CHALMERS

Database maintenance and development CPM phase III

Edited by
Sandra Häggström

IMI - Industrial Environmental Informatics
for
CPM - Centre for Environmental Assessment of Product and Material Systems
CHALMERS UNIVERSITY OF TECHNOLOGY
Göteborg, Sweden 2004

CPM Report 2004:12

Index

INTRODUCTION **1**
KC 2 TECHNICAL ADMINISTRATION OF SPINE@CPM **1**
Sub-project description 1
Results KC2 1
KC 3 DATA ADMINISTRATION OF SPINE@CPM **3**
Sub-project description 3
Results KC3 3
KC 4 TRANSLATION OF SPINE INTO ISO/TS 14048 ..... **6**
Sub-project description 6
Results KC4 6
EXTENSION OF KC5 PREPARATION OF FUTURE PROJECT THAT APPLIES CPM'S TOOLS AND METHODS TO SUPPORT THE SWEDISH EPD-SYSTEM **9**
Sub-project description 9
Results Extension of KC5 9
CONCLUSIONS **10**

Introduction

The database maintenance and development project, KC5, merges the three earlier projects

- KC2 Technical administration of SPINE@CPM,
- KC3 Data administration of SPINE@CPM
- KC4 Translation of SPINE into ISO/TS14048

The decision to merge the three projects was taken 30 November 2002 by the board of CPM. There are strong synergies between the projects and the total budget of the three projects was able to be decreased.

In addition to these three projects, an extension to KC5 Database maintenance and development was added during April 2004 to prepare a future project that applies CPM's tools and methods to support the Swedish Environmental Product Declaration (EPD) system.

Each sub-project is described below together with the results.

KC 2 Technical administration of SPINE@CPM

Sub-project description

Project runtime: 2001-12-01 – 2004-08-31

The project delivers stable access to the information systems where CPM results are stored, e.g. the SPINE@CPM[1] database and the WWLCAW[2] webtool.

Included in the project are:

- Administration of
    - web-sites
    - user authorities
    - backup
    - Internet search engine submission
    - Internet web-hosting
- Management of IT-environment
- Technical support to KC3 Data administration

Results KC2

The administration and development of the systems during the project runtime are described below.

[1] http://www.globalspine.com/
[2] http://workshop.imi.chalmers.se/

Availability and support

The technical administration proceeded stably, and the handover to Ulf Tidstrand in spring 2003 was accomplished without problems.

The level of availability has been constantly high. The web server systems have had no unplanned down-time during the period. Planned down-time has occurred outside office time to make as little impact as possible.

Installation support for SPINE@CPM Data Tool[3] has been given at five occasions.

Technological improvements

In April 2003, Ulf Tidstrand took over the administration and the systems were reinforced in terms of computer security and availability.

Short descriptions of technical improvements made in the project:

- The technical environment of SPINE@CPM has been tuned in to accommodate the new technical policies taken and to facilitate the technological shift towards Java-technology.
- A new Java Enterprise platform was successfully installed on the web servers and is now running in parallel with the old ASP based systems.
- Scalability was implemented for the new systems and system versions under development. This enables the systems to keep a high performance for both small and large groups.
- Bandwidth to the Internet has been increased to 100 Mbps which has lowered response latency time.
- The code in SPINE@CPM DataTool has been improved and a new version (v4.1) was released featuring some bug fixes.
- An updated Spider engine was released. Spider is a tool for peer-to-peer sharing of LCA data.
- A new version of the Spider Server was developed.

Security

The security of the systems has been successfully managed during the many virus attacks that have occurred during this period. The virus status has been continuously monitored and systems have been frequently updated.

The computer security is kept at a high level. Security and antivirus patches are continuously applied to the servers. One attempt from an outside hacker to take over one of the servers through a security flaw in a third party application was effectively discovered and stopped.

[3] Free software downloadable from http://www.globalspine.com/

KC 3 Data administration of SPINE@CPM

Sub-project description

Project runtime: 2001-12-01 – 2004-08-31

The project delivers stable access to the SPINE@CPM database. The project maintains the content in the SPINE@CPM information system, both life cycle inventory (LCI) and impact assessment (LCIA) data. Included with the maintenance are the tasks of CPM data review and administration, data distribution, and manual telephone and e-mail support. In addition, based on user-requirements and requests, the project also includes development of routines and methods for handling data and development of education of data suppliers and users.

CPM member companies contribute in the project by submitting data, testing applicability of the data and databases, and by reporting additional requirements.

Results KC3

Below is a compilation of the data administration tasks performed during the project runtime:

Review and publication of new data sets

During the project runtime, 84 new data sets have been reviewed and published in the SPINE@CPM database. At the end of CPM phase III (31 August 2004) the database contain 538 LCI data sets. 8 of these are transparent LCI flow charts, i.e. each one of the included processes are documented and publicised in the database.

Time period	**Number of data sets**	**Responsible for documentation**
020301-020531	16	Chalmers and Volvo
020601-020831	7	Chalmers
020901-021130	4	Thesis worker at SKF
021201-030228	38	Thesis workers at SKF and Lindab
030301-030531	17	Casco, Thesis workers at SKF and Akzo Nobel
040301-040531	2	Thesis worker at Akzo Nobel
Entire project runtime	*84*	

The reviewing has been performed by Karolina Flemström and Ann-Christin Pålsson, both at Industrial Environmental Informatics (IMI), Chalmers. In total, 13 persons have contributed with data sets, see Appendix A. A list of all publicised data sets during the project runtime can be found in Appendix B.

The SPINE@CPM database is found at: http://www.globalspine.com/

Distribution of data sets

Below is an overview of the distribution of data sets during CPM phase III. Further details about the distribution can be found in Appendix C.

SPINE@CPM

The total value of the data that has been distributed from SPINE@CPM is roughly 152 000 SEK, of which about 11 000 SEK (7 percent) have been paid in money. The other data has been distributed to CPM members or thesis workers. The thesis workers have paid either by supplying new datasets or by performing an equivalent task, such as an evaluation of SPINE@CPM as data source.

Time period	Amount of data sets	Customer
020301-020531	54	CPM members
"	42	Thesis workers
020601-020831	10	External customers
020901-021130	23	Thesis workers
021201-030228	1	External customers
030301-030531	4	CPM members
"	10	Thesis workers
"	7	External customers
030601-030831	39	CPM members
031201-040229	4	Thesis workers
040301-040531	9	Thesis workers
040601-040831	538	CPM members
Entire project runtime	*741*	

SPINE@by-pass

The SPINE@by-pass database contains 271 non-reviewed data sets. During the project runtime, data sets of a value of 15 000 SEK were distributed.

Two copies of the SPINE@by-pass database were distributed in 2002, one to Bombardier Transportation and one to a thesis student at the Royal Institute of Technology (KTH) in Stockholm.

One copy of SPINE@by-pass was sold to an external customer in 2004, giving CPM an income of 5 000 SEK.

Education

After request from the CPM companies a one-day course in SPINE@CPM data management was held on the 6th of November 2003. There were three participants; one employee at SAAB and two thesis-workers from Akzo Nobel. The course included LCI data documentation according to SPINE, description of data quality and the data management process at CPM as well as practical training in data documentation.

Education of thesis workers has also been performed at other occasions during the project runtime in order to enable them to document data sets in the SPINE format.

Other

The public-website for the CPM database was updated and restructured during fall 2003, to facilitate the understanding and use of the database.

Several external users have shown interest in using a larger amount of data sets from the SPINE@CPM database through some kind of co-operation. Discussions have been conducted about how such a co-operation could be designed.

There have been some inquiries from CPM companies which data CPM prefer to have in the SPINE@CPM database and discussions about this has been held.

Comparison with the previous CPM phase

	CPM phase II	**CPM phase III**
Data sets published in SPINE@CPM	260	84
Distributed data sets from SPINE@CPM	587	203
Value of the data sets in SEK	325 000	152 000
Amount paid in money	60 000	11 000
Data sets published in SPINE@by-pass	271	0
Distributed SPINE@by-pass databases	3	3
Value of the data sets in SEK	25 000	11 400
Amount paid in money	25 000[4]	5 000

[4] After what can be understood from the report from the previuos phase, CPM Report 2001:16.

KC 4 Translation of SPINE into ISO/TS 14048

Sub-project description

Project runtime: 2002-06-01 – 2003-12-31

When starting the standardisation of the data documentation format ISO/TS 14048 it was intended that CPM should exchange SPINE with the standardisation-result. This project aims at fulfilling that intention.

This project includes:

1. Creating a mapping table-report (technical report and scientific article) between SPINE and ISO/TS 14048
2. Changing user interfaces of web-pages from SPINE to ISO/TS 14048 and help files
3. Programming import and export for communication files based on ISO/TS 14048 and help files
4. Author new manuals

Results KC4

In the beginning of the project, Raul Carlson participated in standardisation work, related to the revision of ISO 14040. He attended a national meeting and an international workshop in Frankfurt where the revision was prepared.

Raul Carlson and Ann-Christin Pålsson prepared for the continuation of the translation work by manually translating a number of data sets from SPINE to ISO/TS 14048.

The practical translation work was then realised by Markus Erlandsson, Karolina Flemström and Ulf Tidstrand, with support by Raul Carlson and Ann-Christin Pålsson. The achievements are described in short below.

Automatic mapping from SPINE to ISO/TS 14048 data documentation format

The detailed mapping between SPINE and ISO/TS 14048 was developed and published in a report: “Data format mapping between SPINE and ISO/TS 14048”, CPM Report 2003:8

Based on this, an application for automatic mapping from SPINE to ISO/TS 14048 data documentation format has been completed. The other way around, mapping from ISO/TS 14048 data documentation format to SPINE, has was been prioritised due to limited resources in the project.

A web based mapping application was also developed, which t allows the user to upload data in XFR (SPINE) or XML (ISO/TS 14048) communication format, convert it to the other format and then view or download it. The user can also submit/fetch ISO/TS 14048 data in XML format to/from a database based on the new IMI 2003 integrated database model which includes the ISO/TS 14048 data documentation format as a subset. The mapping application was extensively tested before it was used for mapping data sets with beginning in December 2003.

Development of a new web portal for LCI data built upon the above mentioned database model

A new web portal for ISO/TS 14048 compatible applications has been built, called LCI@CPM. It includes the ISO/TS 14048 version of SPINE@CPM (see below) with more than 500 LCI data sets in ISO/TS 14048 format.

In the portal, a module for viewing and ordering LCI data has been developed. The security system of the portal allows both non-CPM and CPM members to use the same web-based utility but with different views and data access. ISO/TS 14048 data may be viewed and downloaded in XML, HTML and PDF formats. A module for submitting LCI data has also been implemented. The underlying database model has been continuously updated to meet new requirements.

The web-portal is available for public use at http://kakapo.imi.chalmers.se/lcicpm/. It has the following applications running:

- Login system
  A new security system has been installed. It may be easily integrated with future applications and features encrypted passwords, group management and handling of access levels.
- LCI data store
  A new e-commerce application has been developed which features ISO/TS 14048 data sets imported and mapped from SPINE@CPM. The data sets can be previewed and downloaded in HTML, PDF or XML file formats. CPM members may download the complete data sets without any restrictions.
- Mapping application
  Mapping between SPINE and ISO/TS 14048 is made with the mapping application. After mapping, the result can be immediately downloaded. Administrators may also import the result into the ISO/TS 14048 database.
- LCI data input application
  This application allows the user to enter new or edit old LCI data in the ISO/TS 14048 data documentation format.

Implementation of the ISO/TS 14048 data documentation format in the WWLCAW web application

An implementation of the ISO/TS 14048 data documentation format in the WWLCAW web application has been made and tested. The public version became available in September 2003. WWLCAW was complemented with:

- the ability to switch between SPINE and ISO/TS 14048 interfaces
- ISO/TS 14048 formatted reports in HTML format
- Help files and a “quick start guide” for work with work with ISO/TS 14048

The ISO/TS 14048 version of WWLCAW is available at http://workshop.imi.chalmers.se/.

Manuals and reports for data documentation using ISO/TS 14048

To support the practical work with data documentation using the ISO/TS 14048, two new manuals and a report has been written:

- "An interpretation of the CPM data quality requirements in terms of ISO/TS 14048 data documentation format" , 2003:4
  In the report the CPM data quality requirements expressed in the ISO/TS 14048. The report is based on CPM reports 1997:1 and 1999:9.
- "Introduction and guide to LCA data documentation using the CPM documentation criteria and the ISO/TS 14048 data documentation format", 2003:3
  Manual describing how to work practically work the CPM data documentation requirements using ISO/TS 14048. The manual is an adaptation and revision of CPM report 1999:1.
- "Quick guide when switching data documentation format from SPINE to ISO/TS 14048 data documentation format", 2003:5
  A guide to facilitate for users who are familiar with data documentation using the SPINE to switch to ISO/TS 14048

Dissemination

The ISO/TS 14048 version of WWLCAW is available at http://workshop.imi.chalmers.se/.

The web portal for ISO/TS 14048 formatted LCI data, LCI@CPM, is available at http://kakapo.imi.chalmers.se/lcicpm/.

Several reports and manuals have been published; see above.

On the 28th of April 2004, a meeting with the CPM planning group about ISO/TS 14048 was held. The results from KC4 in terms of tools, reports etc were presented followed by very fruitful discussions regarding future strategies. The CPM planning group was very positive to the standardization work aiming at making ISO/TS 14048 data documentation format an international standard and they also wanted to start using this format at the companies.

Extension of KC5 Preparation of future project that applies CPM's tools and methods to support the Swedish EPD-system

Sub-project description

Project runtime: 2004-04-01 – 2004-08-31

The project aims at creating an accepted plan for a future project where CPM's tools and methods for data management are used to support the Swedish EPD system, and establish an organization for this future project so that it can be started in autumn 2004.

The scientific approach of this project is to put together some of the inventive tools and methods developed within CPM in an innovative way into a technical platform for a future EPD system. The cornerstone of the technical platform will be a central server located at CPM. This server contains a database with a data format which is implementing ISO/TS 14048. The central server will not only have the role as a central storage of data in the EPD system, because the data owners are generally not willing to store their data on a central server. The data will instead be stored in a distributed system, where data is shared in a network over internet. The main role for the central CPM server will be to manage nomenclatures and access restrictions for different user groups.

Results Extension of KC5

A pre-study of existing stand-alone tools for editing of xml-files in a user-friendly way, has been performed. The data documentation tool "Authentic" was selected as the most suitable tool for the project's purposes.

The current xml-format for communication of data compatible with ISO/TS 14048 has been reviewed, and an xml-schema has been created. An extension of the communication format has been created with fields for impact assessment data and accomplishment of other changes to comply with future restriction from Product Specific Requirements (PSR).

The development of a tool that makes it possible to configure templates for Authentic has been started. The tool shall be used by PSR groups to modify the user-interface of Authentic, without modifying the underlying common communication format.

A master's thesis in distributed systems with the goal to enable sharing of data over internet in a secure and user-friendly way, has been created. The students Peter Wigren and Muhamed Mostafa were selected and started their work on the 2nd of June 2004. The students have been supervised by Markus Erlandsson and Ulf Tidstrand.

Discussions with the possible future project partners IVL and CIT has been held. Discussions with possible financiers have been held, so far without success.

Conclusions

KC2

The technical administration was stable during the project runtime. The level of availability has been constantly high and the security of the systems has been successfully managed. A great deal of technical improvements was also made.

KC3

The data administration was stable during the project. 84 new data sets have been reviewed and published in the SPINE@CPM database during the project runtime. The database does now contain 538 LCI data sets. 203 data sets have been distributed to CPM members, thesis workers and external customers. The total value of the data that has been distributed from SPINE@CPM is roughly 152 000 SEK. The amount of data sets published and distributed was less compared to the previous CPM phase.

KC4

SPINE tools and manual has been successfully translated to the ISO/TS 14048 format. The WWLCAW web-based application is now available with ISO/TS 14048 format. A new web portal called LCI@CPM has been constructed for management of ISO/TS 14048 data sets. It provides the same features as the SPINE@CPM web portal, i.e. viewing and ordering LCI data and downloading of data sets in XML, HTML and PDF format. In addition it provides the possibility of entering and editing of LCI data in the ISO/TS 14048 format and a mapping application to convert data sets from SPINE to ISO/TS 14048 format. In the web portal is also implemented a security system for group management and handling of access levels.

Reports and manuals have also been published to support the practical work with data documentation using ISO/TS 14048, and the technical mapping between SPINE and ISO/TS 14048.

Extension of KC5

The xml format is currently used for communication of data compatible with ISO/TS 14048. In this sub-project the format has been investigated to prepare for a future project where an EPD system will be created. The work includes creating an xml-schema, extending the format to make it comply with impact assessment and PSR and modifications of the data documentation tool Authentic. A master's thesis in distributed systems with the goal to enable sharing of data over internet in a secure and user-friendly way is also part of this sub-project.

Appendix A
Persons and organisations contributing with data

AB Volvo – 9 published activities

- Sofia Boström, Volvo Technological Development
- Caroline Sjöberg, Volvo Technological Development
- Sofia Haargaard, Volvo Technological Development

Casco Products – 3 published activities

- Birgit Nilsson, Casco Products

Akzo Nobel AB – 5 published activities

- Anastassia Manuilova, thesis worker Akzo Nobel Surface Chemistry
- José Canga Rodrigues, thesis worker Akzo Nobel Surface Chemistry
- Stefan Bengtsson, thesis worker Akzo Nobel Surface Chemistry

SKF Sverige AB – 49 published activities

- Sandra Häggström, thesis worker SKF Industrial Division
- Helene Berg, thesis worker SKF Industrial Division
- Jesper Nilsson, thesis worker SKF

Lindab Ventilation AB – 4 published activities

- Annika Olsson, thesis worker Lindab Ventilation AB

Chalmers – 14 published activities

- Karolina Flemström, IMI
- Maria Erixon, IMI

Appendix B
Compilation of activities published in the SPINE@CPM database during CPM Phase III

Data acquired in: Data exchange agreements

Data acquired within a M Sc. thesis performed at Chalmers and Akzo Nobel Surface Chemistry –2 activities

Data documented by: Stefan Bengtsson, MSc Thesis work, Chalmers University of Technology

Documentation reviewed by: Karolina Flemström, IMI, Chalmers University of Technology

Published: 2004-05-16

- Production of iron oxide yellow colorant containing Bermodol SPS 2532
- Production of iron oxide yellow colorant containing Berol 09

Data acquired within a M Sc. thesis performed at Chalmers and Akzo Nobel Surface Chemistry –3 activities

Data documented by: Anastassia Manuilova and José Canga Rodrigues, *MSc Thesis work, Chalmers University of Technology*

Documentation reviewed by: Karolina Flemström, IMI, Chalmers University of Technology

Published: 2003-05-28

1. Disposal of polyethylene to landfill, Sufficient
2. European average production of sodium carbonate (Solvay process) , Sufficient
3. Plastic waste incineration, Sufficient

Data on different types of adhesives and hardeners produced by Casco Products – 3 activities

Data documented by: Birgit Nilsson, Casco Products

Documentation reviewed by: Karolina Flemström, IMI, Chalmers University of Technology

Published: 2003-05-28

1. Production of Melamine-Urea-Formaldehyde resin 1242 (MUF 1242), Wood adhesive, Acceptable
2. Production of Hardener 2542 for Melamine Urea Formaldehyde resins 1241 and 1242 production, Acceptable
3. Production of Melamine-Urea-Formaldehyde resin 1241 (MUF 1241), Wood adhesive, Acceptable

Data on SKF products acquired within a M Sc. thesis performed at Chalmers –11 activities

Data documented by: Sandra Häggström, MSc Thesis work, Chalmers University of Technology

Documentation reviewed by: Karolina Flemström, IMI, Chalmers University of Technology

Published: 2003 03 21

1. Use of bearing at a paper mill, Acceptable
2. Surface Coating of bearing roller, Sufficient
3. Reconditioning of bearing, Acceptable
4. Rapeseed lubricant, Sufficient
5. Production of mounting fluid, Acceptable

6. Oil filter combustion, Acceptable
7. Mounting of bearing , Acceptable
8. Fabrication of oil filters, Sufficient
9. Dismounting of bearing, Acceptable
10. Combustion of waste oil, Sufficient
11. Cleaning of bearing roller, Sufficient

Data on SKF products acquired within a M Sc. thesis performed at Chalmers – 34 activities

Data documented by: Helene Berg, MSc Thesis work, Chalmers University of Technology

Documentation reviewed by: Karolina Flemström, IMI, Chalmers University of Technology

Published: 2003 02 19

1. Production of SKF spherical roller bearing 232/530, Sufficient
2. Production of bearing rings, Sufficient
3. Production of clean bearing steel, Sufficient
4. Heating of ingot at the rolling mill, Sufficient
5. Forging of ingot into steel bars, 350 mm, Sufficient
6. Turning of steel rings at SKFs site in Göteborg, Sufficient
7. Ring processes at SKFs site in Göteborg, Acceptable
8. Production of brass cages used for spherical roller bearings, Sufficient
9. Production of turned brass cylinders, 205 kg, Acceptable
10. Manufacturing of brass cages at SKFs site in Göteborg, Sufficient

11. Production of bearing rollers (à 9,2 kg), Acceptable
12. Cutting of steel bars (117 x 147 mm), Sufficient
13. Turning of steel bars into bearing rollers, Sufficient
14. Grinding of bearing rollers, Acceptable
15. Handpolishing of bearing rollers, Acceptable

16. Production of guide rings used for roller bearings, Sufficient
17. Production of pig iron, Acceptable

18. Smelting of iron, type V10, Sufficient
19. Smelt iron in a ladle, Sufficient
20. Heating of smelt iron in a holding furnace, Sufficient

21. Smelt iron in a teaming ladle before casting, Acceptable
22. Casting of iron, type V10, Sufficient
23. Production of quartz sand, Acceptable
24. Cleaning and blastering of cast iron, Sufficient
25. Turning of cast iron rings, Sufficient

26. Phosphatising of cast iron rings, Sufficient
27. Production of plywood boxes, Sufficient
28. Plywood production, Sufficient
29. Hot rolling of steel sheet, Sufficient
30. Pickled hot rolled steel sheet, Acceptable

31. Cold reducing of steel sheets, Sufficient
32. Metal coating of cold reduced steel sheets, Sufficient
33. Production of wood, Sufficient
34. Manufacturing of plywood boxes at Nefab in Alfta, Sufficient

Data on Lindab Ventilation AB products acquired within a M Sc. thesis performed at Chalmers – 4 activities

Data documented by: Annika Olsson, MSc Thesis work, Chalmers University of Technology

Documentation reviewed by: Karolina Flemström, IMI, Chalmers University of Technology

Published: 2002 12 10

Production of insulation rockwool, Sufficient 3/3
Production of insulation glass wool, Sufficient 3/3
Production of EPDM, Acceptable 3/3
Production of mastic, Acceptable 3/3

Data on SKF products acquired within a M Sc. thesis performed at Chalmers – 4 activities

Data documented by: Jesper Nilsson, MSc Thesis work, Chalmers University of Technology

Documentation reviewed by: Karolina Flemström, IMI, Chalmers University of Technology

Published: 2002 09 09

Manufacturing of Cold Rolled Steel Tubes, 41,55 x 37,21 or 47,75 x 41,01 mm
Manufacturing of Hot Rolled Steel Tubes, 70,7 x 47,5 mm

Manufacturing of Hot Rolled Round Steel Billets, 80 mm
Manufacturing of the Plain bearing GE30

Data acquired in Database build-up phase III of CPM

Data on solid waste management – 7 activities

Data documented by: Karolina Flemström, IMI, Chalmers University of Technology

Documentation reviewed by: Ann-Christin Pålsson, IMI, Chalmers University of Technology

Published: 2002 08 14

Solid waste management – *Composite system*
Composting of solid municipal waste
Biogasification of solid municipal waste
Landfilling of solid municipal waste
Thermal treatment of solid municipal waste
Sorting of solid municipal waste
Pre-treatment of biowaste

Data on production of polymer materials, acquired from APME eco-balance reports – 5 activities

Data documented by: Sofia Boström, Volvo Technological Development

Documentation reviewed by: Ann-Christin Pålsson, IMI, Chalmers University of Technology

Published: 2002 05 24

Production of butadiene
Production of PVC calendered sheet (APME), Sufficient
Production of PVC injection moulding (APME)
Production of PVC pipe (APME)
Production of PVC unplasticised film APME

Data on production of production of aluminium products, acquired from EAA Environmental Profile Report for the European Aluminium Industry – 7 activities

Data documented by: Maria Erixon, IMI, Chalmers University of Technology

Documentation reviewed by: Ann-Christin Pålsson, IMI, Chalmers University of Technology

Published: 2002 05 08

Aluminium recycling by refiners
Primary aluminium production
Production of 0,005-0,02 mm double-rolled aluminium foil
Production of 0,02-0,2 mm single-rolled aluminium foil

Production of extruded aluminium profiles
Production of rolled aluminium sheet
Remelting of aluminium scrap

Data on production of polymer materials, acquired from APME eco-balance reports – 4 activities

Data documented by: Caroline Sjöberg and Sofia Haargaard, Volvo Technological Development

Documentation reviewed by: Ann-Christin Pålsson, IMI, Chalmers University of Technology

Published: 2002 04 03

Production of hydrogene (cracker) (APME)
Production of methylene diphenyl diicocyanate, MDI (APME)
Production of pentane (APME)
Production of polybutadiene (APME)

Appendix C
Distribution of data sets during CPM phase III

Table presenting external data orders from SPINE@CPM 011201-040831

No	Date	Contact	Organisation	Quantity	Value (SEK)
1	2002-06-18	Ann Vercalsteren	IMS	10	3900
2	2002-12-17	Karl Jonasson	SKF/Chalmers	1	900
3	2003-04-01	Thomas Låstbom	SWECO VIAK	1	950
4	2003-05-05	Mikael Stenius	SINF miljökvalitet AB	1	1300
5	2003-06-16	Pia-Maria Rögård	Svenska Yrkeshögskolan	5	4150
					11200

Table presenting internal data orders from SPINE@CPM 011201-040831

No	Date	Contact	Organisation	Quantity	Value (SEK)
1	2002-05-21	Patrik Klintbom	Volvo Technology Corporation	42	10000
2	2003-03-17	Sylva Arnell	ABB	2	2200
3	2003-03-17	Marcus Wendin	Volvo	1	1200
4	2003-03-24	Patrik Klintbom	Volvo Technology Corporation	1	1200
5	2003-06-30	Caroline Sjöberg	Volvo Car Corporation	7	6800
6	2003-06-30	Christian Wiklund	ITT Flygt	31	23700
7	2003-07-01	Marcus Wendin	Volvo Technology Corporation	1	1200
8	2004-08-31	Robert Svensson	Volvo Technology Corporation	538	x
					46300

Table presenting master thesis student's data orders from SPINE@CPM 011201-040831

No	Date	Student	Organisation	Quantity	Value (SEK)
1	2002-02-27	David Cockburn	AB Tetra Pak	12	5100
2	2002-03-25	Annika Olsson	Chalmers	12	6400
3	2002-04-02	Annika Olsson	Chalmers	10	7800
4	2002-04-29	Anna Gabrielsson	KTH	20	13900
5	2002-10-28	Sandra Häggström	SKF/Chalmers	8	5900
6	2002-11-04	Sandra Häggström	SKF/Chalmers	3	1650
7	2002-11-12	Sandra Häggström	SKF/Chalmers	4	2300
8	2002-11-12	A. Manuilova	Akzo Nobel/Chalmers	7	4900
9	2002-11-18	Sandra Häggström	SKF/Chalmers	1	450
10	2003-03-10	Anna Lindgren	Uppsala universitet	7	5300
11	2003-03-24	Anna Lindgren	Uppsala universitet	2	1100
12	2003-03-25	Anna Lindgren	Uppsala universitet	1	1200
13	2004-02-24	David Jansson	Atlas Copco	4	4200
14	2004-03-01	Tommy Binbach	Atlas Copco	4	31200
15	2004-03-18	David Jansson	Atlas Copco	1	450
16	2004-03-25	David Jansson	Atlas Copco	2	700
17	2004-03-29	David Jansson	Atlas Copco	2	2200
					94750

Table presenting data orders from SPINE@by-pass 011201-040831

No	Date	Contact	Organisation	Quantity	Value (SEK)
1	2002	-	Bombardier	271	5000
4	2002-05-06	Anna Gabrielsson	KTH	271	5000
5	2004-06-19	Pia-Maria Rögård	Svenska Yrkeshögskolan	271	5000
					15000