

must be made of a complicated situation.

CONCLUSIONS

A number of conclusions can be drawn from this study. In general, abstracting journals in metallurgy cover patents in a cavalier fashion either because they ignore patents altogether or because they restrict their coverage to too few countries. *Chemical Abstracts* attempts to cover all the world's chemical patents and we have found that its coverage of the metallurgical patent literature is reasonable, but not as good as *World Patent Index* either in terms of coverage or timeliness. However, it does provide fuller abstracts than WPI. The more chemically oriented the subject, the better is the CA coverage, but its coverage of Belgian and Netherlands patents continues to be poor.

Finally, the policy of a number of abstracts journals to restrict their coverage to one country's patent seems unwise. Extension to coverage to only three countries would give excellent coverage of the world's patent literature without loss of timeliness and with a not too excessive translation burden.

ACKNOWLEDGMENT

We would like to thank Mr. Martin White and Ms. Bridget Hayes of Zinc/Lead Development Association for their assistance.

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Studies on the Metallurgical Patent Literature. II. Case Study on GALVALUME

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A study was made of the patent and nonpatent literature coverage of a new steel coating process known as GALVALUME. It was found that *Chemical Abstracts* and *Metal Finishing Abstracts* noted all seven patent families which discuss GALVALUME. Very little nonpatent literature has appeared on GALVALUME; the earliest such material appeared 6 years after the first patents and gave very little detailed information. The first detailed description in a journal appeared 10 years after the first patent. These results confirm Liebesny's views that patents give fuller and faster information on technological developments than do journal articles.

INTRODUCTION

In an earlier paper¹ we examined the coverage of patents by a number of metallurgical abstracting services. A number of these services do not cover patents at all and the editor of one (*Metals Abstracts*) commented in reply to our query² that "scientific abstracting services should not include patents. If the contents of a patent is of any scientific value, it will be the subject of a paper in a journal." This is a fairly widespread assumption, and we therefore decided to assess its validity with a case study on the major metallurgical development known as GALVALUME.

GALVALUME is the trade name for a hot-dip coating of an aluminum-zinc alloy which can be applied to steel. It was first patented by the Bethlehem Steel Corporation in 1966 and a number of foreign filings and subsidiary patent filings followed. GALVALUME was a completely new alloy coating for steel which combined the best properties of the traditional pure aluminum and zinc coatings. The nature of the invention meant that it came within the scope of abstracts journals in the fields of aluminum, zinc, metal finishing, and general metallurgy, and the coverage of GALVALUME patents by

these journals can be used to give an indication of their patents coverage.

METHODOLOGY

Our first task was to prepare a list of GALVALUME patents. We were fortunate in having access through the Zinc/Lead Development Association Library to a list of these patents current up to 1976. Those on this list were examined and their priority dates, references, and issue dates were noted. Searches through WPI (*World Patents Index*) and CA (*Chemical Abstracts*) equivalent indexes added a number of new equivalent patents. The patents were then organized into families, according to their priority dates. A number of Luxemburg and Italian patents included on the initial list were not found in WPI or CA, nor were they held by the Science Reference Library in London. This is because Luxemburg and Italy are not covered by WPI, and Luxemburg and nonnational Italian patents are not covered by CA. The families which they belonged to therefore are not known. These patents are listed in Table I, with two Canadian and one Swedish patent which had priority dates not corresponding

Table I. GALVALUME Patents of Unknown Family

country	number	issue date (where known)
CA	762885	11/7/67
	763386	18/7/67
IT	891552	
	891553	
	990172	
LUX	49050	
	50811	
	59298	
	59299	
	68194	
	68483	
SW	383762	22/3/75

with any others. None of this list was found in any of the abstracts journals later searched.

Table II lists the rest of the GALVALUME patents in family priority date order, and within this, in order of issue date. The first priority data was in 1964, and so a search for the inclusion of these patents by relevant abstracts journals began with 1965 volumes and went on to current issues.

The abstracts that were searched are listed in Table III. We did not search Derwent's *Central Patents Index* (CPI), Section M (metallurgy) because this source was not available to us at the time this research was carried out.

The search through *Montan* brought none of the patents to light and the following analyses, therefore, exclude this journal.

RESULTS

Before looking at the results, it is useful to examine what information each family of patents contains. Both families 1 and 2 describe the apparatus and process for the application of GALVALUME and the contents of the coating. The major difference in family 2 is the specifying of less than 0.6% lead (by weight of aluminum)—lead is not mentioned at all in family 1. The proportion of zinc and aluminum in the coating is also modified slightly. The remaining five groups of patents modify the basic process and contents of the coating and probably represent advances as further research was carried out. For example, in group 4 the critical lead content goes down from 0.6 to 0.2%; the rate of cooling is altered in group 6 to prevent flaking in an acidic environment, and the application of the coating to iron, with the addition of some iron to the alloy is described in group 7. To get a complete picture of how the process has been modified and refined, it is necessary to monitor at least one patent from each family, although the basic idea can be gleaned from the first groups of patents.

It should also be noted that *Bull Signal* annual patentee indexes were not available before 1969; that *Zn Bull Anal's* coverage of patents began only with the first issue of 1975; and that *Aluminum Abstracts* (the forerunner to *W Al Abs*) contained no patents until 1970.

Table IV summarizes the coverage of the patents by the journals. From it one can see that CA and *M Fin Abs* covered at least one patent from all seven families. Twice as many patents are covered by CA but searching *M Fin Abs* should reveal as much information on the development of GALVALUME. *BNF Abs*, *W Al Abs*, and *Zn Abs* all contain representatives of only four of the families. *BNF Abs* excludes the patents reducing the lead content from 0.6 to 0.2% and the method by which GALVALUME may be applied to iron. *W Al Abs* missed the first, basic patent although this was largely repeated in the second family of patents and also omitted those discussing variations in the proportions of different constituents. The first few patents were monitored by *Zn Abs* but families 4, 5, and 6, changing the lead content and increasing the cooling rate, were omitted.

Table II. Families of GALVALUME Patents

number	issue date	delay from 1st issue (days)
Family 1. Priority US 382595 on 14/7/64		
BE 666914	10/1/66	
BE 666915	10/1/66	
FR 1441918	2/5/66	114
IT 721208	15/11/66	310
US 3343930	26/9/67	624
GB 1115673	29/5/68	871
US 3393089	16/7/68	918
CA 802844	31/12/68	1086
DT 1521148	7/8/69	1275
SW 315460	29/9/69	1317
DT 1796353	28/4/77	4125
Family 2. Priority US 445201 on 2/4/65		
BE 678892	3/10/66	
FR 1473683	17/3/67	164
IT 763801	15/5/67	224
GB 1127408	18/9/68	714
DT 1521159	24/7/69	1024
SW 330300	9/11/70	1496
Family 3. Priority US 445202 on 2/4/65		
BE 678893	3/10/66	
FR 1473684	17/3/67	166
IT 763802	15/5/67	225
GB 1127407	18/9/68	715
DT 1521160	24/7/69	921
SW 330301	9/11/70	1497
JA 7625220	29/7/76	3586
Family 4. Priority US 753188 on 16/8/68		
DT 1941083	5/3/70	141
FR 2016954	15/5/70	212
ZA 6905751	2/10/70	351
CA 899175	2/5/72	929
BE 737468	15/10/69	
Family 5. Priority US 753262 on 16/8/68		
BE 737547	16/2/70	
DT 1941102	5/3/70	20
ZA 6905753	11/3/70	26
FR 2016958	15/5/70	90
CA 899729	9/5/72	813
Family 6. ^a Priority US 225407 on 11/2/72		
US 3782909	1/1/74	
BE 805509	28/3/74	88
ZA 7307469	28/8/74	239
SW 7312874	22/3/75	448
NL 7313431	2/4/75	456
DT 2349236	24/4/75	476
FR 2245777	25/4/75	477
JA 7559234	22/5/75	505
GB 1440328	23/6/76	905
Family 7. Priority US 278304 on 9/8/72		
BE 803307	7/2/74	
NL 7311038	12/2/74	5
DT 2339916	28/3/74	21
FR 2195699	8/3/74	30
ZA 7305088	29/5/74	111
JA 7484928	15/8/74	190
GB 1436213	19/5/76	834

^a It should be noted that the nonUS patents in this family were filed after the convention years. This explains the increased delay times.

CAN ABSTRACTS JOURNALS IGNORE THE PATENT LITERATURE?

The abstracts journals listed in Table III together with *Applied Science and Technology Index*, *British Technology Index* (BTI), and *Metals Abstracts* were searched for any nonpatent literature which describes GALVALUME in any way. Those journals with subject indexes were searched under the following headings or those closest to them:

Aluminum-zinc coatings

Table III. Abstracts Journals Searched for GALVALUME Patents

<i>BNF Abs</i> (<i>BNF Abstracts</i>)
<i>Bull Signal</i> (<i>Bulletin Signalétique</i> , 740-Metallux)
<i>Zn Bull Anal</i> (<i>Centre Technique du Zinc</i> , <i>Bulletin Analytique</i>)
<i>CA</i> (<i>Chemical Abstracts</i>)
<i>M Fin Abs</i> (<i>Metal Finishing Abstracts</i>)
<i>Montan</i> (<i>Montanwissen</i> , <i>Schaftliche Literatur-Berichte</i> , B)
<i>W Al Abs</i> (<i>World Aluminum Abstracts</i>)
<i>Zn Abs</i> (<i>Zinc Abstracts</i>)

Table IV. Coverage of GALVALUME Patents by Abstracts Journals^a

family	no. of patents	(a)	(b)	(c)	(d)	(e)	(f)	(g)
1	11	1		1	7	4		1
2	6	1			2	2	1	1
3	7	1			5	3		1
4	4		1		2	1		
5	5		1		2	1	2	
6	9	1	1	3	6	2	2	
7	7		1	1	6	2	1	1
Total	49	4	4	5	30	15	6	4

^a Key: (a) *BNF Abs*; (b) *Bull Signal*, not available before 1969; (c) *Zn Bull Anal*, patents covered from 1975 only; (d) *CA*; (e) *M Fin Abs*; (f) *W Al Abs*, Aluminum Abstracts pre-1970, no patents covered; (g) *Zn Abs*. Numbers in the table indicate the number from each family monitored by each journal.

Coating, steel

Coatings

aluminum-zinc

zinc-aluminum

GALVALUME

Hot-dip coating

aluminum-zinc

zinc-aluminum

of steel

Steel coating

aluminum-zinc

zinc-aluminum

hot-dip

Zinc-aluminum coatings

ZINCALUME

GALVALUME is manufactured under license in Australia by John Lysaght Ltd. and is marketed as ZINCALUME.

The inventors cited on the relevant patents were noted, and author searches were made under the company, inventors, and the authors of any relevant articles once found:

Bethlehem Steel Corporation

Borzillo, A. R. (inventor)

Cleary, H. J. (inventor)

Crowley, J. E. (inventor)

Harvey, G. J.

Horton, J. B. (inventor)

Irving, R. R.

Melloy, G. F. (inventor)

Full searches were carried out only for journals in English, but an author search was carried out in *Bull Signal* and a search through relevant subsections of *Zn Bull Anal* was made. Ten articles related to GALVALUME were retrieved by the subject search or under Bethlehem Steel. These are listed in Table V in order of publication. The first mention of GALVALUME found outside the patent literature appeared in June 1972, about 6 years after the first patent, and another five relevant articles were published by the end of 1973. By mid-1972 full production of GALVALUME-coated steel was about to begin, and these articles seem to relate to sales promotion by Bethlehem Steel. Articles (a), (b), and (e) were all very similar. They were written by a general science reporter who was not involved directly in the work of Beth-

Table V. Nonpatent References Relating to GALVALUME

- Irving, R. R., "A Third Coated Steel is Ready to Roll", *Iron Age*, Vol. 209 (22), 1972, pp 52-54.
- Irving, R. R., "A Third Coated Steel is Ready to Roll", *Southam's Metalwork*, Vol. 35 (7), 1972, pp 18-20.
- Bethlehem Steel Corporation, "Al-Zn Sheets Go beyond Galvanised", *Metal Progress*, Vol. 102 (1), 1972, pp 7-8.
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- Bethlehem Steel Corporation, "Galvalume-Alloy Coated Sheet Steel", pamphlet, 1973.
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- Harvey, G. J., "New Hot-dip Coating for the Protection of Steel Sheet", *Metals Australia*, Vol. 8 (8), 1976, pp 176-180.
- Anon, "Galvalume Shines at Intergalva", *Metal Bulletin*, No. 6133, 1976, p 37.

Table VI. Coverage of Nonpatent Literature on GALVALUME by Abstracts Journals^a

Article	Abstract Journal									
	1	2	3	4	5	6	7	8	9	10
(a)					✓	✓		✓		
(b)						✓		✓		
(c)	✓									✓
(d)	✓									
(e)						✓		✓		
(f)					✓		✓			
(g)			✓							
(h)			✓							
(j)						✓		✓		
(k)			✓							
Total	2	0	3	0	2	4	1	4	0	1

^a Key to articles is given in Table V. Key to journals: (1) *BNF Abs*, (2) *Bull Signal*, (3) *Zn Bull Anal*, (4) *CA*, (5) *M Fin Abs*, (6) *W Al Abs*, (7) *Zn Abs*, (8) *Metals Abstracts*, (9) *BTI*, (10) *Applied Science and Technology Index*.

lehem Steel. In each, the composition of GALVALUME is given simply as 55% aluminum, 45% zinc. No details of apparatus or the process are given nor are specific patents referred to, although it is mentioned that patents appeared in 1967 and 1968. Basically, these articles concentrate on properties and applications of the finished material. References (c) and (d) were written by Bethlehem Steel itself but, as with the three outlined above, production details are not given and there are no patent numbers given; (f) is a Bethlehem Steel Corporation pamphlet and, as with (c) and (d), its general tone is that of a sales promotion document.

The references published in 1972 and 1973, therefore, served to publicize the existence and potential of GALVALUME but repeated very little of the detailed information which had been available in patents in a number of languages for up to 6 years past.

The second group of publications begin in May 1976 and seem to come in response to the start of licensed production of GALVALUME (ZINCALUME in Australia). Articles (g), (h), and (k) were not readily available, but from their abstracts they seem to cover the same ground as the 1972 articles. The article by Harvey in September 1976, however, is the first publication which gives detailed technical specifications. It discusses the material's microstructure and how it has responded to corrosion tests and outlines the method of production. Some details, which had appeared in earlier patents, such as the temperature of the coating material were

omitted. References were given to US 3 343 930 and US 3 393 089 which are the two US patents belonging to family 1, the basic invention.

Table VI shows how these other publications were covered by the abstracts journals under study. No reference to GALVALUME was found in *Bull Signal*, CA, or BTI, but only an author search was made through *Bull Signal* and the commercial nature of many of the articles found elsewhere probably accounts for their absence from CA. BTI covers only British technical journals and all the references found were to US or Australian periodicals.

Zn Abs and *Applied Science and Technology Index* included only one of the references, while the two covered by *BNF Abs* were the same article in two different journals. Three relating to the development of ZINCALUME in Australia were monitored by *Zn Bull Anal*, and no one else, in August 1976. *W Al Abs* and *Metals Abstracts* covered the highest number of the references (four each) and were the only two so far to quote the detailed article by Harvey (j). *Metals Abstracts* included it only in June, 1977, so it is possible that other journals will include it in future issues.

The small number of references covered by each journal is probably due in part to the relatively obscure periodicals in which some of the articles were published, such as *Southam's Metalwork* and *Lysaght Brownbult Industries*. *W Al Abs* in August 1972 was the first to cite a journal article relating to GALVALUME. By August 1973 all the journals referring to any GALVALUME literature, apart from *Zn Bull Anal*, had mentioned GALVALUME. But this was 6 to 7 years after the appearance of the first relevant patents, and up to 1976, the articles referred to contained few technical details and they did not give the relevant patent numbers for anyone wanting to find out more about GALVALUME.

The assumption made by *Metals Abstracts* that all information contained in patents of importance will be repeated in journals articles has therefore, in this case, been shown to

be false. Using journals only, the existence of GALVALUME would have been realized 6 years after the first published patents were available and, without referring to the patents, details of the process by which it is formed and used would still not be known. These results also confirm those found by Liebesny³ that items appearing in the patent literature rarely also appear in the nonpatent literature.

CONCLUSIONS

That patents are valuable and often unique sources of information tends to be stated or rejected with little evidence to back it up. Thus, for example, when Liebesny stated⁴ that patents are frequently the only source of information, give more information than any other form of literature, and frequently give information much sooner than any other form of literature, he based this on his own subjective experiences rather than on hard evidence. We believe our results confirm Liebesny's views in one particular subject area, and we hope they have gone some way to convincing people who think that patents are not worthwhile sources that they need to reconsider their views.

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"The Merck Index": The Merits of Using Computers in Publishing[†]

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"The Merck Index", an internationally recognized encyclopedia of drugs, chemicals, and biologicals was produced by the traditional method for eight consecutive editions. Owing to the rapidly increasing volume of information and escalating costs of book production, it became desirable to design a computer-assisted production method for preparation of the recently published ninth edition. The method that was developed and used as well as the philosophy behind its use are described.

"The Merck Index", an encyclopedia of chemicals, drugs, and biologicals has been published periodically by Merck & Co. since 1889. In its original form Merck's Index was a 170-page alphabetical list of E. Merck products sold all over

the world. Through an evolutionary process and several successive editions, "The Merck Index" has developed from a company catalog into an authoritative, internationally recognized, 2000-page reference source with a circulation of about 150 000 copies per edition. It contains capsule descriptions (monographs) of about 10 000 chemicals, drugs, pesticides, and biologically active compounds, together with

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