purchase one product at a time but many. This is known as Volume Licensing, for quantities of between 5 and 250, lasting two years and offering savings of up to 25%. It is an area of increasing complexity.

Other benefits of Volume Licensing include:

- Discount also offered on any additional purchases during the license period
- On-line storage of license information
- Installation of software centrally from a server, instead of adding it manually to each computer
- Software assurance: this is a comprehensive maintenance package, covering new versions of programs training use at home and technical support

In some countries there is also the problem of pirate products and the fact that the pricing of the original versions is not representative because the bulk of purchases are of pirate versions. Nobody buys the non-pirate products.

Finally the products on the list do not cover the whole market. They are all off-the-peg products. There is a significant segment of the market that is accounted for by software that is tailor-made for individual customers and therefore cannot be priced or compared.

It will therefore be seen that there are many combinations of the products available and they will all vary in price. It is therefore very easy for countries to price different versions unless the specifications are absolutely watertight.

Although some of the above comments apply only to Microsoft products they are indicative of the whole market of which Microsoft anyway has more than 90%.

The problem therefore relates to exactly which versions should be specified and the need to specify all the possible variables.

Product Specifications

- Accept any Service Pack
- The Service Pack issue is not very important as it does not impact on the price
- Include Internet Explorer and Media Player
- Accept only original versions that include Internet Explorer and Media Player

Take Retail versions, exclude OEM versions

- OEM versions cause some problems and in a way are a bit similar to pirated material. The rules for selling OEM versions seem to vary between different resellers in any given country. And it could also be argued that business customers differ from consumer purchasers in that they would not buy OEM versions. Therefore OEM versions should be totally excluded.

Take 32-bit version

- As the 32-bit versions are more popular than the 64-bit, the former should be specified.
 - Full versus upgrade versions

Commercial purchasers may well buy computers with operating systems installed. Therefore it is difficult to distinguish between full and upgrade versions as to which are the more representative. A solution to this problem would be to include both full and upgrade versions as this would clarify the situation and avoid any confusion.

- Licence quantity: normally one but consider each item separately

As discussed above, commercial purchasers do not normally buy one product or licence. But as it is not practical for the survey to consider Volume Licensing, normally the price for one user should be specified.

However, some products vary in the number of computers into which they can be installed, e.g. in some cases it is one but in others between one and three.

This parameter should be specified for each item and should state the conditions that apply.

- Web price

The term “web price” could be misleading. This is because some products can be downloaded directly from the manufacturers’ webpage without any media. If the media is specified, e.g. DVD then there is no ambiguity, but prices should be obtained from representative outlets, either a physical store or an internet shop.

- English versus national languages

A question was raised concerning the policy of Microsoft with respect to the prices charged for programs in the English languages and those for national languages. Some countries had said that the programs in national languages tended to be more expensive because the markets are smaller and there is no competition. Others said that the prices for national language version have tended to become cheaper. Whereas in the past the English language versions were in more widespread use this could have been because national language versions were not available.

In order to clarify the situation the matter was discussed with Microsoft. They said that there was no specific company policy with respect to the pricing of versions in different languages and that it is up to the resellers in the countries concerned. They have the flexibility to price the products according to market conditions and thus the relationship between the prices of English and national language versions can vary from country to country.

For the survey the conclusion is that it is still relevant to collect prices for both the English and national language versions.