Summary

Jet Aviation Basel (www.jetaviation.ch) is the historic and major site of the Jet Aviation Group, one of the leading business aviation services companies in the world. At our Basel location, we provide maintenance, avionics, completions and refurbishment, and paint services. Jet Aviation completed several completion projects on Airbus 319ACJ, A320 and Boeing B737, B757, B767, B747SP, B747-400 and on more 120 Falcon.

Jet Aviation Basel has committed itself to continual improvement and to the development of an Integrated Management System (IMS), in order to get the ISO 14001 (regulation regarding the environment) and OHSAS 18001 (regarding the Heath and the Safety) certification by 2014. This project is led by the EH&S team (Environment, Health & Safety), inside the Total Quality dept.

This study explains the different steps to the certification and exposed the most important parts of that process. It leads to the establishment of several tools and studies resolving most of the non-conformities of this company.

This study aims, to the resolutions of the biggest non-conformities developing tools to improve the workplaces Health & Safety performance, and to perform the Risks Assessment of the Jet Aviation Basel Company. It mainly includes:

- The establishment of a Solvent Management Plan
- The creation of an online tool for the management of non-conformities
- The method and the realization of Risks Assessment
- The establishment of a Greenhouse Gas Footprint

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1. Glossary

Aircraft management: Management of aircraft including service and charter management, cabin crews, maintenance coordination…

Charter services: 24 hour worldwide aircraft charter with operations centers in EMEAA and US.

Completions and refurbishment: Installation of VIP interior in business jets, customer specific refurbishment.

Fixed Base Operations: Aircraft services such as fuel sales, hangar rental, passenger and aircraft handling, ground support activities.

Maintenance and repair: Maintenance services include airframes, engines and fuselage repair, aircraft skin replacement.

TIMEX products: The Time Expired products are the products whose the burn test is more than two years old. They cannot be used in the aircraft before a new burn test was made.

CMPL: Completion

MTX: Maintenance

BU: Business Unit

EASA: European Aviation Safety Agency

EMEA & Asia: Europe, Middle-East, Africa and Asia

FAA: Federal Aviation Administration

FBO: Fixed Base Operations

FM: Facility Management

GD: General Dynamics

JBSL: Jet Aviation Basel

LOB: Line Of Business

MRO (or MTX): Maintenance Repair and Overhaul

SCM: Supply Chain Management

SU: Service Unit

TIMEX: Time expired

MSDS: Material Safety Data Sheet

H7: Hangar 7

SMP : Solvent Management Plan

2. Introduction

2.1. General

Historically, Jet Aviation was founded in 1967 by Carl Hirschmann at the Basel airport. At the beginning, he rented a hangar and established a maintenance facility. With the coming of the aviation in Europe, the company grew and expanded internationally. The first maintenance base outside of Switzerland was established in 1975 in Dusseldorf, Germany, and in 1979, a partnership was formed with a group of Saudi businessmen in the Kingdom of Saudi Arabia to operate a FBO facility in Jeddah. Ten years after the creation of Jet Aviation, Hirschmann bought an old Cathay Pacific Convair 880, installed a luxury interior and took it to the 1977 Paris Air Show. It is the first aircraft outfitted by Jet Aviation. Since then, the company has grown and Basel center has become the largest independent completions center in the world.

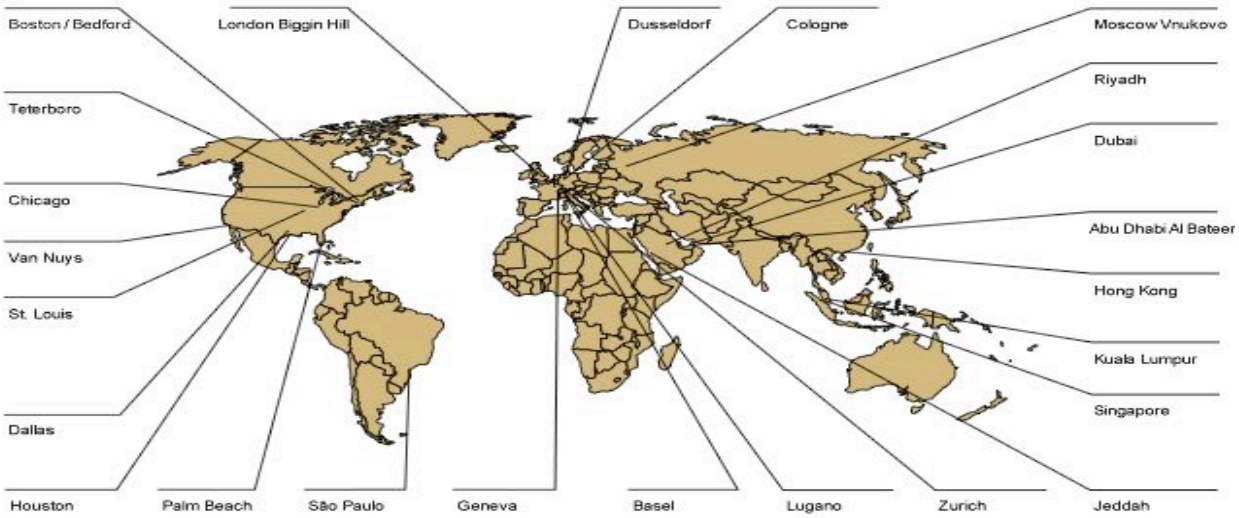
Jet Aviation successfully entered the U.S. market during the 1980s and so become the first global player in the business aviation industry. The company continues its expansion during the 1990s with a major move into the Asian market in 1995: the opening of a maintenance facility in Singapore.

The company continues to grow: Jet Aviation acquired a maintenance, refurbishment and FBO facility at London Biggin Hill airport in 2001. That same year, an aircraft management and charter firm was established in Hong Kong, China. In the United States, the company opened Jet Aviation Engineering Services near San Antonio, Texas, to support its own completions facility in Basel. Jet Aviation's presence in the Middle East was also strengthened in April 2005, when the company opened a new maintenance and FBO operation in Dubai.

Finally, in October 2005, Jet Aviation was acquired for about 800 M€ by Permira Funds, an English investment fund, which marked the end of a 38-year family business. Between 2006 and 2008, Jet Aviation highly grows, especially in the USA with the acquisition of the St Louis facility and in Brazil where the company established its presence for the first time (Sao Paulo).

On November 5, 2008, the company was acquired for approximately 1 500 M€ by U.S.-based General Dynamics, headquartered in Falls Church, VA. General Dynamics is a market leader in business aviation, combat systems, armaments and munitions, shipbuilding and marine systems, and information systems and technologies.

Today, Jet Aviation is a wholly owned subsidiary of General Dynamics (GD) and is one of the leading business aviation services companies in the world. Close to 5,000 employees cater to client needs from 26 airport facilities throughout Europe, the Middle East, Asia and North and South America. The company provides maintenance, completions and refurbishment, engineering, fixed base operations, along with aircraft management, charter services, aircraft sales and personnel services. Jet Aviation's European and U.S. aircraft management and charter divisions jointly operate a fleet of more than 200 aircrafts.



Jet Aviation facilities around the world today.

2.2. Lines of business

There are five major activities which form the core service business of Jet Aviation:

- Maintenance and repair*: avionics services
- Completions services* (outfitting and refurbishment)
- Global executive jet charter services* : flight planning and flight tracking
- Aircraft management* and flight support services, and extensive international support for corporate flight operations
- Fixed base operations (FBO)*

* *Means there is a related note in the glossary about this word.*

MAINTENANCE AND REPAIR

There are fifteen Maintenance and Repair Operations (MRO) facilities worldwide including Basel. They are all authorized by all the leading aircraft manufacturers (Airbus, Boeing, Dassault Aviation, Gulfstream…); and they are approved by the European Aviation Safety Agency (EASA) and the FAA (Federal Aviation Agency). Maintenance services include airframe, engines and fuselage repair, aircraft skin replacement…

COMPLETIONS AND REFURBISHMENT

Since the 1970s, Jet Aviation is one of the world best specialists in completions and refurbishment. The company installs VIP interior in business jets and establish customer specific refurbishment. The major completions centers are Basel (Switzerland) and St Louis (USA). The outfitting of an aircraft involves several departments, as interior design or engineering, and production workshops: sheet metal, wood shop, upholstery. It is even possible to paint the exterior of the aircraft, whatever his size. Despite of the excellence of the company in this activity, completions and refurbishment projects know a big decrease because of the economic crisis especially in the United States and Europa.

AIRCRAFT CHARTER SERVICES

Jet Aviation provides aircraft charter services all around the world. With an access to more than 1700 charter aircraft worldwide from its management fleet, partnership aircrafts and vendors, this line of business, which is one of the most recent of the company, is quickly growing up.

AIRCRAFT MANAGEMENT

The company manages over 200 aircrafts through the world. It offers turnkey management and flight support programs including flight operations, flight crew staffing, flight planning and scheduling, maintenance, administration, insurance, etc. Jet Aviation helps offset fixed costs by chartering aircrafts.

FIXED BASE OPERATIONS (FBO)

Jet Aviation owns 14 FBO facilities worldwide. It deals with various operations as for example: aircraft refueling, washing and cleaning but also passenger and crew services or line maintenance services.

2.3. Basel Center

In May 1945, Switzerland and France signed a contract to build up a binational airport. The Airport Basel-Mulhouse-Freiburg took place about 4 kilometers north of Basel. The surface area has been provided by the French government and Switzerland has financed the construction of runway and buildings. Today, the airport is operated jointly by Switzerland and France. Jet Aviation is founded on the airport in 1967. At the beginning, the company only provides maintenance services for business aircraft. But the 1970s saw Jet Aviation becoming a major player in the outfitting and refurbishment market and in 1977, the company added completions to the Basel operation as a new line of business. Since that time, Basel facility has grown to become the largest independent completions center in the world. Before 2008, there were six hangars belonging to the Basel facility. In 2008, Jet Aviation Basel (JBSL) added a new wide-body hangar large enough to work on any wide-body aircraft, including the Boeing 747-8 or the Airbus A380: the hangar 7 (H7) located on the airport ground. The most of completion activities are currently located in the hangar 7 and the others hangars are used for maintenance activities.

Today, JBSL owns 9 hangars on the airport including the paint hangar, which is large enough to receive aircrafts up to the size of a Boeing 737-800. Aircrafts can be stripped, sanded and painted in this hangar. The company rents some storage areas too: the two mains are the Pratteln and the Log Nexus.

2.4. Total Quality department

In Jet Aviation Company, quality is a main requirement because of the excellence of the product we are providing to the customers. My internship was belonging to this department and was focused on the implementation of Environmental, Health and Safety standards, including a resolution of regulatory non-conformities and an implementation of Risks Assessment.

The total quality department is a division containing 2 subdivisions:

- Quality
- Environment, Health and Safety

The subdivision I was working for is the Environment, Health and Safety which is composed by two people: Costel-Corneliu Muraru and Barbara Josseron. This department is in charge of the implementation and management of Environmental, Health and Safety systems, including:

- Contaminated Land and Remediation
- Noise
- Energy and water Conservation
- Air Emissions and Ambient Air Quality
- Physical Hazards
- Chemical Hazards
- Personal Protective Equipment (PPE)

In 2008, the implementation of Environmental (ISO 14001), Health and Safety (OHSAS 18001) have been decided by the owner of Jet Aviation, General Dynamics (GD). This project, managed by Barbara Josseron, will enable the JBSL Company to get, by the end of 2014, these two certifications. Moreover, the JBSL Company decided, in order to anticipate a GD request, to get into the Quality system (ISO 9001) to prepare all the necessary tools for a likely Quality certification.

To do so, several steps are necessary:

1. Some Non-Conformities have to be resolved and managed
2. A Quality System have to be implemented: a Process Mapping of the company have to be clearly established
3. Risks Assessments have to be done for the entire JBSL Company
4. An EHS Manual has to be written

3. Implementation of the EHS Standards

3.1. Presentation

The realization of this complete study has been done according to the standards ISO 14001 [5] and BS OHSAS 18001:2007 [6].

3.1.1. General Presentation

General Dynamics, the owner of Jet Aviation, impose to the JBSL Company to be compliant with two main international standards ISO 14001 (Environmental Standard) and OHSAS 18001 (Health and Safety Standard). This two standards are constructed with the same structure as the Quality Standard (ISO 9001), which is also a basics in the industrial world.

The ISO 14001 is the international standard for environmental management. The organization uses its ISO 14000 / ISO 14001 system to control the way(s) its processes impact, or cause changes to, air, water, land, and so on; comply with laws/regulations, and continually improve its environmental performance.

To comply with and become registered to ISO14001, the organization must:

- Determine all the ways its operations can impact the environment (air, water, land, flora, fauna, etc.);
- Identify environmental laws / regulations pertinent to its operations;
- Identify environmental impacts that are potentially adverse: those that can cause pollution, violate regulations, and/or can give rise to environmental accidents or emergencies;
- Design and implement controls to eliminate or at least manage environmental impacts that are potentially polluting or otherwise adverse;
- Establish improvement programs and set targets, goals, and measurement methods to track the effectiveness of the controls.

The organization must also establish and communicate its environmental policy, maintain records, internally audit its environmental system, ensure affected employees are competent through training or other means, submit the system and its status and results to regular management review, and appropriately document the system.

Aimed at management of health and safety, OHSAS is not a Standard the way ISO 9000 / ISO 9001 and ISO 14000 / ISO 14001 are. OHSAS 18000 / OHSAS 18001 are an assessment series published by a British standards institution. Since there is not yet an official ISO health/safety management standard, OHSAS 18001 has achieved a certain level

of international acceptance. But it has not gone through the exhaustive development and deliberative ISO process that involves all affected stakeholders worldwide.

OHSAS 18001 requires identifying health/safety hazards and risks associated with your operations, eliminating or at least controlling those hazards / risks, and demonstrating improvement by minimizing and/or eliminating illness and injury.

To comply with and become registered to OHSAS 18000 / OHSAS 18001, the organization must:

- Determine the health and safety hazards and risks associated with its operations;
- Identify health / safety laws / regulations pertinent to its operations;
- Design and implement controls to eliminate or at least manage health / safety hazards / risks;
- Establish improvement programs and set targets, goals, and measurement methods to track the effectiveness of the controls.

The organization must also establish and communicate its health / safety policy, maintain records, internally audit its 18001 system, ensure affected employees are competent through training or other means, submit the system and its status and results to regular management review, and appropriately document the system.

3.1.2. Implementation and Communication

The implementation of these standards has to be done according to several steps:

1. Some Non-Conformities have to be resolved and managed:

The biggest non conformity unsolved was the establishment of a Solvent Management Plan, which is mandatory according to the Jet Aviation local Regulations (the “arrêté préfectoraux” n°2008-183-5 dated on the 1st of July 2008, for the Historical Site, and the “arrêté préfectoraux” n°2007-243-1 dated on the 31st of August 2007, for the Hangar 7). These law texts (one for the Historical Site and one for the Hangar 7) are specifically related to the Jet Aviation Company and contain some duty of the company regarding the French territory.

In a second time these non-conformities have to be managed thanks to a tool that has to be created.

2. A Quality System has to be implemented: a Business Process Mapping of the company have to be clearly established.

Business process mapping refers to activities involved in defining what a business entity does, who is responsible, to what standard a business process should be completed, and how the success of a business process can be determined.

The main purpose behind business process mapping is to assist organizations in becoming more efficient. A clear and detailed business process map or diagram allows outside firms to come in and look at whether or not improvements can be made to the current process.

3. Risks Assessments have to be done for the entire JBSL Company

Risk assessment is the determination of quantitative or qualitative value of risk related to a concrete situation and a recognized threat.

The role of risk assessment is to identify and evaluate the risks faced by the organization across multiple disciplines, to communicate these risks to senior management (and possibly the board of directors and other stakeholders), and to monitor and manage those risks in a way that ensures the organization bears only the risks to which its management and board want exposure.

The parts of my jobs in Jet Aviation Basel were the points 1 and 3, explained in the rest of this document, project by project. Those several tasks were part of the complete implementation process.

In order to involve everyone in the company, a communication (which was also part of my job) was done.

This communication was divided in two parts:

- The intranet of the company
- The Company itself

I have created an animated image (.gif format) with Photoshop® software that was diffused on the intranet during 1 month with, when clicking on this animated image a teaser showing the silhouette of the three members of the EHS team. This image have been displayed for one moth on the JBSL TVs located thoughout the company (including corridors and workshops) and 70 posters were printed and exposed in every places in the company.

In the middle of January the second image was revealed, showing the three menbers of the group with a short explanation. The biggest explanation have been done in a Quality Newsletter Special Edition (see Appendix N°9).

3.1.3. Aspects/Impacts on the environment

The goal of this study is partly to reduce the impact of the Jet Aviation Company on the French environment, by reducing the emissions of solvents to atmosphere during the phases of work, and by using product that are not harmful to health and environment.

As we will see further, the Jet Aviation company in submitted to some French rules that are imposing a minimal level of emissions of solvent: If the consumption of the company is higher than 15 tons a year, the limit emission value for non methane VOC, expressed in carbon equivalent, is 50 mg/m^3. For the yearly flow of diffuse emissions, it has to be below 20% of the solvent used. The Jet Aviation Company, according to the study done in this report, is consuming 31 tons a year of solvent so is under this category. The goal of this analysis will be to determine how much solvent the company is emitting expressed in percentage of solvent used and by place, and to recommend some specific actions related to the biggest VOC emitters.

The Second environmental point of this project is an analysis of the different products used by the company in order to comply with a European regulation imposing to all the companies composed by more than 50 employees to use non harmful products. The regulation's name is REACh (Registration, Evaluation, Authorization and Restriction of Chemicals) and is divided in several parts allowing a classification of chemicals in four categories:

- **Restricted Chemicals**
- **Authorized**
- **Candidate to Authorization**
- **None Restricted**

The study is to analyze if the Jet Aviation Company is concerned by this regulation, meaning are they using problematic chemicals. The second part of the study was to give some recommendations on the biggest problematic products to replace,

To conclude, the goal of the ISO 14001 certification is to comply with the pertinent environment regulations, to setup some measurements and to find solutions to decrease the impact of the company on the ground where it is implemented. This project will lead to the compliance of the JBSL Company to these rules, and so will contribute strongly to the reduction of the environmental impact of the company.

3.2. Main Non-Conformities

3.2.1. Resolution of the biggest Non-Conformity: The Solvent Management Plan

3.2.1.1. Description

The solvent management plan is a material balance of input / output solvents on an installation. It is one of the key elements of the policy of control and of reduction of fuel consumption and emissions of solvents. From a regulatory perspective, it aims to assess the total emissions (channeled and diffuse) or diffuse volatile organic compounds (VOCs) in order to verify compliance with the emission limit values.

Jet Aviation Basel is subject to the “arrêté ministériel” of the 2nd of February 1998 (See appendix N°14) stating in the second section “Pollution de l’air”, article 30, under the point 20, that a company with a solvent consumption higher than 15 tons a year has to keep his diffuse emissions under 20% of the quantity of solvents used.

Jet Aviation Basel is subject to the two other specific regulations called “Arrêtés préfectoraux” (See extracts in Appendices N°12 and N°13): one for the historical site and one for the Hangar 7. In these two legislations, the article 8.8 recommends, for the air rejects and for pollutant prevention, to do a Solvent Management Plan.

The Solvent Management Plan is a balance modeling of input and output flows of solvent in order to control and reduce the emissions and consumption of solvents in the company.

The main goal of this study is to calculate and to reduce the diffuse emissions below 20%, which is mandatory in the “Arrêtés préfectoraux” and in the “arrêté ministériel”.

The Solvent Management Plan is then made available to the State authority "Inspection des Installations Classées pour la Protection de l'Environnement (ICPE)" that is monitoring actvities of some kind of industries due to their potential large impact on the environment.. If the annual consumption of solvents installation is more than 30 tons per year, the operator shall forward annually to the inspection of classified installations the solvent management plan and informs its efforts to reduce their consumption.

The solvent Management Plan is divided in Input:

- I1 Solvent bought and used
- I2 Solvent reused (internal regeneration)

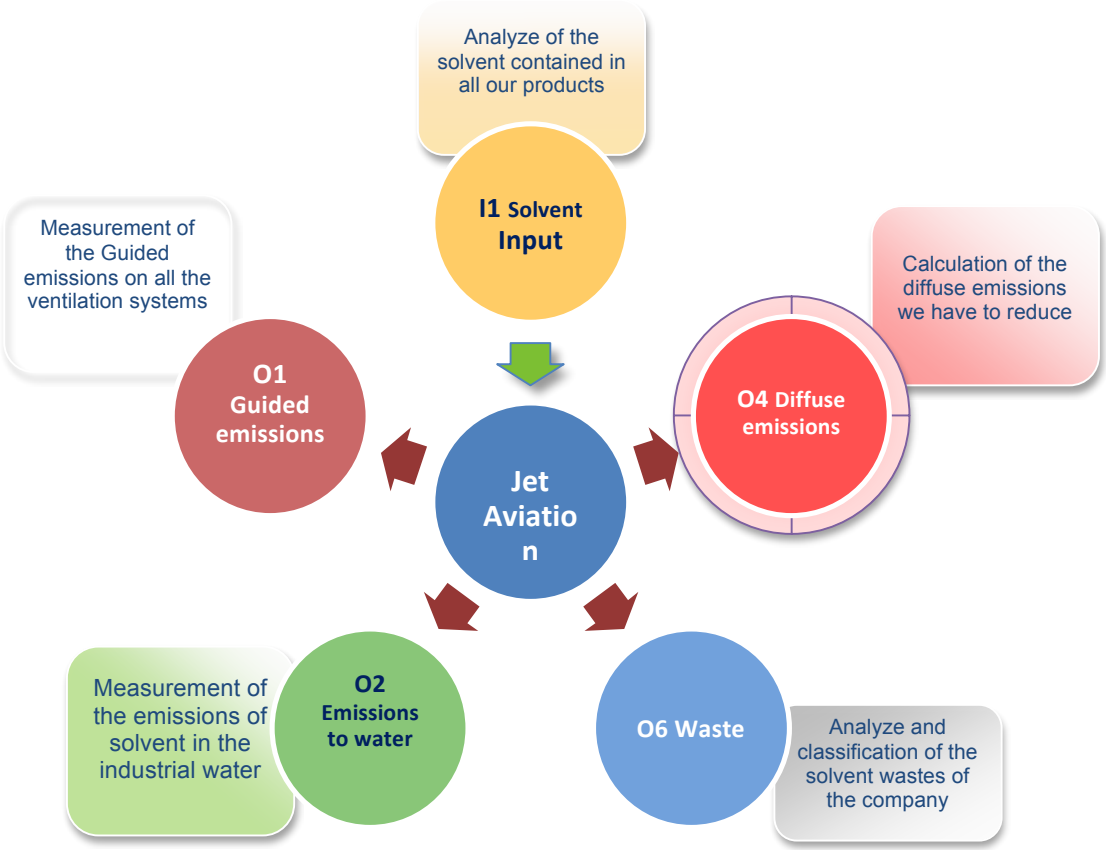
And Output:

- O1 Guided Emissions
- O2 Emissions to Water
- O3 Loss in final products
- O4 Diffuse emissions
- O5 Solvent ruined
- O6 Loss in Wastes
- O7 Solvents sold
- O8 Recovered solvents for internal regeneration
- O9 Solvent released in another way

To establish this study, two hypotheses were necessary:

1. The proportion for a specific product which is going in the company is the same as the proportion which is going out, meaning that if we consider the paint, bought by the company as 12% in entrance, we can consider it as 12% outgoing also.
2. The measurements of the guided emissions have been done in an activity phases.

In Jet Aviation Basel Group, after investigation, only the following Input / Output are relevant:



3.2.1.2. Building up the SMP

The Solvent Management Plan has been created according, to the official guide from INERIS (Institut National de l'Environnememnt Industriel et des Risques) [1], to the Arrêté prefectoral n°2008-183-5 (for the Historical Site) [2], to the Arrêté prefectoral n°2007-243-1 (for the Hangar 7) [3], and to the Arrêté ministeriel, A. du 02/02/1998 [4].

The SMP is a study divided in several Worksheets:

- SMP : a dashboard for all the complete file
- I1 Historical Site : an analyze of the input solvents in the historical part of the company
- I1 H7 WIBO : an analyze of the input solvents in the Hangar 7 (also called Wide Body in SAP system)
- O1 Historical Site + H7 : containing the air measurements and calculations
- O2 Historical Site + H7 : containing the water measurements and calculations
- O6 Historical Site : containing the wastes measurements and calculations for the historical site
- O6 Hangar 7: containing the wastes measurements and calculations for the hangar 7
- I1 Data Historical Site : a data base of the input solvents in the historical part of the company
- I1 Data H7 WIBO : a data base of the input solvents in the Hangar 7 (also called Wide Body in SAP system)
- I1 SAP- Historical Site : a SAP data base of the input solvents in the historical Site directly extract from the SAP system
- I1 SAP- H7 WIBO : a SAP data base of the input solvents in the Hangar 7 directly extract from the SAP system
- Useful : containing some useful information

The difference between Historical Site and H7 has to be done because of the separation in the "Arrêtés préfectoraux".

3.2.1.2.1 I1 Solvents Input

To establish a SMP tool, a lot of information were to be collected: a list of all the solvents in the company, the total consumption of every product… To build a correct data base, Jet Aviation uses the software SAP ERP from the SAP Company. This software is an Enterprise Resource Planning (ERP) who permits a complete management of all the data of the company. It got also the advantage to be adjustable. Some technical staffs from this company are working in the Jet Aviation Company and they are able to adapt the software as requested.

A basic list of the product containing solvents have been pre-established by the company, but wasn't accurate: **the first step** of the fabrication was to build a new one.

The JBSL Company encloses 3 main stores where all the products are passing through before being distributed to the different stores: The Fluid Store (for the historical site and for the H7), the Paint Store and the Wood Store (this store is located in the Wood Shop).

Every store having its own list, it was possible to start a new one more accurate and containing all the products. We then had to sort them out by categories according to their concentrations in solvents.

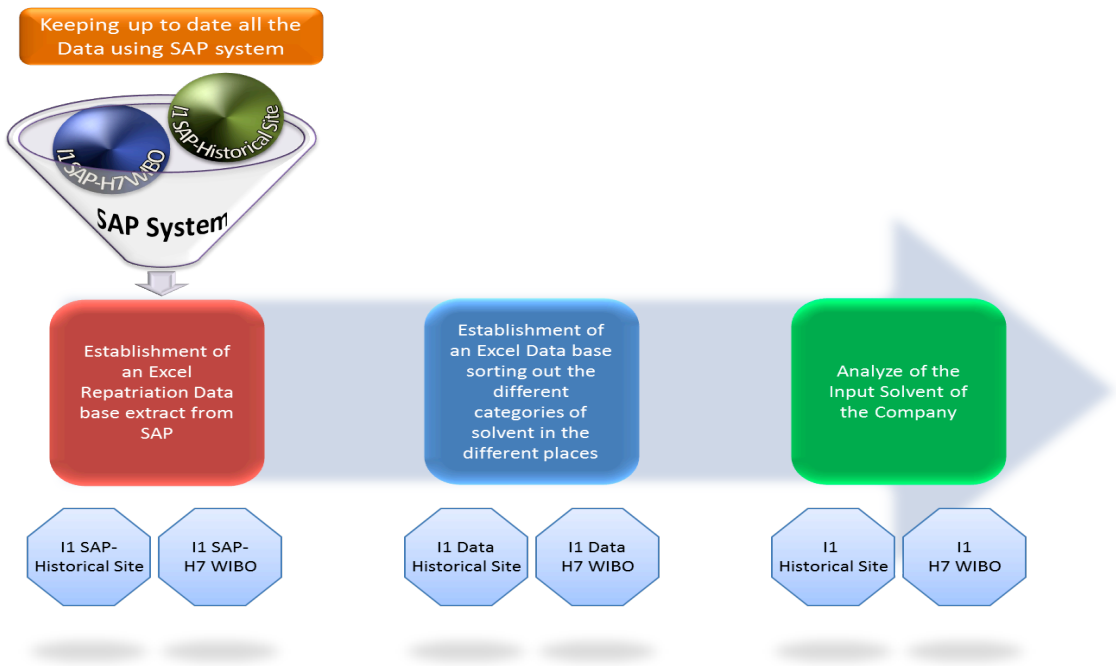
From the data collected in the different main stores of the company, a list of 534 products has been established, and divided in 12 different categories:

- Cleaner (VOC = 500 g/l)
- Diluent (VOC = 800 g/l)
- Glue (VOC = 600 g/l)
- Hardener (VOC = 573 g/l)
- Kit (half Paint and half Hardener) (VOC = 494 g/l)
- Paint (VOC = 407 g/l)
- Polish (VOC = 500 g/l)
- Protection Fluid (VOC = 400 g/l)
- Seal (VOC = 400 g/l)
- Solvent (VOC = 800 g/l)
- Spray (VOC = 400 g/l)
- Others (VOC = 600 g/l)

The Data Base is organized as below:

1	Count	Cat.	id	Partnummer	Bezeich	Qua	Unit	Place	COV/ Ref [g/l]	COV total/id [kg]
498	x1	Paint	237880	KARDIX BRUN ROU	TEINTE KARDIX	0.00	LI	WOOD Shop	407	0.0
499	x1	Paint	243733	KARDIX JAUNE	TEINTE KARDIX	0.00	LI	WOOD Shop	407	0.0
500	x1	Paint	237882	KARDIX ROUGE VI	TEINTE KARDIX	0.00	LI	WOOD Shop	407	0.0
501	x1	Paint	237884	KARDIX VERT	TEINTE KARDIX	0.00	LI	WOOD Shop	407	0.0
502	x1	Protection Fluid	533438	LPS3-LIQUID	CORROSION INHIBITOR TN 10138 Type I Gr.2	0.00	ST	FLST	400	0.0
503	x1	Solvent	569001	NAPHTHA	NAPHTHA SOLVENT, 1 CAN = 5 LITERS	0.00	LI	FLST	800	0.0
504	x1	Paint	569216	NOVOCOLOR	WNC	0.00	LI	PSHP	493.5	0.0
505	x1	Protection Fluid	554957	P19320-20L-P-1:UNKNOWN	PAINT,PROTECTION,TEMPORARY SURFACE 20l	0.00	LI	FLST	406.6	0.0
506	x1	Paint	562367	P2333ES	PAINT,GLOSS BLA	0.00	LI	PSHP	800	0.0
507	x1	Paint	562368	P6180ES	PAINT,GREY	0.00	LI	PSHP	493.5	0.0
508	x1	Paint	568762	P6183ES	COATING POLYURE	0.00	LI	PSHP	407	0.0
509	x1	Paint	562003	PANTONE 428 PSG	PAINT ACRY GLO	0.00	LI	PSHP	407	0.0
510	x1	Paint	562001	PANTONE 653 PSG	PAINT ACRY GLO	0.00	LI	PSHP	407	0.0
511	x1	Paint	562000	PANTONE 655 PSG	PAINT ACRY GLO	0.00	LI	PSHP	407	0.0
512	x1	Paint	561087	PANTONE COOL GR	PAINT JETGLO EX	0.00	GAL	PSHP	407	0.0
513	x1	Paint	561378	PG-6-BK9/PH-34	BLACK BAPAINT-B	0.00	KIT	PSHP	236	0.0
514	x1	Paint	550323	PG-6-C64	PAINT BAPAINT M	0.00	GAL	PSHP	407	0.0
515	x1	Hardener	550325	PG-6-R228	PAINT BAPAINT R	0.00	GAL	PSHP	573	0.0
516	x1	Hardener	550328	PH-34	CATALYST	0.00	GAL	PSHP	573	0.0
517	x1	Paint	21469	PRIMER FCR	PAINT METAFLEX	0.00	LI	PSHP	407	0.0
518	x1	Paint	566802	PSG-HT10568	ACRYGLO PAINT	0.00	LI	PSHP	42	0.0
519	x1	Paint	542077	PSG-X1131-2.85	PAINT ACRYGLO R	0.00	LI	PSHP	407	0.0
520	x1	Paint	542075	PSG-X1170-2.85	PAINT ACRYGLO C	0.00	LI	PSHP	407	0.0
521	x1	Paint	522421	RAL 3020 RED AC	PAINT ACRY GLO	0.00	LI	PSHP	407	0.0
522	x1	Paint	522422	RAL 7004 GREY A	PAINT ACRY GLO	0.00	LI	PSHP	407	0.0
523	x1	Paint	522423	RAL 7047 GREY A	PAINT ACRY GLO	0.00	LI	PSHP	407	0.0
524	x1	Seal	563122	RTV116	SEALANT	0.00	ST	FLST Other	120	0.0
525	x1	Paint	434057	SF7100	PAINT FRS40	0.00	KG	WOOD Shop	407	0.0
526	x1	Paint	547636	SIKKENS ORANGE	PAINT ACRYGLO	0.00	LI	PSHP	407	0.0
527	x1	Diluant	561061	SR-12	STANDARD REDUCE	0.00	GAL	PSHP	800	0.0
528	x1	Diluant	550329	SR-420	REDUCER	0.00	GAL	PSHP	800	0.0
529	x1	Paint	565855	TITANINE FE 50/	POLYURETHANE FL	0.00	LI	PSHP	407	0.0
530	x1	Diluant	76322	TL65	VERDUENNER	0.00	LI	PSHP	800	0.0
531	x1	Cleaner	387129	TOTAL CLEANER SPRAY	CLEANER SPRAY	0.00	ST	FLST Other	700	0.0
532	x1	Solvent	538683	TTI-735 GRADE A	ISOPROPYL ALCOHOL	0.00	LI	FLST	800	0.0

To summarize, the organization of the Solvent input is the following:



3.2.1.2.1.1 To get a new product

In order to keep this list up to date, a list of the different categories we took in the SMP inventory has been distributed to the Leader Operator Logistic of the H7 and the Wood Shop, and to the Storekeeper. Moreover an investigation has to be done to control the accuracy of the list and to check the new product going in the company.


Liste de produit pour mise à jour Plan de Gestion de Solvant.

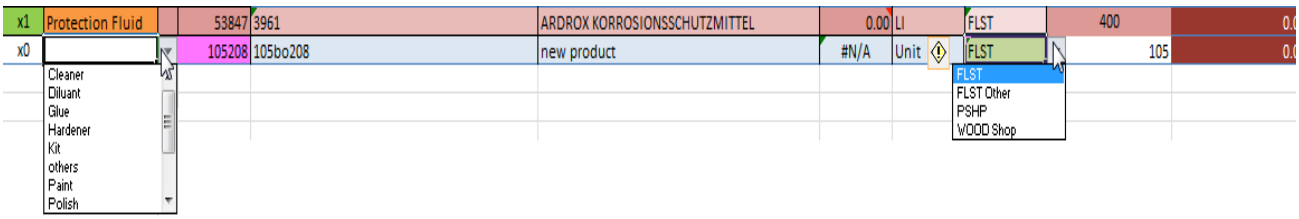
Si nouvel ID envoyer un mail à : raphael.dumond@jetaviation.ch

Protection Fluid
Solvent
Glue
Sealler
cleaner
Glue
Spray
Polish
Seal
others
Paint
Durcisseur
Diluant
Kit

Every year, the SMP must be updated, and for every realization, the Leader Operator Logistic for the H7 and the Wood Shop, and the Storekeeper of the fluid store, have to be asked for an update of the new products bought by the company during the year. A list of those new products must be sent by these two contacts during the year at every receiving of a new Id and Part number, and should be categorized according to the list below (send to the two contacts).

3.2.1.2.1.2 To add a new product to this tool when Jet Aviation buys a new product

To add a new product, the filling up of the different cells is necessary, according to the Material Safety Data Sheet and to the ID in SAP. To do so, the column Cat, id, Partnumber, Description, Unit, Place, COV/Ref [g/l] must be filled using the list pre-established.



ETSEIB

The different sites of the company were divided in four macro categories:

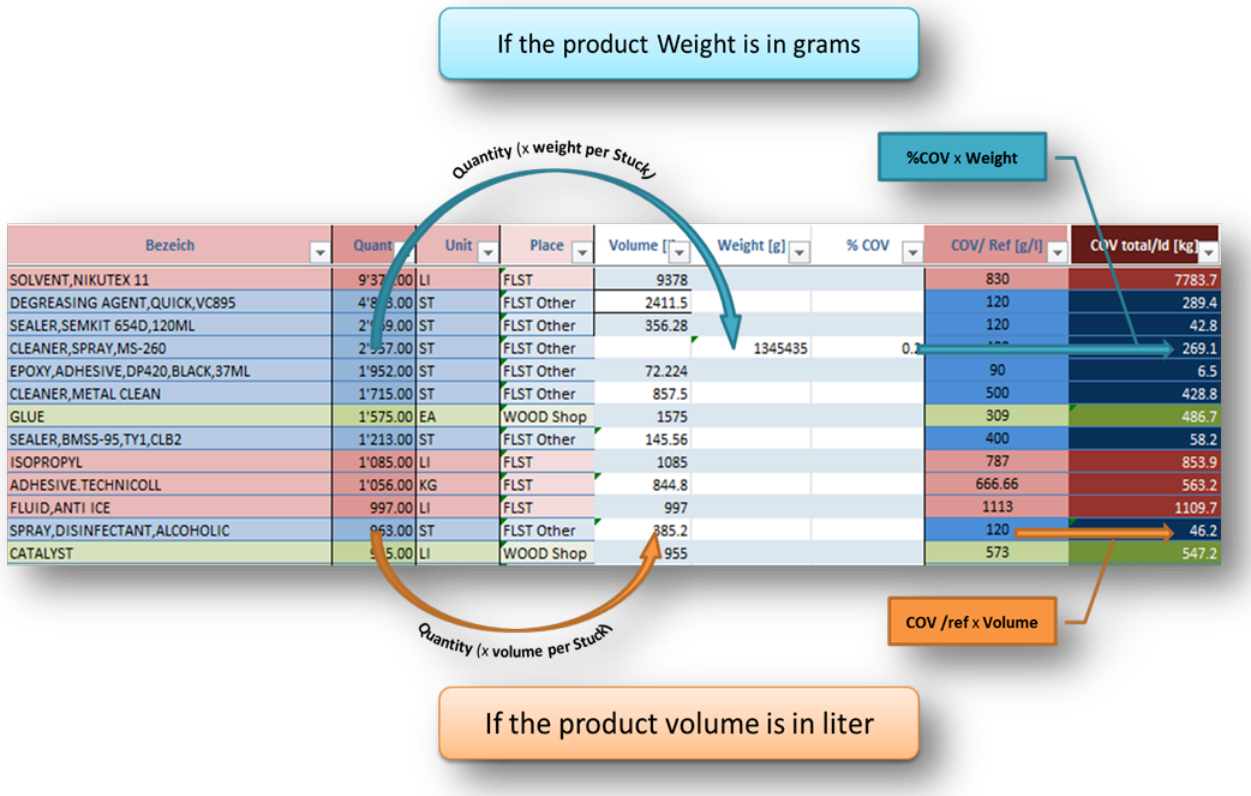
- The “Fluid Store” (FLST), where we can find most of the products used in the hangars of the historical site
- The “Fluid Store Other” (FLST Other), which include mainly glue, cleaner and other product that have to be kept in a frigorific area (a part of the Fluid Store of the historical site)
- The “Paint Shop”
- The “Wood Shop”

The “Fluid Store” and “Fluid Store Other” are mainly composed by products used in the hangars of the Historical Site.

All the information needed is available in the MSDS. To help the user, the column counts have been added to count if there are any double entries (x2 in red if there is any).

3.2.1.2.1.3 Calculations

This file requires some calculations that have to be done accordingly with the products: if the products’ quantity is expressed in volume or in weight. All the information necessary to fill up this file can be found in a procedure (see appendix N°1).



Bezeich	Quant	Unit	Place	Volume [l	Weight [g]	% COV	COV/ Ref [g/l]	COV total/ld [kg]
SOLVENT,NIKUTEX 11	9'37[illegible].00	LI	FLST	9378			830	7783.7
DEGREASING AGENT,QUICK,VC895	4'8[illegible]3.00	ST	FLST Other	2411.5			120	289.4
SEALER,SEMKIT 654D,120ML	2'[illegible]9.00	ST	FLST Other	356.28			120	42.8
CLEANER,SPRAY,MS-260	2'[illegible]57.00	ST	FLST Other		1345435	0.[illegible]	[illegible]	269.1
EPOXY,ADHESIVE,DP420,BLACK,37ML	1'952.00	ST	FLST Other	72.224			90	6.5
CLEANER,METAL CLEAN	1'715.00	ST	FLST Other	857.5			500	428.8
GLUE	1'575.00	EA	WOOD Shop	1575			309	486.7
SEALER,BMS5-95,TY1,CLB2	1'213.00	ST	FLST Other	145.56			400	58.2
ISOPROPYL	1'085.00	LI	FLST	1085			787	853.9
ADHESIVE.TECHNICOLL	1'056.00	KG	FLST	844.8			666.66	563.2
FLUID,ANTI ICE	997.00	LI	FLST	997			1113	1109.7
SPRAY,DISINFECTANT,ALCOHOLIC	[illegible]63.00	ST	FLST Other	385.2			120	46.2
CATALYST	[illegible]5.00	LI	WOOD Shop	[illegible]955			573	547.2

The same calculations can be found in the two worksheets “I1 Data Historical Site” and “I1 Data H7 WIBO”.

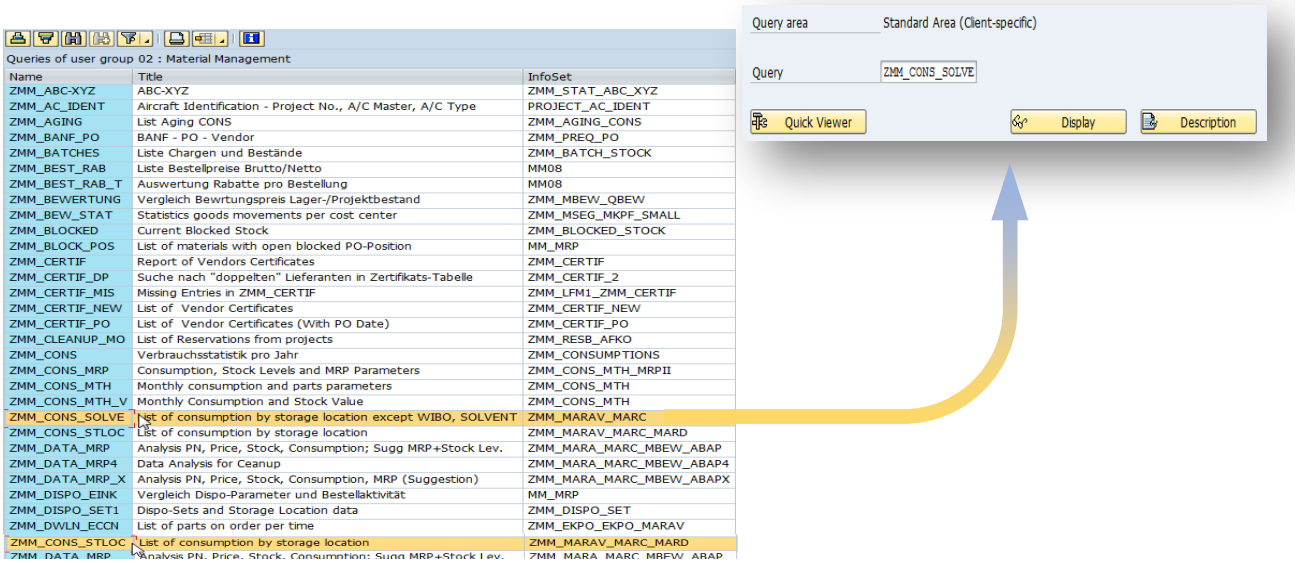
In terms of products, JBSL is organized according to Identification Number (Id Number) and Part Number (P/N) thus making the updating of the data through SAP System possible.

The Second Step of this process was to create a program within SAP system that is checking all the consumption for a specific Id Number on the whole year. The study I have done was based on the year 2012.

Two programs were necessary to be created: one for the Historical Site and one for the H7 were created by a SAP specialist team. The principle of these programs is to make the difference between the incoming and outgoing taking in account the places were the product have been forwarded.

In SAP, in one special section, can be found a list of programs: the two programs done for tracking the consumption of products are highlighted in yellow in the Print Screen, and their names are:

- ZMM_CONS_SOLVE
- ZMM_CONS_STLOC



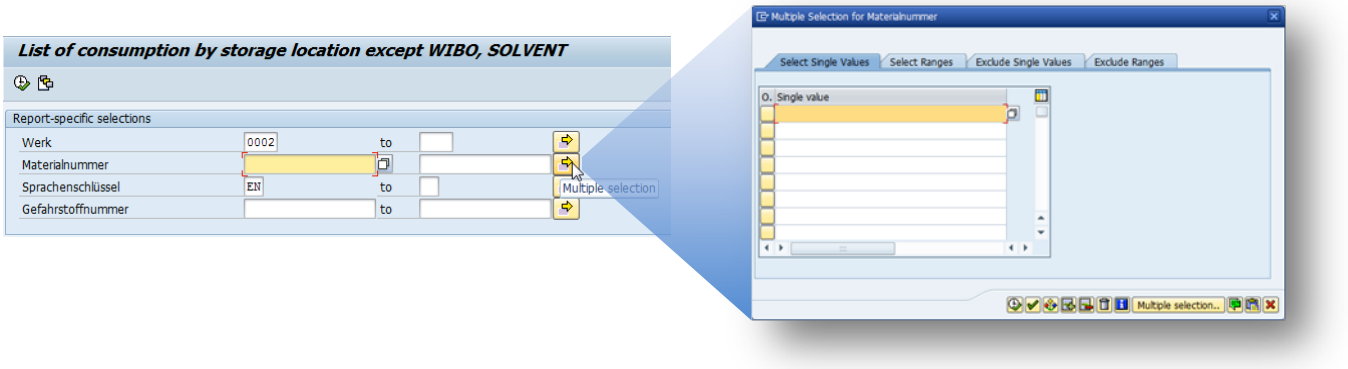
As these two programs are working the same way, the explanation will be done only on the first one: I1 Data Historical Site.

3.2.1.2.1.4 Acquisition of data for the Historical Site:

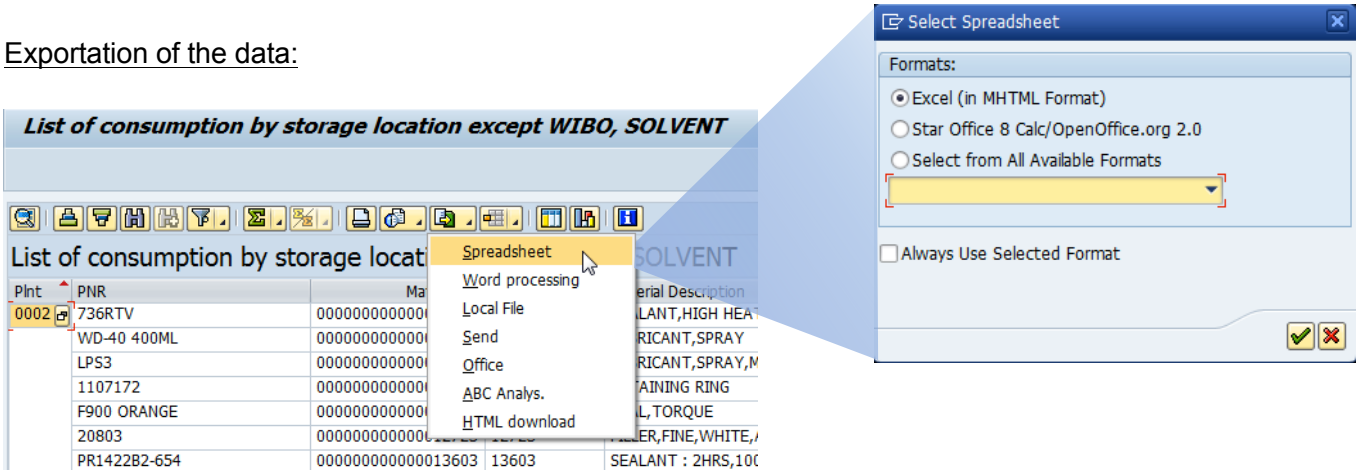
The guideline to find the consumption of products for all the Identification Number is the following:

- Acquisition of data:

The Material Number (or Part Number) needs to be filled out by clicking (on the arrow on the right side) and a copy-paste of the entire Id column from the worksheet I1 Data Historical Site, on the Solvent Management Plan, has to be done.



Exportation of the data:



An exportation in **Excel Format (in HTML Format)** has to be done from SAP using the integrated exportation tool.

- Implementation of the data in the Solvent Management Plan

The repatriation of data and the calculations are done automatically thanks to a lookup from the worksheet “I1 SAP-Historical Site” to the worksheet “I1 Data Historical Site” using the Excel tool “VLOOKUP”.

3.2.1.2.2 O1 Guided Emissions

These calculations are established according to the measurements, done by a contractor in the different zones of air extraction, in the historical site and in the H7 (See Appendices N°7 and N°8).

Measurements

kg/h		Hours Worked with solvents	total kg/h
0.495	Glue room H4	371.3	
1.51	Paint Hangar V1		
1.25	Paint Hangar V2		
1.32	Paint Hangar V3		
0.55	Paint Hangar V4		
0.0	Paint Hangar V5		
0.55	Paint Hangar V6		
0.22	Paint Hangar V7		
0.01	Paint Hangar V8		
5.41	Paint Hangar	492.3	
1.721	Wood Shop	2581.5	3445.1

Historical Site

kg/h		
1.34	Upholstery H7	938

H7

As the flow rate coming from the measurement are in g/l an approximation of the number of hours worked under solvent must be done. The calculation of the guided emissions will result of the multiplication of this two data.

Accordingly to the different place, extractions are working continuously or discontinuously, that's why calculations have to be different.

As the ventilation is working with an average between 20h a week for half of the year and 10h a week for the other half for the upholstery of the historical site, the decision was taken to take 15 h a week on 50 working weeks of 5 days. This approximation can be done regarding the activity and taking in account that the upholstery of the historical site has a low emission of solvents.

The same calculation has been used in the Wood Shop, with an average of 6 hours a day on 50 working weeks of 5 days. Indeed, the varnishing is done almost continuously every day and is divided in two steps done, each of them, under ventilation: the spreading and the drying.

The Paint Hangar is consuming a lot of solvent, so the determination of hours worked need to be more detailed. For it, and in regard with the different aircraft done on the year 2012, an analysis has been done:

Estimation of hours worked

Qty					Cleaning Time using Hrs	Paint Hrs	Time in Hangar	
		Nikutex 2012						
400	BBJ37663	339F	D-AACM	B737	96	120	5	24
		120F			96	120	5	24
1600		0201			256	588	8	73.5
400	BHPAG009	0701	HZ-SPAG	F7X	24	18	2	9
400	BIAMY013	0802	I-JAMY	F2000	36	80	3	26.6667
400	B0301218	0701	30	F50	36	80	3	26.6667
400	BHIVO086	0701	HB-IVO	F2000	36	80	3	26.6667
1200	BFFQ1213	0706	F-RAFQ	F900	36	80	3	26.6667
400	BHIKS092	4002	HB-IKS	CL601	24	72	2	36
200	BMBUS002	0401	M-RBUS	A319	8	18	1	18
400	BMFKR008	4000	M-TFKR	G550	48	96	3	32
400	BZMGS003	0801	ZS-MGS	F50	36	80	3	26.6667
210	BCJ03856	A460	M-RBUS	A319	4	9	1	9
		3830						
1000	BHIVZ179	6000	HB-IVZ	GV	36	144	4	36
200	BVCGA039	0463	VP-CGA	F2000	36	80	4	20
200	BVCGA039	0463	VP-CGA	F2000				
1200	B1321213	0701	132	F50	36	80	3	26.6667
13	BBJ37560	1750	HZ-103S	B737	2	2	0.5	4
9023	Total Nikutex							
		M700						
15	BHPAG009	0701	HZ-SPAG	F7X	6		1.5	0
15	BIAMY013	0802	I-JAMY	F2000	18		2	0
30	B0301218	0701	30	F50	18		2	
5	BVBFT016	4054	VP-BFT	B737	3	4	1	
50	BHIVO086	0701	HB-IVO	F2000	18		2	
5	BGLEX001	4070	M-GLEX	BD700	3	4	1.5	
20	BFFQ1213	0706	F-RAFQ	F900	18		2	
5	BSRDZ006	4008	SE-DRY	G550	2	3	0.5	
20	BOIDV002	0801	OE-IDV	CL605	8	4	1	
20	BHIKS092	4002	HB-IKS	CL601	18		2	
5	BZPKR005	0489	ZS-PKR	F2000	3	6	2	
5	BMBUS002	0401	M-RBUS	A319	3		0.5	
5	BN4GV001	4001	N44GV	GIV	3	4	1	
5	BVBBP010	0406	VP-BBP	F2000	3	4	1	
450	B1321213	0701	132	F50	18		2	
10	BYBNA026	0803	YU-BNA	F50	3	4	1	
		0802			3	4	1	
5	BDOOK041	0407	D-BOOK	F2000	3	4	1	
100	BBJ37663	0201	D-AACM	B737	96		3	
770	Total M700							
		Cleaning solvent C28/15						
15	BFFQ1213	0706	F-RAFQ	F900	6		1.5	
10	BDMET082	0903	D-CMET	F50	12	16	3	
20	BEKPP027	0601	EC-KPP	F10	6	3	2	
30	B1321213	0701	132	F50	12		3	
75	Total Cleaning Solvent							
			Estimation on Hrs		1129	1807	91	

Total of hours worked with solvent

The upholstery of the Hangar 7 has done the same analysis, with an average of 3 hours per working day meaning 700 hours worked with solvents per year.

To implement it in the Solvent Management Plan, you must put all the data in the column "Hours Worked with solvents" according to the necessary calculations (Flow rate x Number of hours).

3.2.1.2.3 O2 Emission to water

According to the Analysis done by Eurofins, the measurements are divided in 28 known molecules, and in 4 samplers:

- PRL 9071
- PRL 9072
- PRL 9073
- PRL 9074

Flux 1,1,1-trichloroéthane	j	NC
1,1,1-trichloroéthane	g/l	< 1,0
Flux Tétrachlorure de carbone	j	NC
Tétrachlorure de carbone	g/l	< 1,0
Flux Tétrachloroéthylène-1,1,2,2	j	NC
Tétrachloroéthylène-1,1,2,2	g/l	< 0,5
Flux Trichloroéthylène	j	NC
Trichloroéthylène	g/l	< 0,5
Flux Dichlorométhane (Chlorure de méthylène)	j	0.061
Dichlorométhane (Chlorure de méthylène)	g/l	370
Flux 1,2-dichloroéthane	j	NC
1,2-dichloroéthane	g/l	< 5,0
Flux 1,1-dichloroéthane	j	NC
1,1-dichloroéthane	g/l	< 2,5
Flux 1,2-dichloroéthylène trans	j	NC
1,2-dichloroéthylène trans	g/l	< 1,0
Flux 1,2-dichloroéthylène cis	j	NC
1,2-dichloroéthylène cis	g/l	< 2,5
Flux 1,1-dichloroéthylène	j	NC
1,1-dichloroéthylène	g/l	< 0,5
Flux Dichlorobromométhane °	j	NC
Dichlorobromométhane °	g/l	< 2,5
Flux Dibromochlorométhane °	j	NC
Dibromochlorométhane °	g/l	< 2,5
Flux Chloroforme °	j	NC
Chloroforme °	g/l	< 1,0
Flux Bromoforme °	j	NC
Bromoforme °	g/l	< 2,5

This analysis allowed a calculation of the quantity of solvent for the molecule(s) concerned. In this case, the molecule dichloromethane is found with a too high concentration: the calculation will be the flow rate multiplied by the concentration.

To get these calculations done, the light yellow cells should be filled up.

Spot	Substance	Qtity [g/j]	VOC [k
PRL 9071	-	insignificant	
PRL 9072	Dichlorométhane	0.0607	0.015175
PRL 9073	-	insignificant	
PRL 9074	-	insignificant	
Total			0.015175

Historical Site

Spot	Substance	Qtity [g/j]	VOC [kg]
PRL 9071	-		
Total			0

H7

3.2.1.2.4 O6 Waste

3.2.1.2.4.1 Description

The wastes are managed by a Facility Maintenance Worker, of the facility Department. This person is doing a classification of the different products of the company in the file named "1 Registre de suivi de l elimination des dechets.JBSL.xslx". The products we are interested in are under the four following categories:

- "Paint and Similar" with the Classification "Decret N°2002-540" number **08 01 13***
- "Solvent" with the Classification "Decret N°2002-540" number **08 01 11***
- "DECAPANT" with the Classification "Decret N°2002-540" number **11 01 05***
- "P.R.Colles" with the Classification "Decret N°2002-540" number **08 04 09***

Unlike the categories "DECAPANT" and "P.R.Colles", the "Solvent" and "Paint and Similar" groups are divided in some additional categories.

The group "Solvent" is divided into four others:

- "Diluant Solvant"
- " Nikutex"
- "Toluen"
- "White Spirit"

The group "Paint and Similar" does not officially include any other categories. Nevertheless, it unofficially contains some: this is due to the fact that for some wastes it is difficult to segregate the trash. For this group, a further study was necessary.

The analysis of wastes has been done thanks to a classification of the company **Thommen Furler**. This study was done on a six month period in order to obtain a correct classification of the wastes included in this group (see Appendix N°6).

The results of this review were implemented in the Solvent Management Plan according to the categories containing solvents: at the end, we can find a 67% of solvents contained in the wastes, coming from the categories:

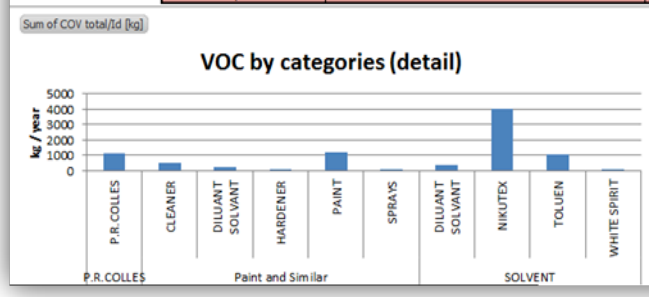
- Paint
- Cleaner
- Diluant Solvant
- Sprays
- Hardener

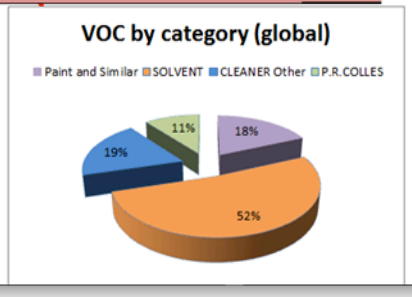
The analysis of the waste area is the following:

Solvent in Waste - Historical Site

Clasification Decret N°2002-540	Cat.	Column1	Column2	SubTotal [kg]	Density	COV/ Ref [g/l]	COV total [kg]
08 01 13*	Paint and Similar	PAINT Paint and Similar	36%	1958	1.4	400	1096.5
08 01 13*	Paint and Similar	CLEANER Paint and Similar	21%	1142	1	500	571.1
08 01 13*	Paint and Similar	DILUANT SOLVANT Paint and Similar	6%	326	0.8	800	208.9
08 01 13*	Paint and Similar	SPRAYS Paint and Similar	1%	54	0.8	400	17.4
08 01 13*	Paint and Similar	HARDENER Paint and Similar	3%	163	0.45	573	42.1
			67%				
08 01 11*	SOLVENT	DILUANT SOLVANT		563	0.8	800	360.3
08 01 11*	SOLVENT	NIKUTEX		6258	0.8	800	4005.1
08 01 11*	SOLVENT	TOLUEN		1635	0.8	800	1046.4
08 01 11*	SOLVENT	WHITE SPIRIT		60	0.8	800	38.4
08 01 13*		Paint and Similar	5439	3644			1935.9
08 01 11*		SOLVENT		8516			5450.2
		CLEANER Other		3998	1	500	1999.0
08 04 09*	P.R.COLLES	P.R.COLLES		1849	1	600	1109.4
				18007.1			10494.6 Total [kg]

Cat.	SubTotal [kg]
Shops in Hangar	6292.0
PSHP	2193.8
WOOD Shop	2080.0
	10565.9





3.2.1.2.4.2 Calculations

This worksheet contains two different parts, the analysis of solvent by categories, and the analysis of solvent by places.

The first one is calculated according to the quantity of waste found in the file "1 Registre de suivi de l elimination des dechets.JBSL.xslx", and the second one is calculated automatically.

It is based on a postulate: the proportion of waste which is going in the company is the same as the proportion which is going out, meaning that if we consider the paint, bought by the company as 12% in entrance, we can consider it as 12% in outgoing also. This postulate, after calculation, is matching at 99%.

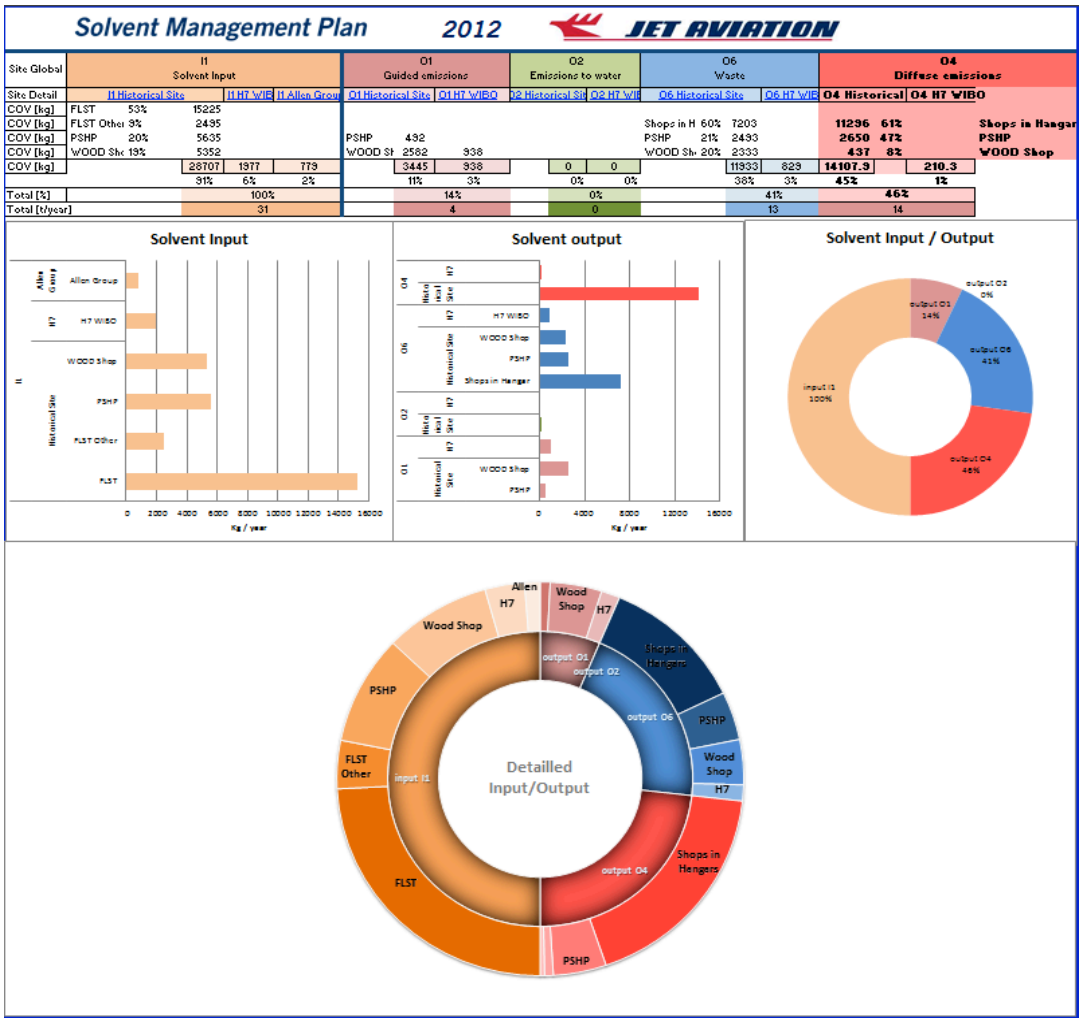
3.2.1.3. The Results

The results are divided in several parts (See Appendix N°10):

- A Global Dashboard where is visible all the global information
- Several individual analyses for each part of the SMP (Waste, water reject, air reject and input of solvent)

The segregation in two parts of the study enables to build a strategy to reduce the diffuse emissions and to comply with the law.

This dashboard is built to have a quick overview on the conformity to the regulation. It is a complete summary of the movement of solvents in the company, including analysis of the different sites (historical and Hangar 7) and of the places within the sites.

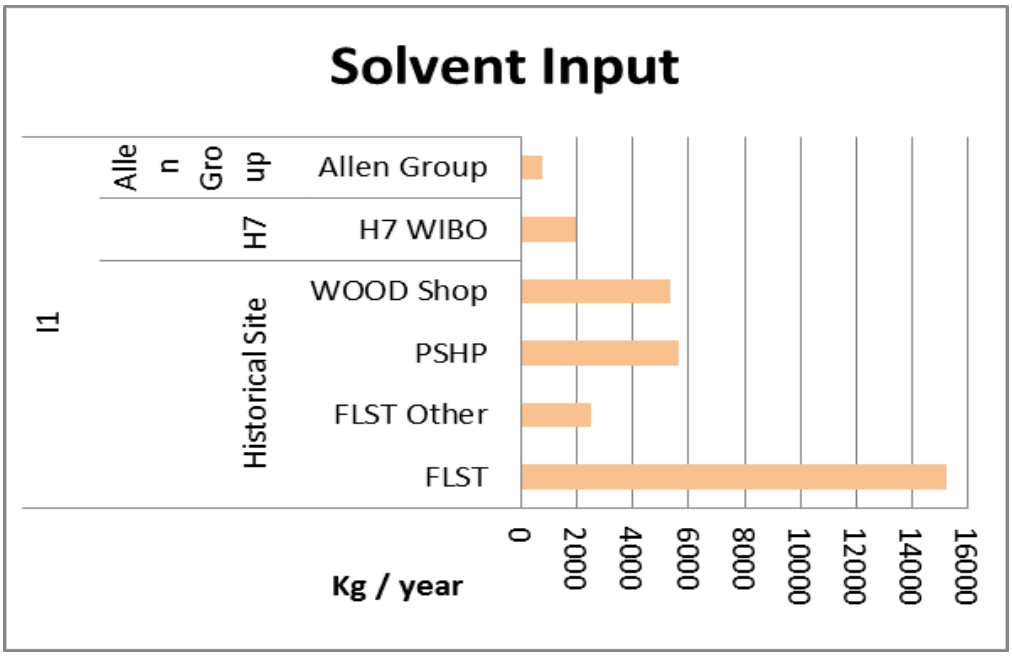


The historical site (and the Allen Group, an external company working to clean the aircrafts and mainly based on the ground of the Historical Site) is consuming 93% of the total solvent used in the JBSL Company. This study permits a determination of the biggest consumer, and of the products target that we have to reduce.

In order to reduce the solvent, some global solution can be adopted: the first one is the diminution of solvent in input. In first time, the problematic locations have been identified.

Thanks to the first graphic, “Solvent Input”, the different sites of the JBSL were analyzed and the result is that the biggest consumption of solvent is done by the products passing through the Fluid Store (FLST): 53% of solvent imputed in the JBSL Company is coming from the Fluid Store and is used in the hangar of the historical site.

The Paint hangar and the Wood Shop are also consuming a lot of solvent: 20% and 19% of solvent relatively.

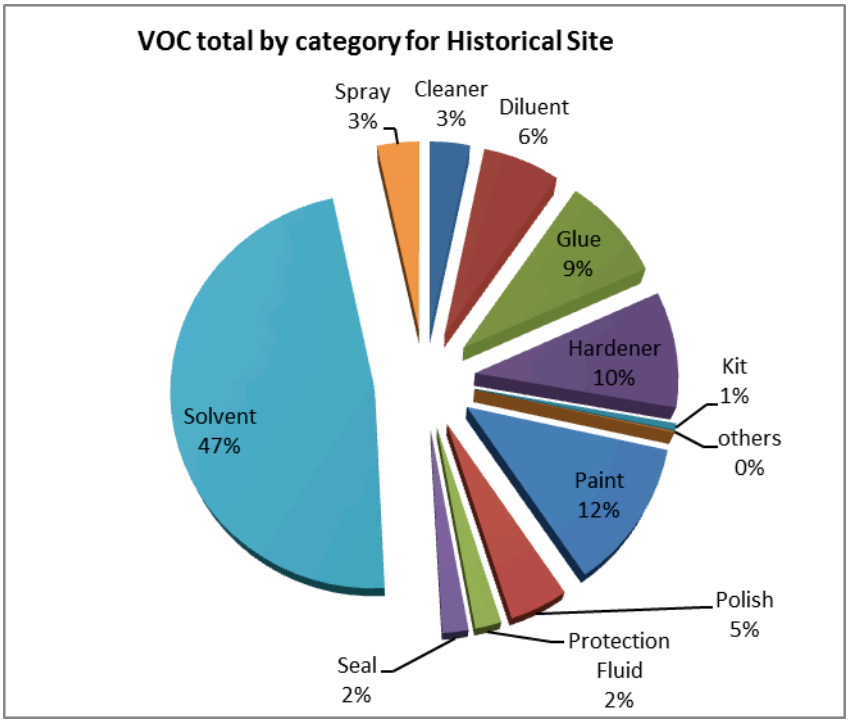


In a second time, a deeper analysis has been done.

The Historical Site and the Hangar 7 have a detailed analysis by category of products containing solvents.

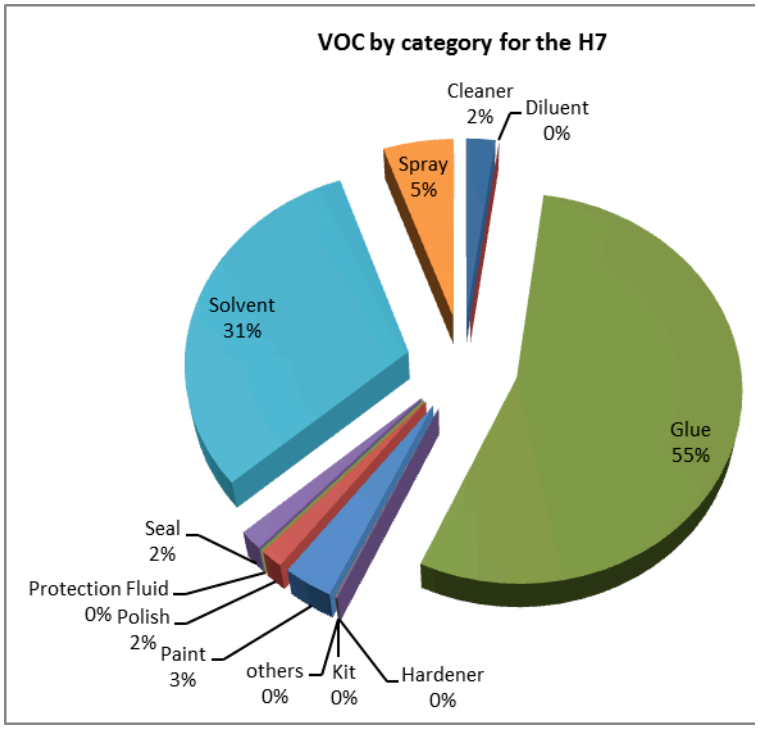
This analysis reveals that the Historical Site activities are consuming mainly

- 47% of pure solvent,
- 12% of Paint,
- 10% of Hardener
- 9% of Glue
- 6% of Diluent



The solvent is mainly used to dilute other products and to clean parts of the plane (motor, hydraulic parts…).

The same analysis has been done for the Hangar 7:



In the H7, the main source of diffuse emission of solvent is the glue room: it is why the analysis shows a 55% of glue.

As the H7 has a low percentage of diffuse emissions of solvent (1%), the analysis can focus in a first time in the Historical site.

The reduction of solvent by replacing product is not an easy task: a deep study for every substitute product replacing the old one has to be done. Moreover, the aeronautic regulation is playing an important role in this process of replacement because every product used on an aircraft has to be certified by this one.

This study is usually long and difficult because of the complexity and the diversity of the materials used in the planes (For example, different types of raw material need to be treated or stick together such as leather, iron, gold, wood…).

The second solution is to act on the output directly: by improving the filtration of the Paint Shop (responsible of 47% of diffuse emissions).The filtration of the Hangar of the Historical Site is not appropriate (paper filter) and should be replaced by active charcoal filters.

At the end the best solution to implement for reducing the diffuse emissions of solvent in the JBSL Company are:

- For the Paint Shop, some active charcoal filters have to be installed
- Substitute the products that are the biggest VOC emitter

A list of the main products has been established:

Cat.	id	Partnumber	Description	Place	VOC total/Id [kg]
Solvent	51879	RAK0011	SOLVENT,NIKUTEX 11	FLST	7783.7
Paint	470976	CM840-0007	JET GLO EXPRESS	PSHP	1352.7
Diluent	397392	M700	THINNER	PSHP	1236.2
Solvent	49933	FROSTSCHUTZ PRELIT:CHEMISCHE	FLUID,ANTI ICE	FLST	1109.7
Solvent	269789	050	FOAM,INSTAPACK,70 KG,COMPONENT A	FLST	1064.0
Solvent	73738	ISOPROPYLALKOHOL	ISOPROPYL	FLST	853.9
Solvent	283289	054	FOAM,INSTAFILL,58KG,COMPONENT B	FLST	788.8
Hardener	444918	CM0840-A03	ACTIVATOR	PSHP	778.2
Solvent	21233	MEK (HPN 116)	METHYL ETHYL KETONE	FLST	589.3
Solvent	21129	ACETON	ACETON	FLST	571.0
Glue	313823	TECHNICOLL 8058	ADHESIVE.TECHNICOLL	FLST	563.2
Hardener	502841	PU/C 039	CATALYST	WOOD Shop	547.2
Glue	82550	10GR PANZER KLEBER	GLUE	WOOD Shop	486.7
Cleaner	254670	8133	CLEANER,METAL CLEAN	FLST Other	428.8
Glue	231806	3524B/A FST:3M SCHWEIZ	EDGE FILLER,SCOTCH-WELD,KIT,15KG	FLST	396.0
Paint	225202	CLH	ZWEIHORN LACK	WOOD Shop	380.5
Glue	361573	BE 1122-CHIMIPRENE	GLUE,CHIMIPRENE,30KG	FLST	232.7

Some of those products are not compliant with the European Union Regulation of 18 December 2006 named REACh, (Registration, Evaluation, Authorization and Restriction of Chemicals, see the Part 4.3.3. REACh of this document). The first and the most emitting, the Solvent Nikutex is submitted to restriction, meaning a product with an unacceptable risk for the health and the environment: this product must be substituted. Others big solvent emitters are the glue Technicoll and Chimiprene which are also submitted to restriction. Those products will be replaced in the future, in regard with the obligation of substituting every Substance of Very High Concern by August 2014 (restricted products).

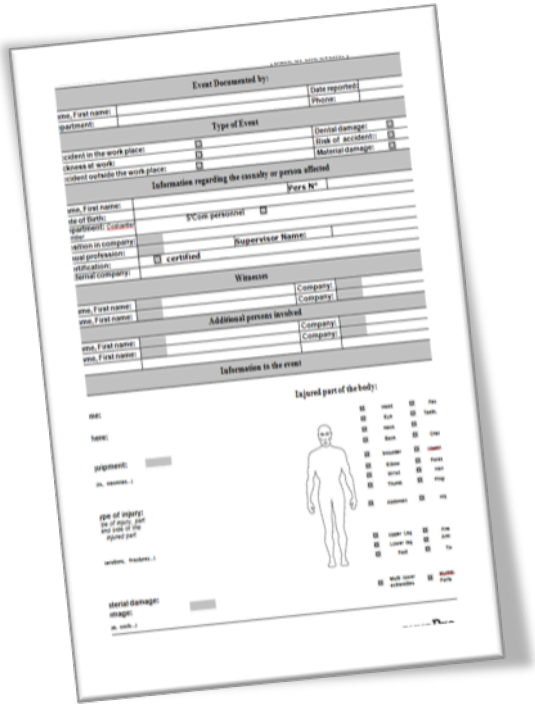
The second recommendation of this study will also be implemented thanks to the Risks Assessment of the Paint Shop that will lead to a replacement of these filters.

3.2.2. Management of all non-conformities: The Non Conformity Tool

3.2.2.1. Description of the need

The EHS Department is monitoring Aviation and EHS Non Conformity, occurrences, pro-active actions and Injuries. The EHS standard that the company is implementing required some information to be collected:

- A risk severity for Non Conformity Report (NCR) and Occurrence Report (OR)
- A root cause analysis for Non Conformity Report (NCR), Occurrence Report (OR), Injury Report (IR) and Pro-Active Report
- Correctives and Preventives Actions for Non Conformity Report (NCR) and Occurrence Report (OR)



Only one tool has to be created for these four reports, in order to simplify the input process.

All the information contained in this report needs to be updated in an Excel spreadsheet, in order to do statistics on it.

Injuries are reported thanks to an Accident Report of two pages which can be found on the intranet (see Appendix N°2), and sent by email the EHS Report mail box.

Every employee injured needs to fill out this form for the company records and for the SUVA insurance (*Swiss National Accident Insurance Fund*).

This Non-Conformity Tool had to be done online thanks to the web application Microsoft SharePoint®, in order to be accessible to every employee. This Reporting tool is included in the EHS website in a dedicated page.

To build up the data base of non-conformities for 2012, two excel files were done and managed by an administrator from the Facility Department. Those files were included in this data base (to do so a list has been created to store the old data on the intranet website).

Microsoft SharePoint is a Web application platform developed by Microsoft that can be used to provide intranet portals, document & file management, collaboration, social networks, extranets, websites, enterprise search, and business intelligence.

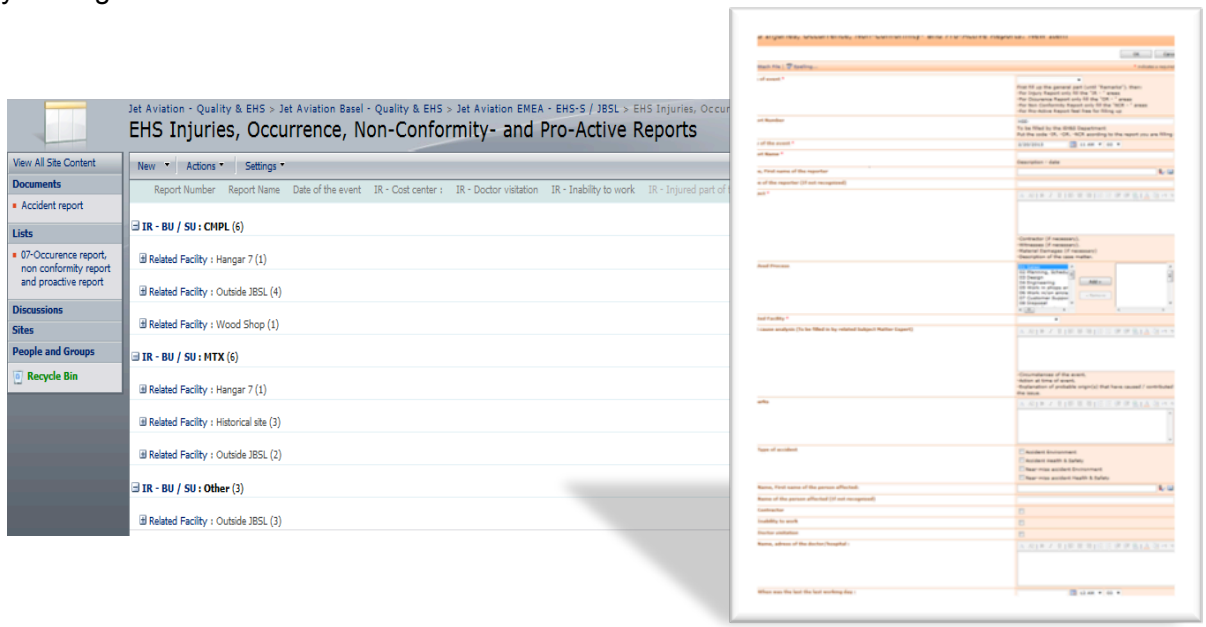
3.2.2.2. The Tool

3.2.2.2.1 The report on SharePoint

The Internet Report will be divided in three parts linked:

- The Global Report (common two all of the different parts)
- The part Injury Report
- The part Occurrence Report and Non Conformity Report

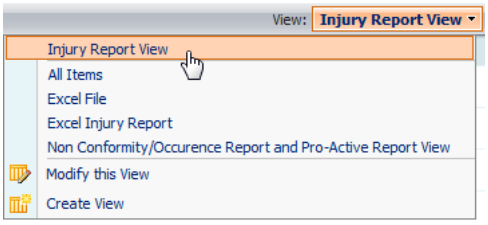
Afterward, these three parts are collapsed by Business Units (Maintenance, Completion, Other) and sub-collapsed by Related Facility (Hangar 7, Historical site, Wood shop, Log Nexus, Outside JBSL), in order to give a good overview of the EHS Non-Conformities to every Manager.



The first step for filling up this report is to choose the “type of event” you want to report (Injury Report, Occurrence Report, Non Conformity Report or Pro-active Report).

The Global Report (see Appendix N°3 and N°4) contains some mandatory elements that need to be filled up to create a new Report. The two other parts of the report are not mandatory but according to the Report that you want to do, you must fill the parts “Injury Report” or “Occurrence Report and Non Conformity Report”.

The web application Microsoft SharePoint® allowed filtering the view according the criteria “type of event”, which permits a segregation of the reports. This filtered view answers perfectly to the contraint “one tool, four reports”.



3.2.2.2.2 The Excel File linked to the SharePoint

This excel file is only related to the Injury Report and has been done in order to avoid any mistakes due to the complexity of the filters.

Indeed, what we get from the SharePoint® application, when creating the file, is a raw data base. This data base needs to be filtered regarding the types of statistics required. Five kinds of figures are necessary:

1. Recordable Case’s Statistics:

Recordable Case JBSL	
Target	5
Year of the event	2012
IR - Doctor visitation	(Multiple Items)
IR - BU / SU	(All)
Related Facility	Accident in the work place
IR - Contractor	FALSE

The accidents impacted by this study are the JBSL employees who have an occupational accident with a doctor visitation.

For these accidents, a Total Case Incident Rate (TCIR) has to be calculated, to compare it to the target of the year. This target is calculated according to the formula:

$$TCIR = \frac{Number\ of\ Accident\ *\ 200\ 000}{Number\ of\ hours\ worked}$$

For 2012 the target for JBSL was of 5 recordable cases in and the results are the following:

2. Absence Case's Statistics:

The accidents concerned by this study are the JBSL employees who have an occupational accident, with a doctor visitation, and who needed sick leave.

Absence Case JBSL	
Target Absence Case	1.66
Year of the event	2012
IR - Doctor visitation	TRUE
IR - Inability to work	TRUE
Related Facility	Accident in the work place
IR - BU / SU	(Multiple Items)
IR - Contractor	FALSE

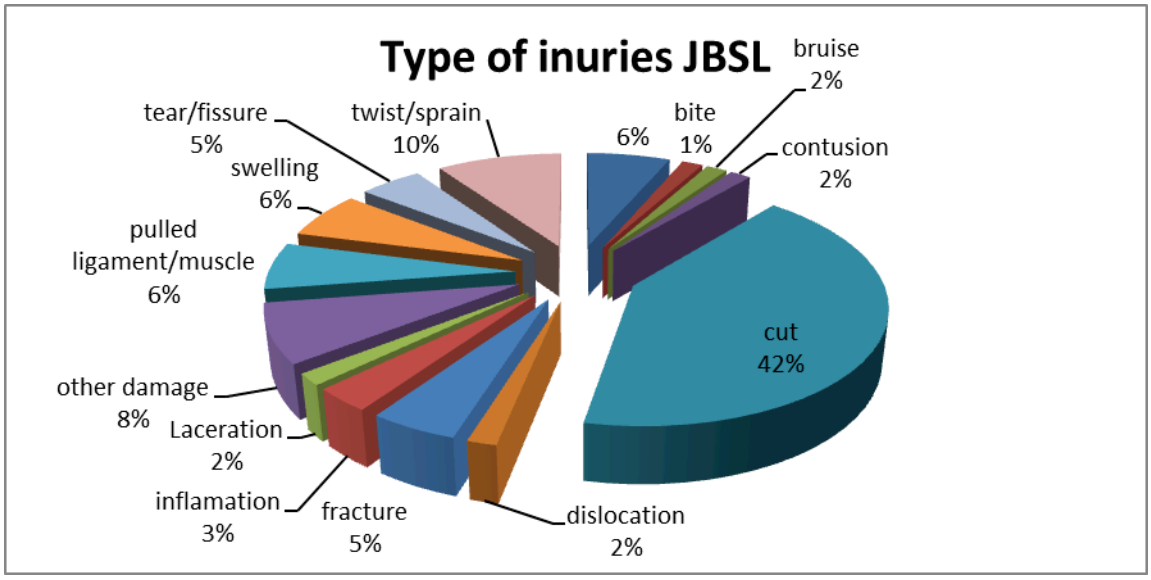
For these accidents, a Total Case Incident Rate (TCIR) has to be calculated, to compare it to the target of the year. This target is calculated according to the same formula.

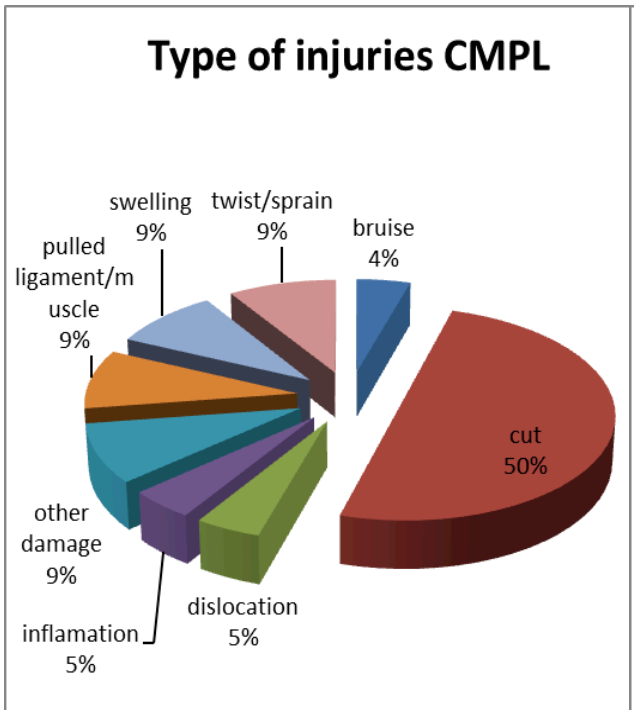
For the year 2012 the recordable case target for JBSL was of 1.66 and the results are the following:

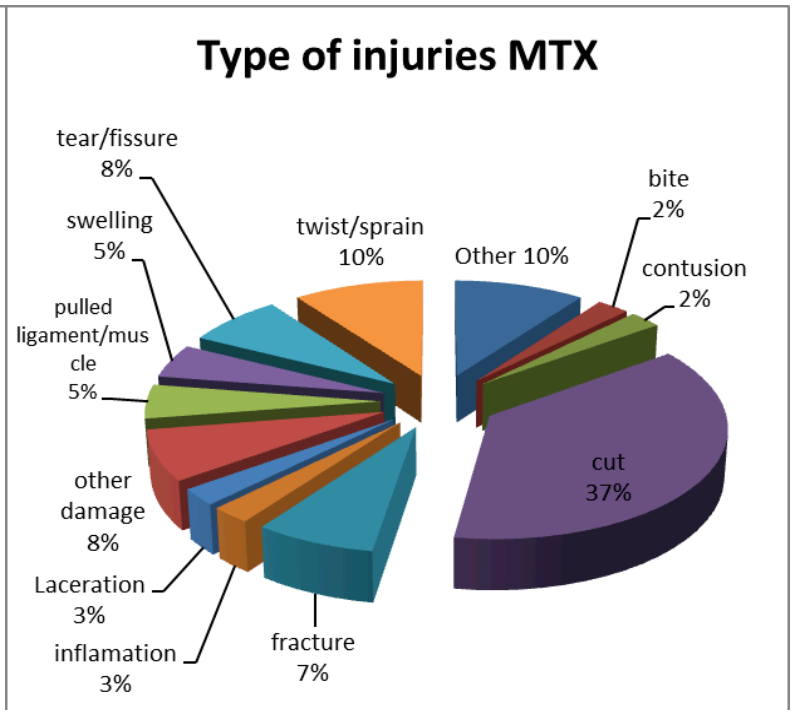
3. Type of injuries' Statistics

The accidents impacted by this study are the JBSL employees who have an occupational accident with a doctor visitation.

For the year 2012 the types of injuries' results are the followings:



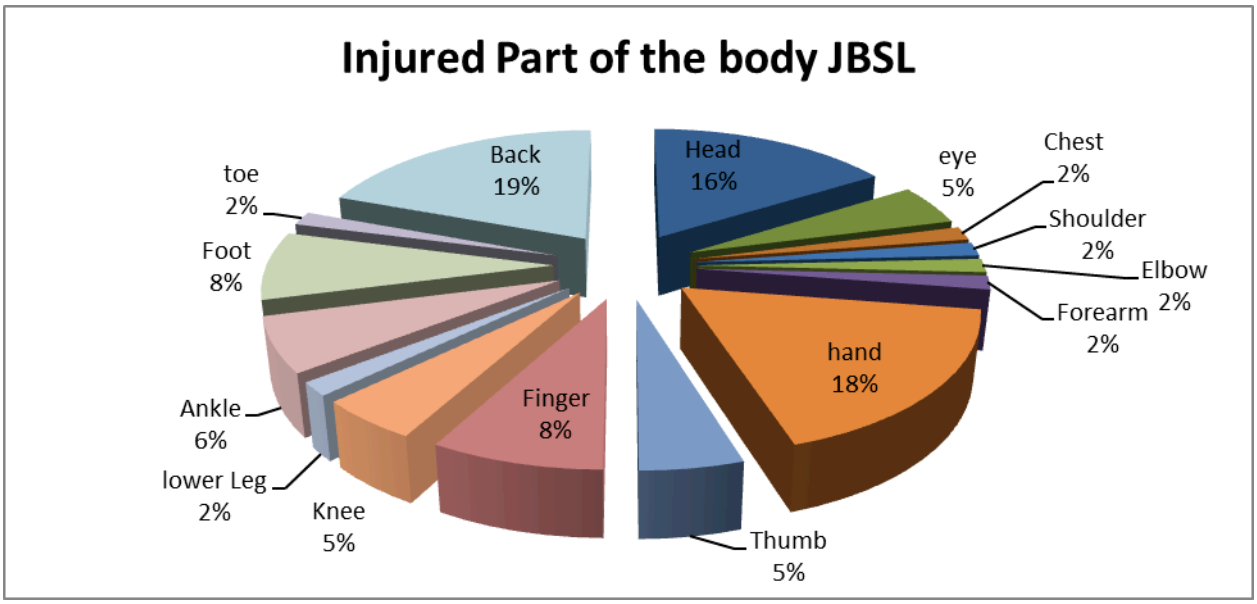


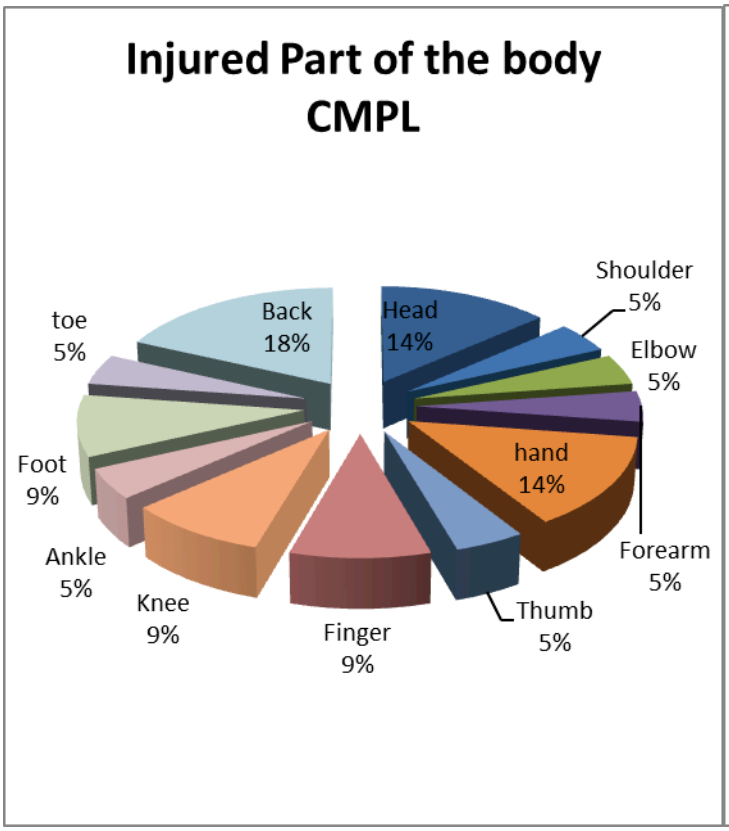


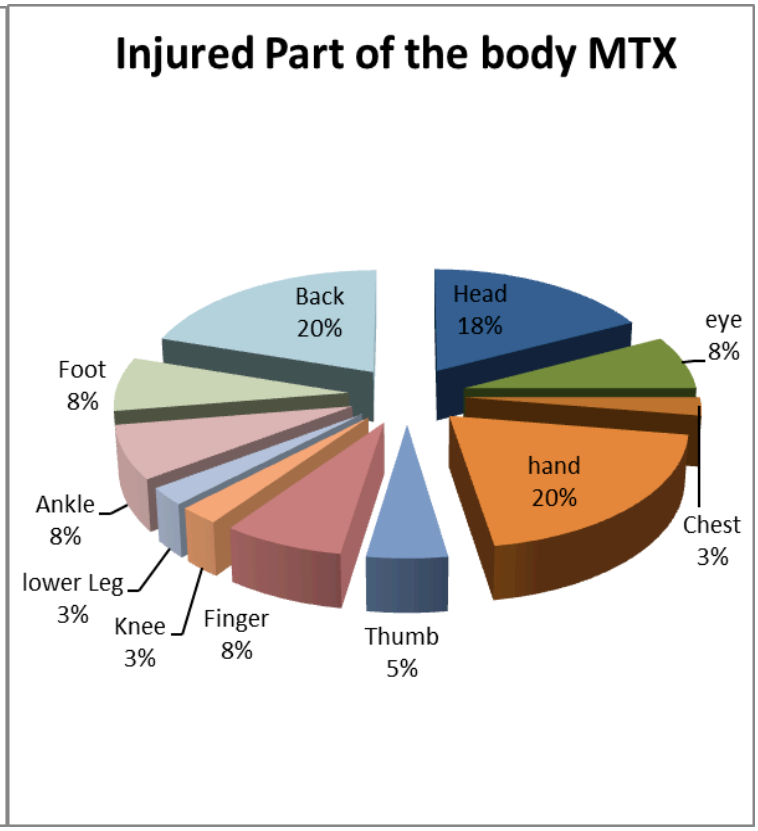
4. Injured Part of the body's Statistics

The accidents concerned by this study are the JBSL employees who have an occupational accident with a doctor visitation.

For the year 2012 the Injured Part of the body's results are the followings:







5. A Part/Type of injuries' Statistics

The accidents impacted by this study are the JBSL employees who have an occupational accident with a doctor visitation.

For the year 2012 the Part/Type of injuries' statistics are the followings:

Row Labels	bite	bruise	contusion	cut	dislocation	fracture	inflamation	other damage	pulled ligament/muscle	swelling	tear/fissure	twist/sprain	Grand Total
Back (left part) ;# 37										1			1
Back (Right part) ;# 38								1					1
Chest ;# 7								1					1
Head ;# 1			1	9									10
Left Finger ;# 21				4							2		6
Left Foot ;# 34								1		1			2
Left Hand ;# 19				3		1							4
Left Knee ;# 28	1											1	2
Left toe ;# 36										1			1
Multiple Injuries	3						1	1	2			1	8
Right Ankle ;# 31												2	2
Right Elbow ;# 12					1								1
Right eye ;# 3								1					1
Right Foot ;# 33	1		1									1	3
Right Forearm ;# 14				1									1
Right hand ;# 18				3		2			1			1	7
Right Knee ;# 27	1						1		1				3
Right lower Leg ;# 29		1											1
Right Shoulder ;# 8										1			1
Right Thumb ;# 20				2							1		3
Grand Total	**6**	**1**	**1**	**1**	**22**	**1**	**3**	**2**	**5**	**4**	**4**	**3**	**6**	**59**

This Matrix is the most important statistics of this study because it help to adapt Personal Protective Equipment (PPE) to the injuries and to put in place specific corrective actions to prevent any injury to happen again: in our case, and as a pro-active action for 2013, helmet should be mandatory, the wear of gloves should be controlled further, and some ankle safety boots should be proposed.

Moreover, another measure for 2013 should be the use of cutting tool must be controlled and only provided to people that are working with.

For the staff awareness, a communication plan have to be implemented and display in every places of the company, but first and foremost in the shops, where most of the accidents take place.

3.2.3. The EHS Risks Assessment

3.2.3.1. Description

The role of risk assessment is to identify and evaluate the risks faced by the organization across multiple disciplines, to communicate these risks to senior management (and possibly the board of directors and other stakeholders), and to monitor and manage those risks in a way that ensures the organization bears only the risks to which its management and board want exposure.

Effective risk assessment does not provide a guarantee against failure. Risk assessment failures can result from using a risk metric that answers the wrong questions. But for businesses to grow and to survive, organizations must take risks that are compatible with their risk appetites. A well-administered risk management plan is essential in order for organizations to reduce their EH&S and operational risks.

An EH&S risk assessment is the careful examination of what, in or as a result of an organization's operations and daily business functions, can cause harm to employees and the environment. The assessment is used to identify hazards and determine controls that are both precautionary and prevent harm.

An EH&S risk assessment program starts with identifying the possible risks (and benefits) associated with a product or with a process used to develop, manufacture, and distribute the product. The following questions should be asked at each stage of the product's life cycle:

- What are the safety and environmental risks?
- Who and what is at the highest risk?
- What populations / ecosystems are at risk?
- Are the risks predictable?
- Are the risks preventable?

Hazard assessments form the basis of controlling hazards. They should be seen as important tools in ensuring that an organization's activities don't present risks and that the controls implemented are appropriate.

This risk assessment period will result in establishing a functional tool box used by every manager, giving an answer to most of the possible injuries that can occur in their shops. This tool box is also called, in the French regulation the "Document Unique".

3.2.3.2. Planning

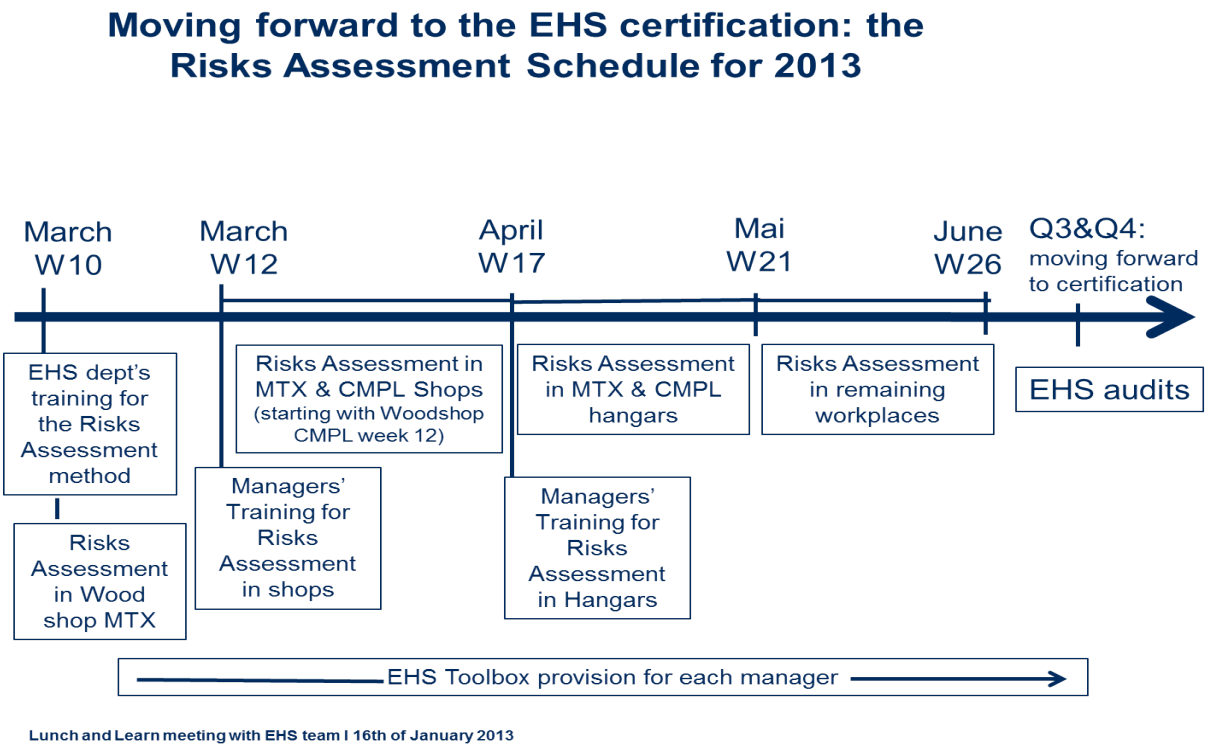
In order to comply with the certification in 2014, the risk assessment Program has been planned: first in the shops and secondly in the hangar.

As a first step, 17 risk assessments are performed: all the managers of every 17 shops are involved one day, for each shop. The shops' Risk Assessment of the company is lasting two month (from week 10 to week 17).

As a second step, the Risk Assessment of the hangar will be planned at the end of the first Risk Assessment period and are pre-planned from week 17 to week 21.

To plan this meeting, a pre-meeting had been done on the 16th of January with the two Vice-President (VP), Neil Boyle and Johannes Turzer (see Appendix N°11), and their team.

Here you can find the pre-schedule planned at this time:



A kick-off meeting has been conucted with the directors and the VP on the 5th of March in order to have every step clear to go ahead.

The period of risk assessment being at the end of my internship, I have planned every meeting until the 23rd of April knowing that I will be there only for the beginning (for the training and for the first 6 Risks Assessment).

The planning of the risks assessment, from the 7th of March to the 23rd of April can be found below:

		Day	Month	Global Action	Detail Action	Location	Manager	Coments	Statut preparatio
	Sunday	3	March						
W10	Monday	4	March	Risks Assessment	Retour Barbara				
	Tuesday	5	March		Kick Off Meeting			with directors	PLANED
	Wednesday	6	March		training EHS Dpt				PLANED
	Thursday	7	March		Training EHS Dpt				PLANED
	Friday	8	March		Risk Assesment			Risk Assesment Document delivery	PLANED
	Saturday	9	March						
	Sunday	10	March						
W11	Monday	11	March	Risks Assessment	Dekra Analyse R.A. Wood shop				
	Tuesday	12	March						
	Wednesday	13	March						
	Thursday	14	March						
	Friday	15	March						
	Saturday	16	March						
	Sunday	17	March						
W12	Monday	18	March	Risks Assessment	Training shops Managers			Training Manager Shop MTX, CMPL	PLANED
	Tuesday	19	March		Wood Cabinet NB/WB	Wood Shop	Nicolas Pfeffer		PLANED
	Wednesday	20	March		SCM Meeting 10h-11h	Quality Global Meeting room			PLANED
	Thursday	21	March		Wood System Integration	Wood Shop / H7	Raphael Naegelen		PLANED
	Friday	22	March						
	Saturday	23	March						
	Sunday	24	March						
W13	Monday	25	March	Risks Assessment	Wood Finishing Dpt.	Wood Shop	Raphael Naegelen		PLANED
	Tuesday	26	March						
	Wednesday	27	March		Paint Shop	Paint Shop	Marius Peens	Replacement: Denis Cuozzo	PLANED
	Thursday	28	March		Paint Shop	Paint Shop	Marius Peens	Replacement: Denis Cuozzo	PLANED
	Friday	29	March		Public Holiday				
	Saturday	30	March						
	Sunday	31	March						
W14	Monday	1	April		Public Holiday				
	Tuesday	2	April	Risks Assessment					
	Wednesday	3	April		Uph. Cmpl	H7	Chris Hilfer		PLANED
	Thursday	4	April		Uph. Cmpl +Sheet Metal instalation	H7	Chris Hilfer + Stephane Richard (+ Nicholas Merry)		PLANED
	Friday	5	April		Uph. Mtx	Historical Site	Vincent Deichtmann		PLANED
	Saturday	6	April						
	Sunday	7	April						
W15	Monday	8	April	Risks Assessment					
	Tuesday	9	April		Sheet Metal Cmpl	Historical Site	Steve Sommerfeld		PLANED
	Wednesday	10	April		Sheet Metal Cmpl	Historical Site	Steve Sommerfeld		PLANED
	Thursday	11	April		Sheet Metal Mtx	Historical Site	Eric Merceron		PLANED
	Friday	12	April						
	Saturday	13	April						
	Sunday	14	April						
W16	Monday	15	April	Risks Assessment	Engine Shop	Historical Site	Peter Amacher		PLANED
	Tuesday	16	April		Wheel Shop	Historical Site	Fernand Neunlist		PLANED
	Wednesday	17	April		NDT	Historical Site	Hans-Jürgen Lindgens	+ special training on the morning	PLANED
	Thursday	18	April						
	Friday	19	April						
	Saturday	20	April						
	Sunday	21	April						
W17	Monday	22	April	Risks Assessment	Instrument Shop	Historical Site	Dino Tavone		PLANED
	Tuesday	23	April		Avionic	Historical Site	Michel Wogenstahl		PLANED
	Wednesday	24	April						
	Thursday	25	April						
	Friday	26	April						
	Saturday	27	April						
	Sunday	28	April						

3.2.3.3. Realization

The realization of this EHS Risks Assessment will be divided in three steps: the assessment of the shops first, then, the assessment of the Hangars, and finally, the assessment of the remaining workplaces (offices …).

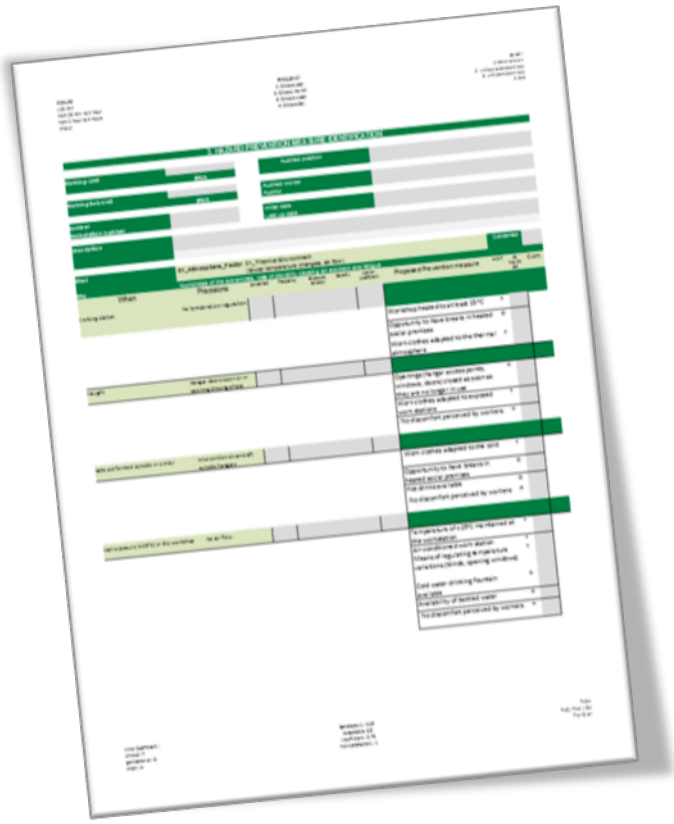
As the complete cycle of assessment will last approximately 6 months, my task was the preparation and the realization of the beginning of the first phase.

This first phase included a training of the shop managers and a launching assessment phase that have been done during the first week (Week 12). The training of the managers has been done by the EHS consultant Dekra, which was providing the assessment tool. This training is composed by an interactive presentation of the Risks Assessment focusing on the technical points and regulatory aspects.

The assessment phase has been done thanks to a check-list of more than 500 questions linked to an excel spread sheet. Every shop has to be divided in sub-units and every check-list is related to one sub-unit.

This check-list includes all the regulatory points of the legislation and is common to all the places assessed. Then the excel spread sheet linked is divided in 5 pages:

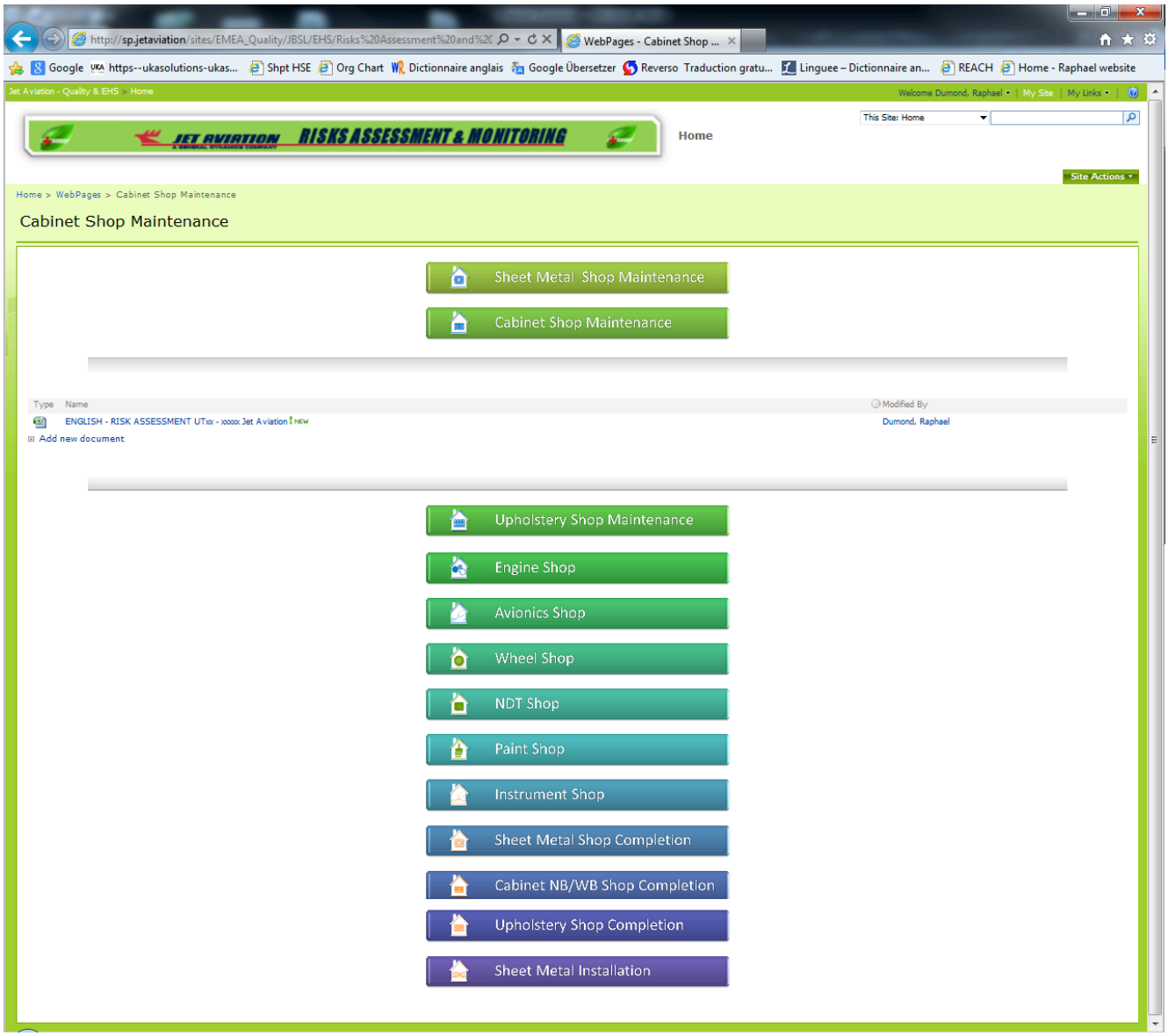
- The breaking down of the work unit in sub-units
- Description of the sub-unit
- Hazard and prevention measures identification
- Risk evaluation
- “Document Unique”



The Sub-division of the shop in work sub-units has to be done previously by the manager. The shops are assessed, thanks to the sub-unit pre-defined, using the check-list.

An extract of the check list used is visible in Appendix N°16.

The second phase was the creation of an intranet tool box accessible for each managers of each shops assessed. To do so a special website has been developed permitting the manager to see only his shop, keeping a certain confidentiality.



The tool box of the manager for the Cabinet Shop Maintenance

3.3. Other Non-Conformities

3.3.1. Greenhouse Gas Footprint

This study has been done according to the guide from the Ministère de l'écologie, du développement durable, des transports et du logement [7], and to the ADEME (Agence de l'Environnement et de la Maitrise de l'Energie) guide for the carbon footprint realization [8].

3.3.1.1. Description

Greenhouse gas can be emitted through transport, land clearance, and the production and consumption of food, fuels, manufactured goods, materials, wood, roads, buildings, and services.

Most of the Greenhouse gases footprint emissions for the average U.S. household come from "indirect" sources, i.e. fuel burned to produce goods far away from the final consumer. These are distinguished from emissions which come from burning fuel directly in one's car or stove, commonly referred to as "direct" sources of the consumer's Greenhouse gases footprint.

An individual's, nations, or organization's carbon footprint can be measured by calculative activities denoted as carbon accounting. Once the size of a carbon footprint is known, a strategy can be devised to reduce it, e.g. by technological developments, better process and product management, changed Green Public or Private Procurement (GPP), carbon capture, consumption strategies, and others.

The Carbon footprint that we are using is a slim version of the complete ADEME file Named: "Bilan Carbone®". This file is usually used for the determination of a Carbon Footprint, a study, not mandatory and much more complete. This file is composed by an Excel file and a 172 pages PDF document.

3.3.1.2. Building up of the study

To set the baseline, the greenhouse gas emissions have been assessed across the whole company, based on a daily updated data base. This investigation has been done on the year 2011.

This study is focusing on some key activities classified in four main groups:

- Energy
- Other than energy
- Freight
- Displacement

The group “Energy” allows accounting of emissions released by the use of energy from the company’s stationary source. The term "stationary source" refers to:

- Use of combustion in fixed facilities (e.g. boilers)
- The use of electricity in fixed installations (electricity consumption buildings, engines, etc…).

In the Jet Aviation Basel Group, only three energies are used, mainly for the use of the installations and the heating system: Combustible (Natural Gas), Superheated Water and Electricity.

The group “Other than energy” includes others possible way of greenhouse emissions. Regarding this, the Jet Aviation Basel Company is only concerned by Kyoto gas (R407c, R410a, and R404a) and Non Kyoto Gas (R22).

The group “Freight” is separated in two subgroups:

- Internal Road Freight
- Internal Cargo

The subgroup “Internal Road Freight” is composed by the gasoil and fuel consumption used by the internal production vehicles (car trucks, and tractors).

The subgroup “Internal Cargo” contains the kerosene consumption used during the flight test and the aircraft engine run-up test.

As a precise calculation cannot be established, an approximation has been done, based on the type of aircraft and the flight duration.

The group “Displacement” refers to the transportation of VIP clients (e.g. from the hotel to the company mainly).

3.3.1.3. The Results

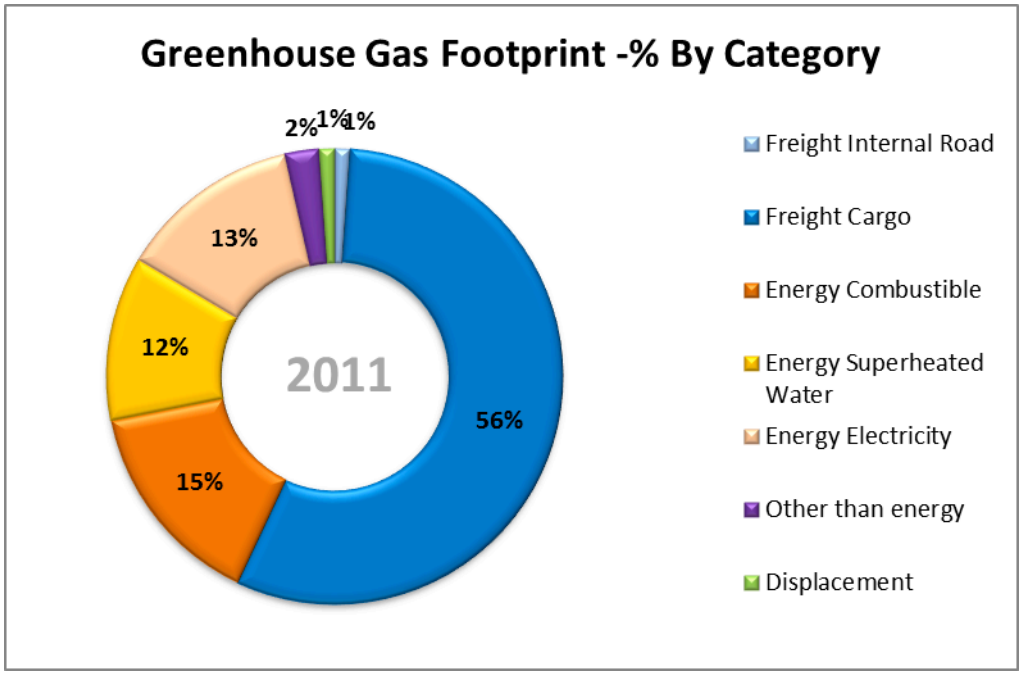
Description of selected organization workshop/department:

Emissions Categories	N°	Emissions group	
Direct Emissions of GHG	1	Fixed Sources Emission	Natural Gas combustion
	2	Thermic motor's moving emissions sources	Carburant combustion of vehicles owned by the company, carburant combustion for run-up of engines and for flight test
	3	Non energy emissions	*Non concerned*
	4	Momentary emissions	Leak from liquid refrigerant
	5	Biomass emissions	*Non concerned*
Indirect Emissions of GHG	6	Emissions linked to electricity consumption	Electricity production, transport and distribution
	7	Vapor, heat, cold consumption	Overheated water

The results are divided according to some categories defined below:

Greenhouses Gas Emissions (in tons)							
2011							
categories	**Emissions group**	**CO2 (t)**	**R407c (t)**	**R410a (t)**	**R404a (t)**	**R22 (t)**	**Total (tCO2e)**
Directs Emissions	1	1'192.88					1'192.88
	2	4'644.11					4'644.11
	3						
	4		180.51	4.41	3.78	4.16	192.86
	5						
	Sub total	**5'836.99**	**180.51**	**4.41**	**3.78**	**4.16**	**6'029.85**
Indirects Emissions	6	1'033.83					1'033.83
	7	933.27					933.27
	Sub total	**1'967.10**	**0**	**0**	**0**	**0**	**1'967.10**
Total		**7804.09**	**180.51**	**4.41**	**3.78**	**4.16**	**7996.95**

The emissions of Greenhouses gas in the JBSL Company can be divided in a different way, for the company to act on the main emission origins:



With an average of 3500L for the narrow body (and 14 flight for 2011), and 14500L for the narrow body (and two airbus A319, one Airbus A340-600, one Airbus A340-300, and one Boeing B737), the Freight Cargo category is the biggest GHG emitter.

Jet Aviation has rejected 7,996 tons of CO_2 in 2011 for a total number of 1200 employees, meaning 6,66kg for each employee. This number should be compared with the values of the companies that are working in the same filed:

- Airbus Operations SAS: 188,462 tons for 17517 employees, meaning 10,75 kg per employee.
- Dassault Aviation : 36,426 tons for 8068 employees, meaning 4,51 kg per employee.

To conclude, the Jet Aviation Basel Company has a CO_2 emission rate which is acceptable, but that can be manage in a better way by introducing a more detailed following of the kerosene consumption.

At this purpose, an official public document has been published in March 2013 to comply with the French regulation (see Appendix N°15).

3.3.2. MSDS

3.3.2.1. Description

A material safety data sheet (MSDS), safety data sheet (SDS), or product safety data sheet (PSDS) is an important component of product stewardship and occupational safety and health. It is intended to provide workers and emergency personnel with procedures for handling or working with that substance in a safe manner, and includes information such as physical data (melting point, boiling point, flash point, etc.), toxicity, health effects, first aid, reactivity, storage, disposal, protective equipment, and spill-handling procedures. MSDS formats can vary from source to source within a country depending on national requirements.

SDSs are a widely used system for cataloging information on chemicals, chemical compounds, and chemical mixtures. SDS information may include instructions for the safe use and potential hazards associated with a particular material or product. These data sheets can be found anywhere where chemicals are being used.

It is important to use an SDS specific to both country and supplier, as the same product (e.g. paints sold under identical brand names by the same company) can have different formulations in different countries. The formulation and hazard of a product using a generic name may vary between manufacturers in the same country. As Jet Aviation have a special status (because it is a Swiss Company which is on the French Territory) this data base is primordial.

In Jet Aviation Company, the MSDS are accessible to everyone through the intranet web site of the Quality Environment Health and Safety.

New | Upload | Actions | Settings — 1 - 1000 — View: All Documents

Type	Name	Product Name	Product Code / Description	Revision Date	Modified	Activity	Modified By
	044 2 Primaire Universel 134913 BULK 00 FR	044/2 Primaire Universel	134913 BULK 00	4/28/2011	1/4/2013 1:18 PM		Dumond, Raphael
	07309000		07309000		11/21/2012 3:53 PM		Dumond, Raphael
	07309000e				11/20/2012 4:42 PM		Dumond, Raphael
	07309000f		07309000		11/20/2012 4:42 PM		Dumond, Raphael
	10P4-2 Cadnium free FR Epoxy Primer EN	10P4-2 Cadnium free FR Epoxy Primer		9/8/2006	1/8/2013 1:20 PM		Humbert, Christian
	10P4-2NF Epoxy Primer Green BAC 452 - Akzo Nobel	10P4-2NF_FR Epoxy Primer Green BAC 452 no.719727			1/15/2013 8:19 AM		Muraru, Costel-Corneliu
	1200 OS Primer bot.500CC_4CTN				11/20/2012 4:42 PM		Dumond, Raphael
	1776 A 2 AS ACC		1776A2ASACC	6/25/2009	11/20/2012 4:42 PM		Dumond, Raphael
	20P1-10 Polyurethane Fuel Tank Primer, Akzo Nobel EN				11/20/2012 4:42 PM		Dumond, Raphael
	31 Mak idro.de				11/20/2012 4:42 PM		Dumond, Raphael
	336300_DE	Ansatzlos PLUS Stumpfmatt		9/23/2009	11/20/2012 4:42 PM		Dumond, Raphael
	3402 C Molykote	3402 C Molykote .pdf			11/20/2012 4:42 PM		Dumond, Raphael
	3470_001	LPS 2 Aerosol	00216 , C30216		1/11/2013 11:06 AM		Dumond, Raphael
	3976_001				11/20/2012 4:42 PM		Dumond, Raphael
	3990_001				11/20/2012 4:42 PM		Dumond, Raphael
	3M scotch weld 10 universal contact	adhesive spray			11/20/2012 4:42 PM		Dumond, Raphael
	3M scotch weld 10 universal contact adhesive sprayable spray	spray adhesive		10/15/2011	11/20/2012 4:42 PM		Dumond, Raphael
	3M Sprühkleber 77 Universal				11/20/2012 4:42 PM		Dumond, Raphael
	3M (TM) SCOTCH WELD	DP-190 Grau Teil a			11/20/2012 4:42 PM		Dumond, Raphael
	3M (TM) Perfect it III PATE A POLIR	3M (TM)		9/12/2011	12/10/2012 3:21 PM		Josseron, Barbara

An example of the old Data Base

3.3.2.2. Changes and implementation

The implementation of this Material Safety Data Sheets Database was not structured, resulting in an unorganized data base of more than 3000 different products.

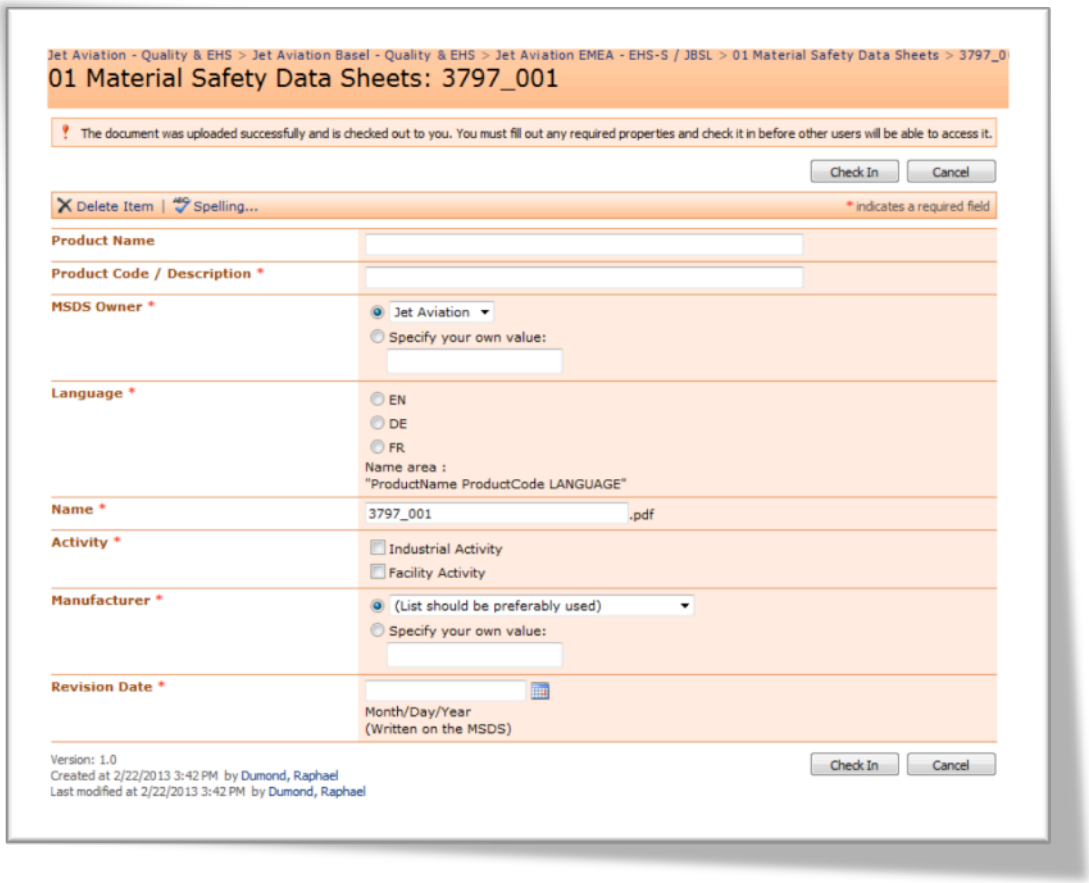
To comply with the regulation a clear and functional data base had to be implemented.

Two points were necessary to implement this new system:

- Information contained in the description form of every product have to be reviewed with some mandatory field
- Sort filters have to be set up to have a quick search

To do the first point, some columns were added (language, Activity concerned, MSDS Owner) and every field must be clearly stated (for some information as the name of Manufacturer should be taken from a pre-established list).

The first Step to put a new MSDS in the system is to fill up this form:

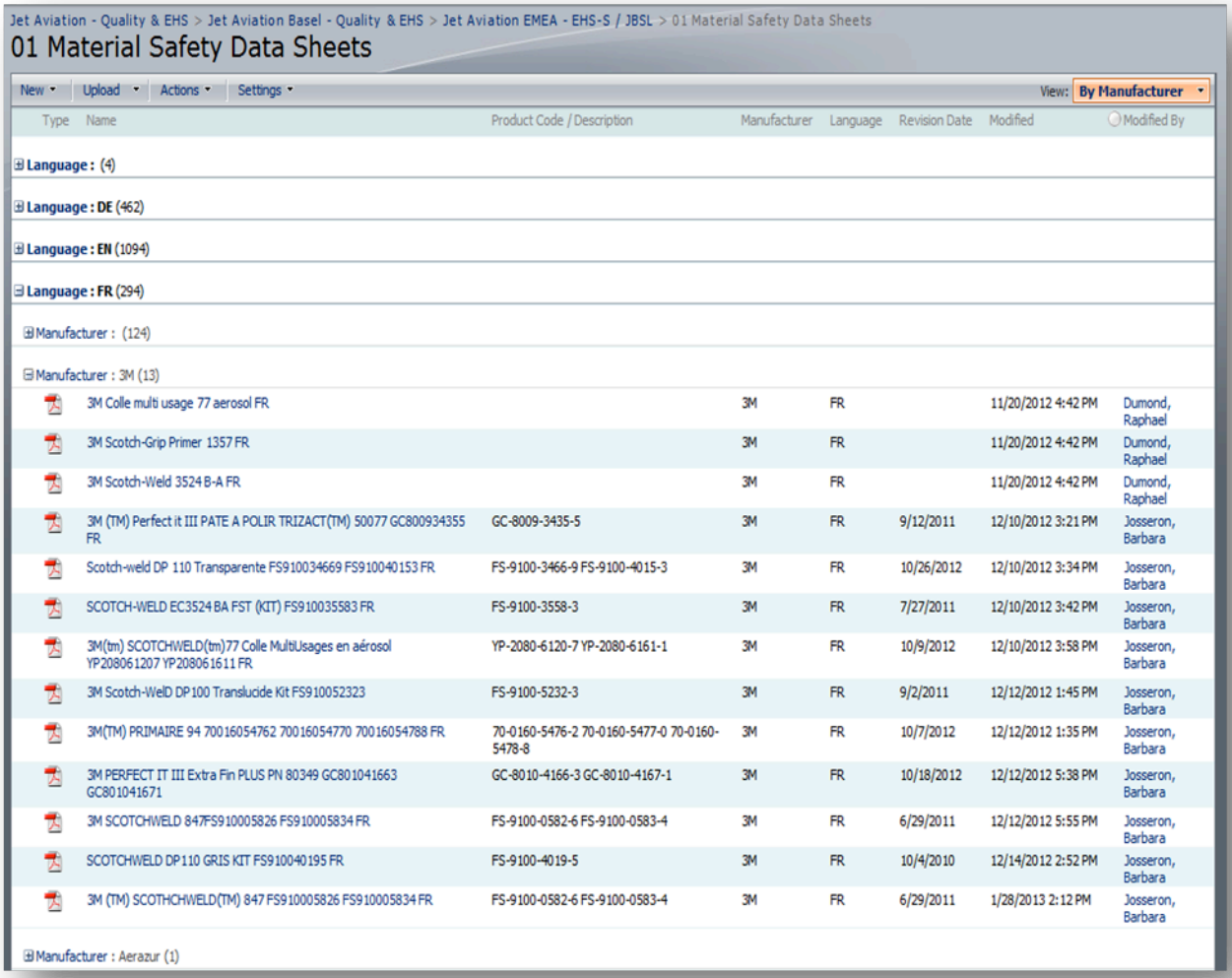


Some information is now mandatories:

- A description of the product
- An owner
- A language
- A Name
- An activity linked to the MSDS (Industrial or Facility)
- A Manufacturer(selected from a list of more than 50 usual manufacturers)
- A revision date

By filling up this information, the data base will auto-filled itself, and build by itself a complete base.

The second step was to sort the data base according to the languages and to the manufacturer. At the end the MSDS Data Base was organized as following:



3.3.3. REACh

This study has been done according to the REACh guide from the Techniques de l'ingénieur [9], and to the Appendix XVII from the REACh regulation [10].

3.3.3.1. Description of the regulation

Registration, Evaluation, Authorization and Restriction of Chemicals (REACh) is a European Union Regulation of 18 December 2006. REACH addresses the production and use of chemical substances, and their potential impacts on both human health and the environment. Its 849 pages took seven years to pass, and it has been described as the most complex legislation in the Union's history and the most important in 20 years. It is the strictest law to date regulating chemical substances and will affect industries throughout the world. REACH entered into force in 1 June 2007, with a phased implementation over the next decade.

REACh is a regulation that Jet Aviation must comply with because it is a European legislation (and Jet Aviation is a Swiss company implanted in a French territory), and because it is a request from its European customers (Airbus, Dassault). This regulation sorts the chemical products in four categories:

- **Restricted Chemicals** : meaning an unacceptable risk for the health and the environment
- **Authorized**: meaning that some products need to have a special authorization to be used
- **Candidate to Authorization**: meaning that some products are on its way to have a special authorization
- **None Restricted:** Meaning not concerned by REACh legislation (water paint…)

3.3.3.2. Implementation

The process in order to be compliant with the REACh regulation means some different steps within the JBSL Company. The first one will be a determination of the products concerned by this directive, and, in second time, the resolution of this non conformity.

The first step requires an accurate classification of the Chemical solvents in the company. Supply Chain Management (SCM) established, when purchasing, such a list. The first problem was that this list was no accurate at all: more than 50% of the list was a melting pot of non-chemical products.

The first step has to be established from the beginning by sorting out this list, and SCM was fully involved in this process. To do so, a meeting with the top management of SCM was established the 20th of March to fix this matter in order to have in the future an accurate list of solvent, based mainly on the list of product from the Fluid Store, Paint Shop, and Wood Shop for the Historical site and H7. This list has to be established by SAP using the old one, in order to keep a record of the old products.

Here you can find an extract from the chemical solvents list:

Old material no.	PNR	Material Description	Matl Grp Name
110716	6608283-1	ACCELEROMETER	Chemical Solvent
11574	AN280R406	KEY WOODRUFF	Chemical Solvent
12574	643R50-MECH	MECH.SITZKISSEN	Chemical Solvent
12612	616-058	MANCHON PROTECTEUR N	Chemical Solvent
12773	9533043	HEAD	Chemical Solvent
13270	5ARM300-8CN-1	LOW TENS.UNT. LAPA	Chemical Solvent
13271	5ARM300-11C	TENS.UNIT LAPA	Chemical Solvent
13303	5ARM300-6CNL	TENSION UNIT	Chemical Solvent
16082	553-4663-003	OSCILATOR	Chemical Solvent
218606	ASPIRATOR GRID	ASPIRATOR GRID	Chemical Solvent
219154	9803074-33	JOYSTICK	Chemical Solvent
1983	704044	THERMOCOUPLE	Chemical Solvent
19848	557-1206-01	SYNCHRO-HOUSING ASSY	Chemical Solvent
19991	557-1853-01	STATOR	Chemical Solvent
221652	69-75970-6	GATE	Chemical Solvent
221653	69-75970-7	GATE	Chemical Solvent
234366	9300-447	HEAT SINK	Chemical Solvent
234637	627964-1	SELECTOR	Chemical Solvent
235047	5441003-8	PISTON ASSY	Chemical Solvent
235374	69-35297-3	COMPENSATOR	Chemical Solvent
235951	9536363	PISTON	Chemical Solvent
235956	9544004	DISK	Chemical Solvent
238014	923530	PORTE BADGE	Chemical Solvent
246656	AVM 280 BLEU 290	ANTI SLIDING FLOOR	Chemical Solvent
247395	94756-13	VIBRATION ISOLATOR	Chemical Solvent
248570	90225025	BAGUE MOLETEE	Chemical Solvent
248807	6011321-20	FRAME SEGMENT	Chemical Solvent
248841	57102-050-1	WEDGE	Chemical Solvent
249069	ASNA3167	RECTANGULAR TUBE 5M	Chemical Solvent
249326	AS1506-26D32	CUFF	Chemical Solvent
255238	AHS 300	SPANNER / CROCHET A ERGOT REGLABLE	Chemical Solvent
255242	97000-1	HEATER	Chemical Solvent
255312	98-6ER575	WINDING WHEEL	Chemical Solvent
240596	65-1093	VANE VORTEX	Chemical Solvent
110246	8F-V12AN	VANNE A POINTEAU	Chemical Solvent
238478	AC-63820	RYTHM AND BLUES # 11 PRALINE	Chemical Solvent
265454	860.006.000	BRAS DE DOUCHE CHROME	Chemical Solvent
228181	9506	BOX TRANSPARENT	Chemical Solvent
387606	12640-03	ACCUMULATOR	Chemical Solvent
110716	6608283-1	ACCELEROMETER	Chemical Solvent

To begin with the second step, a list has been done pre-established by the EHS department for the use of the Solvent Management Plan. This phase was a pre-analysis of the list of the chemical solvent in order to confirm non-conformity of some products of the company. This analysis showed that a couple of products were submitted to restriction and some other is candidate to authorization.

restriction	BE 1122-CHIMIPRENE
restriction	SCALPIK DECAP SEC 77
restriction	NIKUTEX
restriction	TECHNICOLL 8058
restriction	TOLUOL
candidate to authorization	ALODINE1200
candidate to authorization	ALODINE1201-1QT

The REACh study in Jet Aviation is a study that I began during my final year project but a deeper analyze need to be performed. This subject will be really important at the end of 2014 (year where the first European prohibition of some Substance of Very High Concern will be put in place) and could affect the production of Jet Aviation if no replacement has begun.

This study involved the whole Company thanks to its complexity: every product non REACh compliant has to be replaced and some study from the engineering department of Jet Aviation has to be done for the product to comply with the European aeronautic regulation. One other difficulty of this subject is that some products as the Chimiprene or the Nikutex are products that are used since 30 years, and are difficult to replace because they are the more adapted to the task they are belonging.

The REACh study will be conducted more deeply in the future by the EHS team, when it will be deemed appropriate to do so.

4. Conclusions

4.1. General conclusions

This study, thanks to the resolution of the biggest non-conformities, leads to an important progress in the ISO 14001 and OHSAS 18001 certification process of the Jet Aviation Basel Company.

The creation of living tools such as the Solvent Management Plan, the Non-Conformity management tool and the EHS Risks Assessment tools allowed the company to manage those recurrent issues over the years, permitting to the certification process to be continuously improved.

The next step to the certification process is partly to follow some recommendation done in this report such as the replacement of paper filters to active charcoal filter in the Paint Hangar, or the substitution of some problematic products that are not REACh compliant.

The first recommendation will be taken into account as soon as the Environmental Risks Analysis will be done, but request an important budget due to the surface of the Paint Hangar where it has to be implemented.

The substitution of the several products non REACh Compliant will be the subject of a special investigation done by the EHS department when it will be deemed appropriate to do so.

An example of an extraction of 35 000 m^3/h built by the company S.B.P.I ENVIRONNEMENT

Moreover some studies could not have been done or are still pending, due to the lack of time of this study. The complete process of the Risks Assessment phase, lasting 6 months, have been begun and followed during the first 4th weeks, and the REACh study could not have been done in too many details.

4.2. Budget and Recommendations

The steps of this project are divided in three parts. The first one is the implementation of active carbon filter in the paint hangar. This part will be the most costly because of the dimension of the hangar: 35,94m width on 40,85m long (See Appendix N°17).

The best solution is the Active Carbon filter because it have good performance and a low price compared to other solutions and is mostly used for hydrocarbons: toluene, gasoline, hexane, chlorinated solvents:

- Concentration of solvent treated: 1 to 40g/Nm^3
- Usual rate: 300 to 200 000 m^3/h
- Capture efficiency: 95% to 99,9%
- Steam consumption: between 3 and 5 kg per kg of solvent recovered

Advantages of the process:

- Very efficient method due to the high exchange surface between the adsorbent and the fluid (solvent removal and deodorization).
- Wide enough range of application (flow, concentration and type of product).
- Accepts flow variations.
- Allows the treatment of chlorinated solvents

Limitations of the process:

- Some compounds generate polymerization reactions (styrene, butene, formalin, phenol, acrylonitrile ...) during the regeneration phases that can block the porous structure.
- Some compounds generate highly exothermic reactions with risks of hot spots (ketones).

Thanks to the very high air flow (214 888 m^3/h divided in 8 exit) a first approximation has been done by the company S.B.P.I ENVIRONEMENT, but only a specific sizing can provide the right approximation (depending of the need to put on each exit one carbon Filter or grouping all those exits in one and treat the emissions as a all).

The second part of the project, and the more time consuming, is the substitution of the products wich are not REACh compliant. Te first step is to replace the 7 more problematic (see part 3.3.3). A first study has been done for the Chimiprene and took 2 months to one engineer to find the best substitution product, compliant with aviation regulations.

The calculation of the budget has been done on this duration multiplied by the 7 products to replace.

The third point is the management and monitoring of the Risks Assessments by the EHS team (2 persons).

Budget of the Project

Client:	Jet Aviation	Comments	Quantity [Units]	Price per Unit [kCHF]	Amount [kCHF]
Implementation of Active Carbon Filter in the Paint Hangar					
Active Carbon Filter 200 000 m3		Soc. S.B.P.I ENVIRONEMENT	1	250,0	250,0
Subsidiary installation		25% of the Active Carbon Filter price	1	62,5	62,5
Installation/Setting up		15% of the Active Carbon Filter price	1	37,5	37,5
administrative expenditure		10% of the Active Carbon Filter price	1	25,0	25,0
				subtotal	375,0
REACh substitution of products					
		2 months of study done by 1 engineer for each product	7	23,1	161,5
Risks Assessment					
		782 h of work for the EHS team	1	42,5	42,5
				Total amount	579,0 kCHF

The Jet Aviation Basel Company driving to step up its conformity to the local and national low, is ready to set up actions plan focusing on the non-conformities unsolved for the moment. This step forward will definitely help the company to be certificated ISO 14001 and OHSAS 18001 by the end of 2014 if the recommended measures are taken into account as soon as possible.

Thanks

I would like to thank firstly the whole EHS team of Jet Aviation Basel managed by the senior director Yew Chung Low.

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