LCM

Life Cycle Management Project

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Lifecycle Management of Door

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Acknowledgements:

We would like to thank our supervisor **Dr.inz. Krzysztof Koper** for giving us the opportunity to do this project also for his directly and indirectly support during the project work with continuously high motivation to complete our research work.

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Executive Summary:

The journey towards sustainability requires that businesses should find innovative ways to be profitable and at the same time expand the traditional frontiers of business to include the environmental and social dimensions, in other words take account of "the Triple Bottom Line", and to introduce "Life Cycle Thinking". Life Cycle Management (LCM) aims to minimize the environmental and socio-economic burdens associated with product or product portfolio throughout its entire life cycle and value chain. LCM makes life cycle thinking and product sustainability operational for businesses through continuous improvements of product systems, as well as, supporting business assimilation of, for example, integrated product policies.

LCM is for organizations, which have expressed a wish to produce or trade products, which are as sustainable as feasible, to improve their public image, visibility, general relations with stakeholders, and increase their shareholder value, as well as, awareness of and preparedness for changing regulatory contexts.

LCM is not a single tool or methodology but a management system collecting, structuring and disseminating product-related information from various programs, concepts and tools. It incorporates environmental, economic, and social aspects of products, which are applied throughout a product's life cycle.

The organization must 'go beyond its facility boundaries' and be willing to expand its scope of collaboration and communication to all stakeholders in the value chain.

LCM can be specifically adapted and gradually introduced, in any organization, including SMEs.

Organizations may begin with small goals and objectives according to their resources and then get progressively more ambitious over time. To be successful it needs a commitment from top management and the active participation of key employees from relevant departments in the organization.

LCM is a dynamic and voluntary process, which is best implemented through a step-by-step process. Special attention should be given to activities that can secure continuous improvement. Finally, the Plan-Do-Check-Act cycle, in line with international management systems for organizations, such as ISO 9001 and ISO 14001, is recommended.

Introduction to Life Cycle Thinking:

Life cycle thinking is essential to sustainable development. It is about going beyond the traditional focus on production site and manufacturing processes so to include the environmental, social, and economic impact of a product over its entire life cycle. Extended Producer Responsibility and Integrated Product Policies mean that the producers can be held responsible for their products from cradle to grave and therefore, should develop products, which have improved performance in all stages of the product life cycle as shown in Figure below.

The main goals of life cycle thinking are to reduce a product's resource use and emissions to the environment as well as improve its socio-economic performance throughout its life cycle. This may facilitate links between the economic, social and environmental dimensions within an organization and throughout its entire value chain.

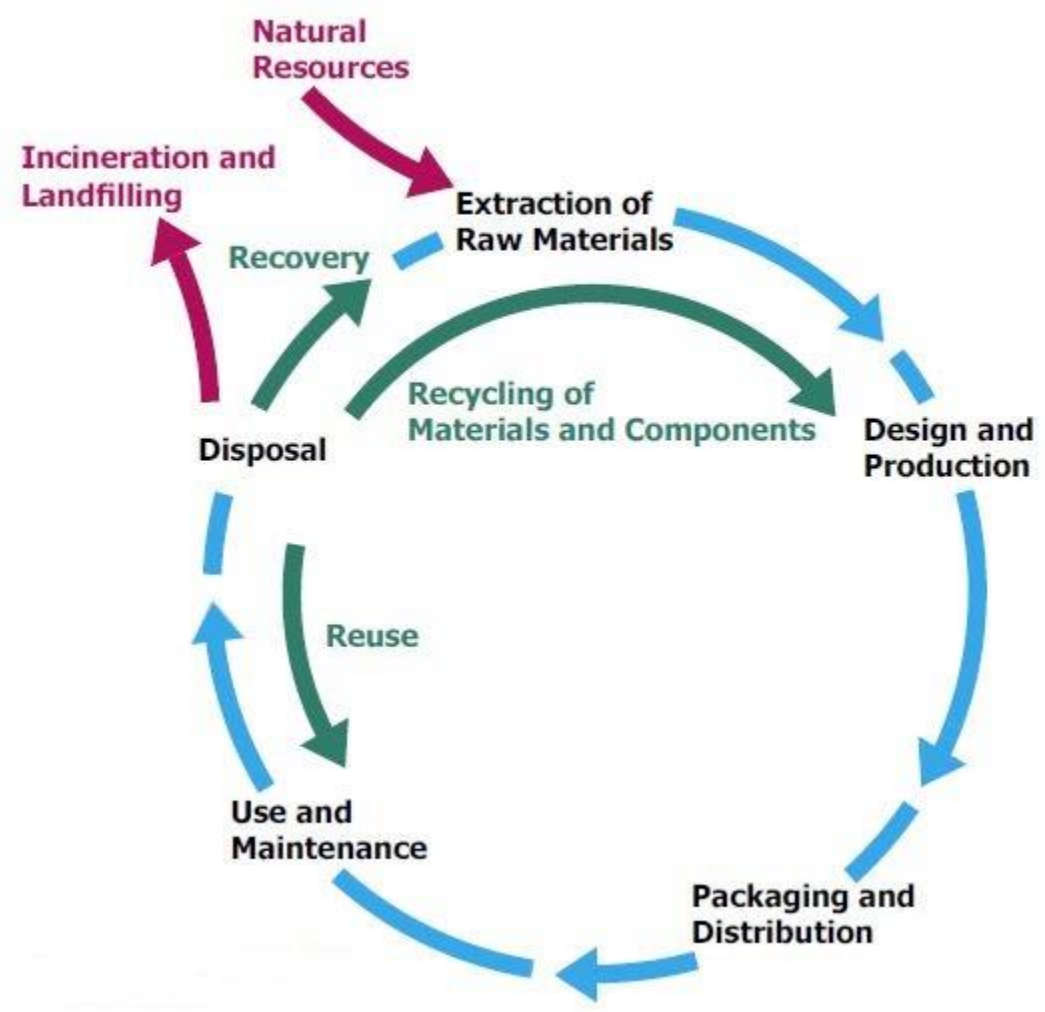


Figure above: A product system or life cycle can begin with extracting raw materials from natural resources in the ground and generating energy.
Materials and energy are then part of production, packaging, distribution, use, maintenance, and eventually recycling, reuse, recovery or final disposal.

What is Life Cycle Management?

Life Cycle Management (LCM) is a product management system aiming to minimize environmental and socio-economic burdens associated with an organization's product or product portfolio during its entire life cycle and value chain. LCM is making life cycle thinking and product sustainability operational for businesses through the continuous improvements of product systems, and LCM supports the business assimilation of policies such as integrated product policies.
Organizations use LCM to support their goals of providing products or services, which are as sustainable as possible. Many organizations have seen this strategy lead to improvements in their image, stakeholder relations, shareholder value, as well as, awareness of and preparedness for changes to their regulatory

contexts.

LCM is not a single tool or methodology but a management system collecting, structuring and disseminating product-related information from the various programs, concepts and tools incorporating environmental, economic, and social aspects of products, across their life cycle. The organization must 'go beyond its facility boundaries' and be willing to expand its scope of collaboration and communication to all stakeholders in its value chain.

ABOUT THE DOOR:

This project made for approach to solving the problem of managing the complete set of door definition information creating that information, managing it through its life, and disseminating and using it throughout the lifecycle of the product. Door is not just a product, but is an approach in which processes are as important, or more important for life cycle management.
The goals of Product Life Cycle management (PLM) are to reduce time to market, improve product quality, reduce prototyping costs, identify potential sales opportunities and revenue contributions, and reduce environmental impacts at end-of-life. To create successful new products the company must understand its customers, markets and competitors. Product Lifecycle Management (PLM) integrates people, data, processes and business systems. It provides product information for companies and their extended supply chain enterprise. PLM solutions help organizations overcome the increased complexity and engineering challenges of developing new products for the global competitive markets.

Our door is made of ten segments; it is generated to be used in light industrial. Many materials are environmentally friendly with recyclable.
Components of the door:
-Ferrules
-Anchors
-Gasket
-Handles
-Panes
-Thermal barrier
-Muntin
-Glass
-door sill
-Latches

Process, Door, Personnel (3P approach):

PERSONNEL, SKILLS MATRIX

Skills Matrix				
Competency	**Engineer**	**Employee**	**Managment**	**R & D**
Technical				
Basic metarial chemistry	Medium	Medium	Medium	Medium
Citrix system (Cloud system)	High	Medium	High	Medium
SAP	High	Medium	High	High
Customer complaints	High	High	Medium	Medium
Micro-testing	Medium	Medium	High	High
Analytical testing	High	High	High	High
ISO system	Medium	Low	Medium	Low
EPD principles	Medium	Low	Medium	Low
Sensory training	High	High	High	Medium
Using statistics	Medium	Low	Medium	Low
rcycling	Medium	Low	Medium	Medium
Managerial				
Time management	High	High	High	Medium
Subordinate development	High	Medium	N/A	N/A
Problem solving	Medium	Medium	High	Medium
Decision making	Medium	Medium	High	High

*Red indicates areas that are in need of improvement

This matrix present of measurement method in order to fulfill needs of requirements related with stakeholder's skills in meantime.

PRODUCT:

Product Title	Product Description Approved		Draft Ready		Final Quality check out		Product approved		Handed over	
	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual
Test plan	1/10	1/10	5/10	7/10	13/10	13/10	01/11	04/11	N/A	N/A
Ferrules	3/10	3/10	7/10	8/10	14/10	14/10	2/11	3/11	N/A	N/A
Anchors	2/10	2/10	6/10	7/10	12/10	14/10	28/10	2/11	N/A	N/A
Gasket	2/10	3/10	6/10	8/10	11/10	11/10	19/10	22/10	N/A	N/A
Handles	1/10	3/10	5/10	5/10	10/10	10/10	25/10	2/11	N/A	N/A
Panes	4/10	4/10	6/10	6/10	12/10	13/10	20/10	27/10	N/A	N/A
Thermal barrier	1/10	1/10	5/10	5/10	13/10	13/10	25/10	25/10	N/A	N/A
Muntin	3/10	4/10	7/10	8/10	15/10	15/10	23/10	1/11	N/A	N/A
Glass	2/10	4/10	8/10	8/10	13/10	14/10	1/11	3/11	N/A	N/A
Door sill	3/10	3/10	7/10	8/10	12/10	15/10	27/10	4/11	N/A	N/A
Latches	7/10	8/10	12/10	12/10	14/10	16/10	22/10	28/11	N/A	N/A
Final Form									6/11	7/11

PROCESS:

Process Audit

PROCESS VERIFICATION (VP)	PRE-SERIES (PS)	RELEASE TO PROD.(DaP)	CURRENT PRODUCTION	PROCESS AUDIT RESULT	Full Approval Planning
Material Req. Date: Build Date / Avail.:	Material Req. Date: Build Date / Avail.:	Material Req. Date: Build Date / Avail.:	Material Req. Date: Build Date / Avail.:		

	1 - PART DESIGN	2 - PROCESS DEVELOPMENT	3 - PROCESS CONTROL	4 - PROCESS CONTROL	5 - OPERATIONS	6 - LOGISTICS	7 - VERIFICATION	8 - QUALITY SYSTEMS	9 - FULL APPROVAL (Select Yes/No)
A	Drawing / Design Model ☐ DA 4	Process Planning ☐ DA 4	Control Plan ☐ DA 3	Process Monitoring & Data Recording ☐ DA NV	Work Instructions ☐ DA 5	First-in First-out (FIFO) & Material Handling ☐ DA 4	Production Demonstration Run ☐ DA 4	Corrective Actions ☐ DA 3	Planning of Self-Qualification Tests ☐ DA Y
B	Design FMEA OK (PPR Result) ☐ DA	Process Flow Diagram ☐ DA 4	Incoming Inspection ☐ DA 3	Boundary Samples ☐ DA 5	Maintenance ☐ DA 3	Traceability & Part Identification ☐ DA 5	Process Performance and Capability ☐ DA 4	Nonconforming Parts Management ☐ DA 3	Planning of Integrative Tests ☐ DA Y
C	Special Characteristics ☐ DA 5	Process FMEA ☐ DA 4	Error & Mistake Proofing ☐ DA 2	First Piece Approval ☐ DA 5	Rework / Repair ☐ DA 4	Packaging ☐ DA 4	SQE Audit ☐ DA 3	Lessons Learned ☐ DA 4	Planning of Matchability / Benestare ☐ DA Y
D	Design Acceptance ☐ DA 4	Tooling & Equipment ☐ DA 5	Gages & Measuring Devices ☐ DA 5	Layered Process Audit ☐ DA 3	Training ☐ DA 3	Sequenced Part Delivery (SPD) ☐ DA 5	Safe-Launch Activity ☐ DA 4	Warranty ☐ DA 3	IMDS ☐ DA Y
E	Change Management ☐ DA 4	Sub-tier Approval ☐ DA 3	Outgoing Inspection ☐ DA 3	Safety / Report Characteristics ☐ DA 4	Environment Health & Safety ☐ DA 4	Miscellaneous Processes ☐ DA 4	Annual Validation / Periodic Recertification ☐ DA 5	Quality Certification & Records Retention ☐ DA 5	

NA - Not Applicable NV - Not Evaluated	1 - JOB STOPPER	2 - JOB STOPPER Risk	3 - Moderate Issue	4 - No Risk	5 - Implemented Activity

☐ = DOCUMENTS ACCEPTABLE DA

Supplier Resp.:		Program Mgr:		SQE / SQ TL:		SQ CMS / SQ CMT:	
Name	Sign.	Name	Sign.	Name	Sign.	Name	Sign.

Modelling the Door Life Cycle:

Stakeholders and their requirements

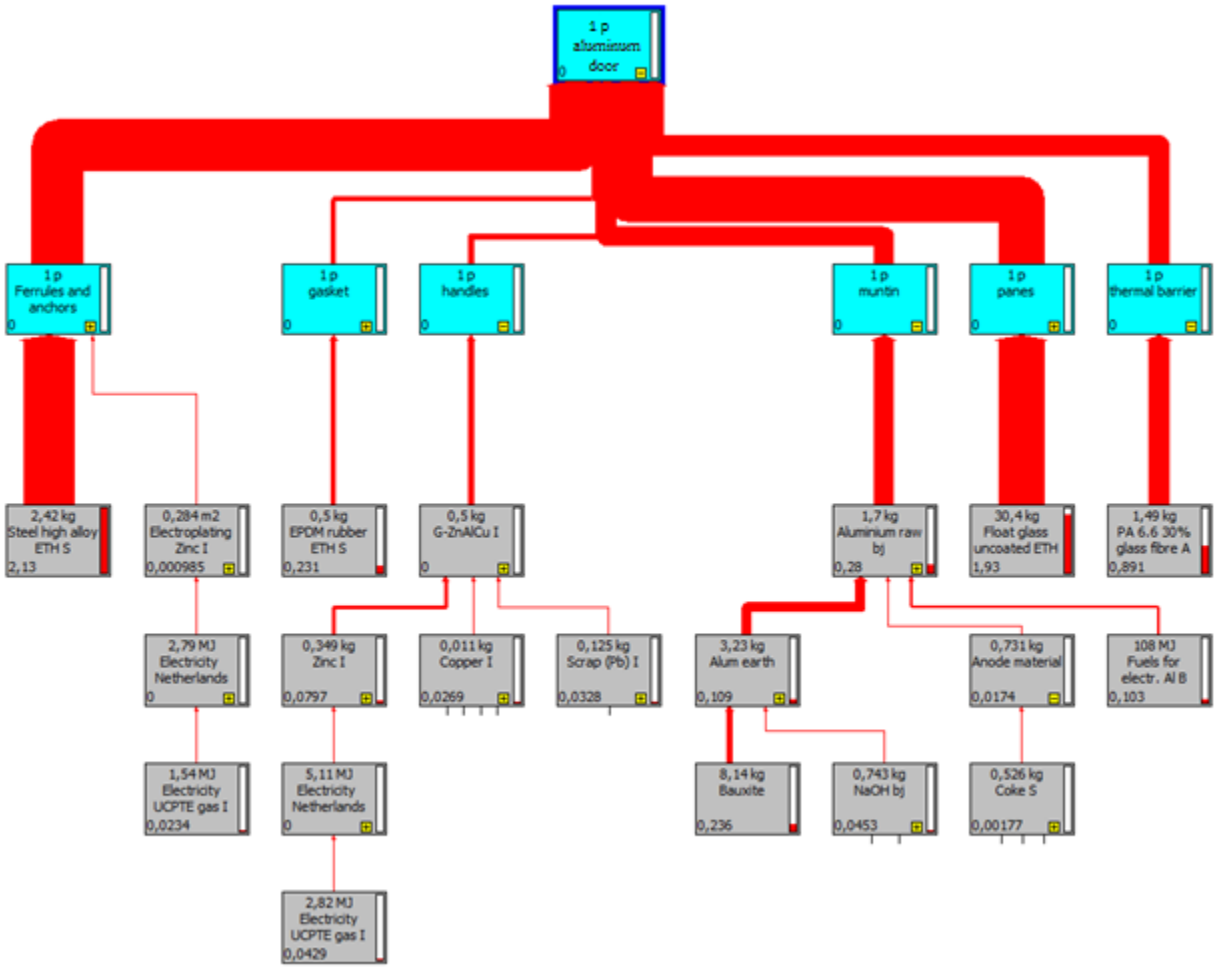
Stakeholder	Requirement	Inclusion
Customers	Quality Affordability lifelong use	Lifelong use between 65-100 years
Suppliers	Purchase agreement Safety Documented Quality System Perfect Delivery	Able to fallow up according to agreement
Employees	Flexible time of work Suitable environment for work payment	fulfilling expectations Minimum level take employees on maximum level
Society	environmental impact sensitivity	Environmental hesitating necessary
Regulatory bodies	Obey to lows Applications for the benefit of workers	Application is necessary for efficiency
NGOs	Giving employee's rights	Work organized with NGOs

List of Manufacturing Procedure:

Process	Place	Time duration
Casting (metals)	External supplier	7 days
Molding (plastics)	External supplier	7 days
Joining (welding, bonding)	Own factory	Max 45 min
Machining	Own factory	Max 1 hours
Assembling	Own factory	Max 1 hours
Others (logistics)	Own factory	Max 2,5 hours

Information about Aluminum Door:

An analysis of all the process trees shows that extrusion of aluminum causes that the most important environmental impact.
The value of the calculated quantity (partial environmental index, selected emissions, normalized or weighted damage indicators, etc.).
The quantity (in pieces, kilograms, liters, etc.).
The name of the material.
The process of life stage (e.g. aluminum alloy, truck, high steel alloy, etc.).
The environmental "thermometer".



Potential users:

Potential users generally;

Residential project, (functional, modern design), Potential users are generally emphasis on design These profiles and finishes also do a nice job of matching the other aluminum components we specify like garage doors, sliding doors and accordion doors. While these decisions and specifications produce a successful door package, there are number of additional considerations that lead to a successful end result.

Featured properties of design:

-Use awning doors where possible.
-Use roto-style hardware for operable doors where screens are desired.
-Double-check exterior alignments as applicable

Also aluminum doors are fire-and earthquake-resistant. They are very resistant to temperature changes.

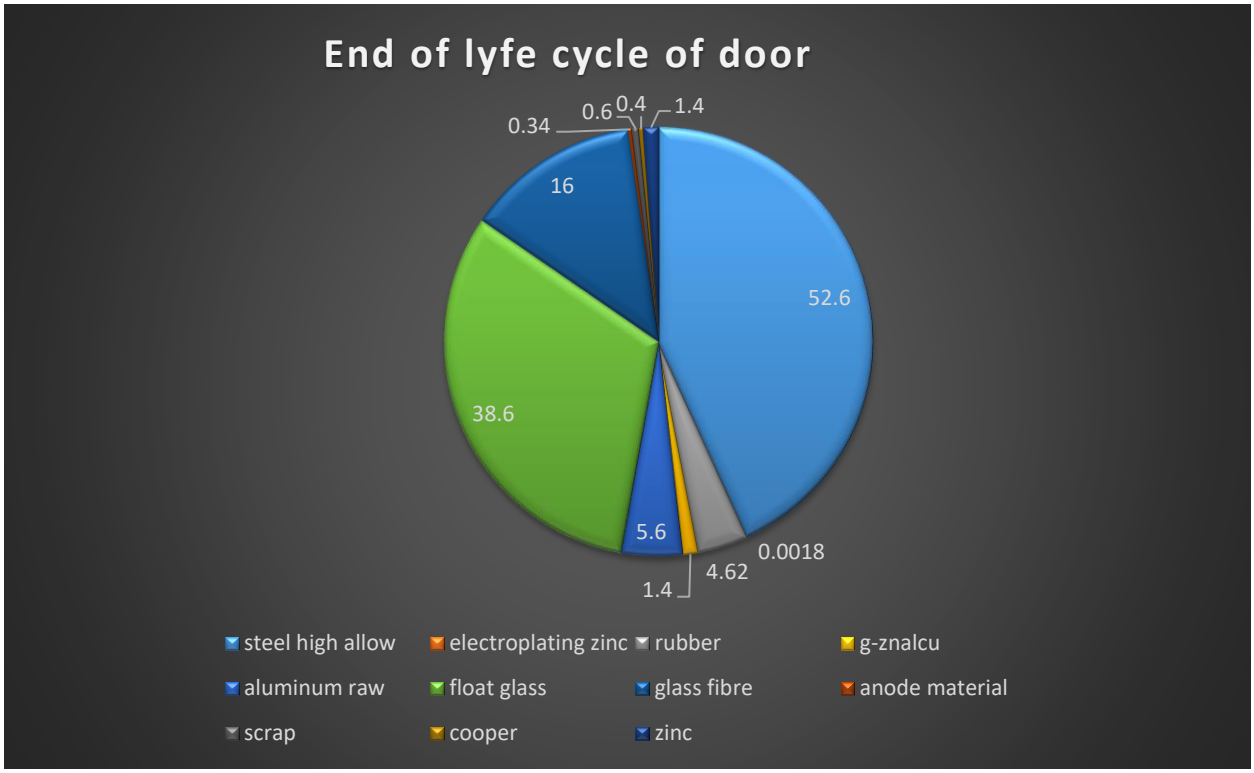
Aluminum doors potential users can be anywhere fully experienced in four seasons in a year.

Maintenance scenario:

Maintenance Features	Critical care	Medium care	Standard care
Gaskets		✓ At least once a year mostly in the autumn	
Fittings (moving parts)	✓ 1-2 times a year		
Profiles			✓ Remote care

The new generation aluminum frame door so strong that life lasts up to one hundred years. Compare with PVC system life long time more but this strongest benefit becoming too loss for maintenance.

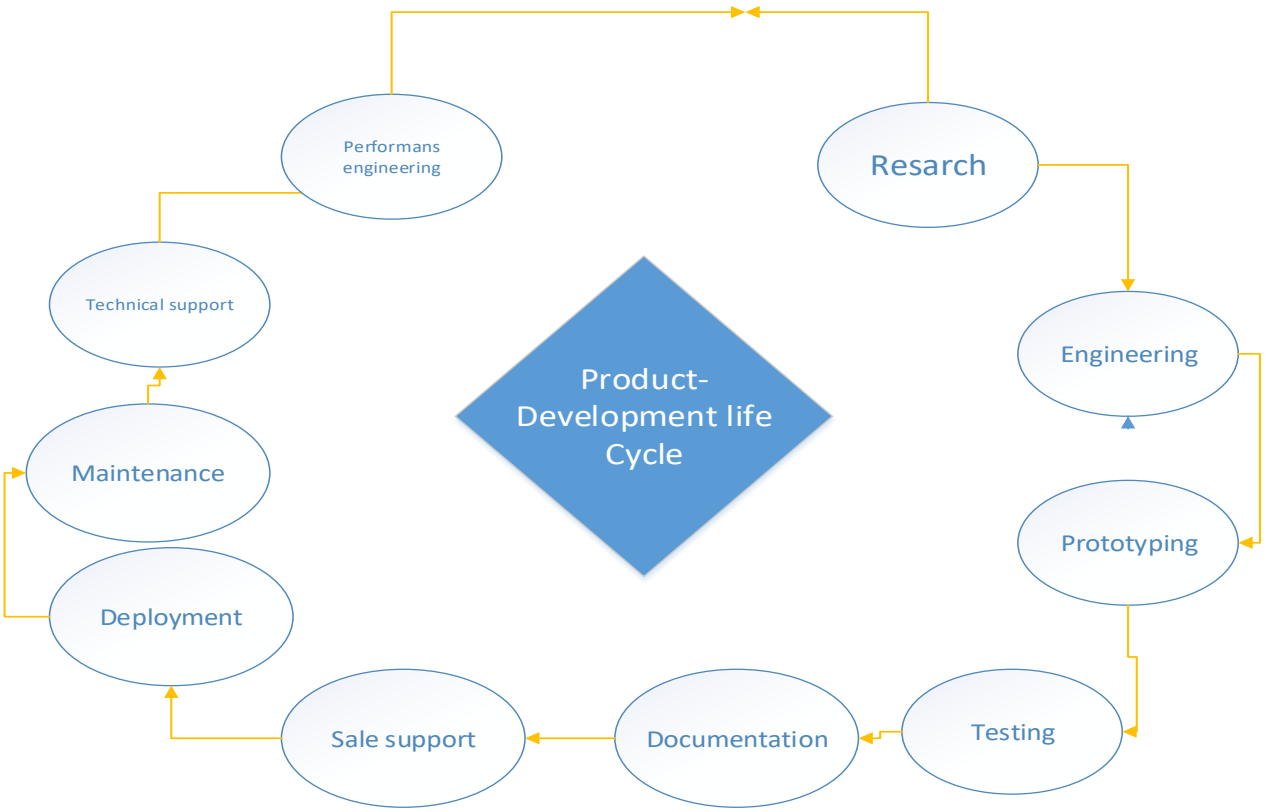
End-of-life scenarios:



Aluminium recycling is the process by which scrap aluminium can be reused in products after its initial production. The process involves simply re-melting the metal, which is far less expensive and energy-intensive than creating new aluminium through the electrolysis of aluminium oxide (Al2O3), which must first be mined from bauxite ore and then refined using the Bayer process. Recycling scrap aluminium requires only 5% of the energy used to make new aluminium. For this reason, approximately 31% of all aluminium produced in the United States comes from recycled scrap. Used beverage containers are the largest component of processed aluminum scrap, and most of it is manufactured back into aluminium cans.
Glass recycling is the processing of waste glass into usable products. Glass waste should be separated by chemical composition, and then, depending on the end use and local processing capabilities, might have to be separated into different colors. Many recyclers collect different colors of glass separately since glass retains its color after recycling. The most common types used for consumer containers are colorless glass, green glass, and brown/amber glass. Glass is ideal for recycling since none of the material is degraded by normal use.

Glass makes up a large component of household and industrial waste due to its weight and density. The glass component in municipal waste is usually made up of bottles, broken glassware, light bulbs and other items. Adding to this waste is the fact that many manual methods of creating glass objects have a defect rate of around forty percent. Glass recycling uses less energy than manufacturing glass from sand, lime and soda.
Every metric ton (1,000 kg) of waste glass recycled into new items saves 315 kilograms (694 lb) of carbon dioxide from being released into the atmosphere during the creation of new glass. Glass that is crushed and ready to be remelted is called cullet.
Many collection points have separate bins for clear, green and amber. Glass reprocessors that intend to make glass containers require separation by color, because glass tends to retain its color after recycling. If the recycled glass is intended for other products, or if the glass reprocessor uses newer optical sorting equipment, separation by color at the collection point may not be required. Heat-resistant glass like Pyrex or borosilicate glass should not be disposed of in the glass container as even a single piece of such material will alter the viscosity of the fluid in the furnace at remelt.

Product Development life cycle scenario:



Aluminum door product development base on outer appearance and designing because mostly tools supply from suppliers and we can prototyping the excellent work regarding to costumers request.

Environmental Aspect Risk Analysis Table:

Activity or product service	Environmental aspects	Benefits(B) and impacts (I)	safety	Natural & Cultural Resources (NCR)	performance	Repudiation & Stallholder (R&S)	Cost	Highest Impacts/ levels	Priority level	Notes /Comments
Felicities Management	Energy Consumption	B	1	4	3	4	5	5	H	Energy saving
	Sustainability(LEED)	B	1	4	3	4	3	4	H	Operational cost expensive
	Water Consumption	B	1	3	2	3	3	3	M	Water cost acceptable
Laboratories	Hazardous Materials	B	3	2	2	3	4	3	M	Chemical mgmt. cost high
	Regulated waste	I	3	2	2	3	2	4	M	Mgmt. controls place
Propulsion testing	Air Emissions	B	2	3	3	4	2	4	M	Mgmt. controls
	Water quality	I	2	3	3	4	2	4	M	Mgmt. controls
Logistics Management	Solid waste	I	2	3	2	2	2	3	L	Mgmt. controls
	Solid waste (Recycling)	B	1	4	2	3	4	4	M	Recycling beings benefit
Environmental Management	Remediation Restoration	B	3	5	1	4	4	5	H	Contamination Acceptable for the environment
	Nature! Resources Habitat Enhancement	B	1	2	1	2	1	2	L	Area available for improvement
Transportation Management	Efficient Fleet Management	B	1	3	2	3	3	3	M	Fuel spend higher then excepted
	Fuel, Oils& Lubricants	I	3	3	2	3	3	4	H	Spills occur 2-3 times per year
Contracting	Sustainable Acquisition	B	1	2	2	2	2	2	L	Mgmt. controls in - place

Quantifying total LC impact:

	Design	Produce	Use	Dispose	
Environmental	4	3	4	4	3,75/75%
Economical	3	2	4	4	3,25/65%
Social	2	3	5	2	3/60%
(total)	3/60%	2,6/53%	4,3/86,%	3,3/66%	3,3/66%

In this table, I calculated this value by a summing the values and dividing by the total number as in below:
Environmental, 4+3+4+4=15/4=3.75
Economical, 3+2+4+4=13/4=3.25
Social, 2+3+5+2=12/4=3
And the same for columns.

Environmental:
Raw material consumption: It contains 91.2% aluminum and glass.
Energy consumption: Electrical energy for machines and tools, fuel or electrical energy for transportation and manufacturing.
Waste generation: According to the pie- charts, it is low due to recycling and reusing
Emission: Air and water pollution during manufacturing and transportation are under the range of standard, soil degradation from mining the aluminum should be considered.
Noise emission: Low noise emission from manufacturing and assembling, actually, it is negligible.

Life cycle cost:
Capital cost (cost of purchase): The customer's priorities are security and aesthetic. We can determine the final cost after designing and manufacturing the product to offer various options regarding the two requirements of marketing.
Operation and maintenance cost: In warranty term for the product, the cost of repairing and maintenance should be considered to guarantee our product in order to meet user's requirements, it is easily achievable to assess the cost of maintenance and repair via preparing a survey for recognizing the common problems.
Replacement cost: According the reusability of nearly 90% of the components of the product, this part has a bit much share of the costs.

Energy cost: The final expenditure of energy consists of manufacturing and transportation energy consumption cost. In this case, as it is local factory, transportation energy consumption is negligible.

Social:

Workers:

The worker should be insured by related organization to keep the safety and health. In another word, It is the main aspect of our project to keep worker's condition health and safety in order to have high efficiency.

Society: Using this product doesn't have any dangerous effects for user and it is quite healthy.

Consumers: After its main role, aesthetic is one of the cultural heritages cause that make satisfy the consumers. Our selection for painting and the design has covered consumer loyalties to make modern and beautiful their houses.

The characterization introduce quantitative analyses for each phase of the life cycle for each impact category.

The results of the characterization phase, shown as the relative significance of the life stages expressed in percent. The point of reference, 100%. It is caused by the high-energy consumption in the aluminum extrusion process, emissions released in conjunction with electricity production, etc.

The impact categories, each with the respective material from the life cycle of the ALU door, are as follows: Carcinogens, respiratory substances, climate change, radiation, ozone layer, exoticity, acidification/eutrophication, land use, minerals, and fossil fuels.

Carcinogens: These include mainly nickel, arsenic and cadmium emitted to water and air. They are involved in the production of steel for ferrules and profile supports as well as glass.

Respiratory organics: Emissions of volatile organic substances (excluding methane) and ethylene accompany mainly Aluminum production and extrusion.

Respiratory inorganics: These are primarily emissions of Sulphur and nitric oxides related mainly to the production of aluminum, and also negative emissions of dust during aluminum recycling.

Climate change: Over 90% of results in this category include CO2 emissions generated during the production of electricity necessary for recycling and for the production of aluminum by the suspension technique, and the production of steel for ferrules and of glass.

Radiation: The greatest contributions are from the processes of production of steel for ferrules, glass, and synthetic rubber for gaskets.

Ozone layer: Dismantling of a window has a positive contribution in this category because of the production of electricity needed for recycling.

Eco toxicity: The most important substances toxic for the environment in the life cycle of a plastic door are nickel, zinc, and copper, as well as other emissions to the atmosphere.

Acidification/eutrophication: In this category are emissions of nitric oxides and sulphur dioxide connected with the production of steel for ferrules, aluminum and electricity.

Fossil fuels: In the phase of production, the most crude oil and natural gas.

Life Cycle of PVC Door:

Materials used for door frames have to fulfill quality aspects like mechanical stability and low thermal conductivity. A certain flexibility in the design is advantageous; however, flame resistance is mandatory for some applications. The use phase (function, maintenance demands and durability) is the most important part of the life cycle of doors. Therefore, the quality of the door frame structures is key to the optimisation of their life cycle. From a LCA perspective any further optimisation processes within the life cycle must be undertaken with respect to the use phase.

Design flexibility and low heat-transfer coefficients of PVC doors are possible. Steel inlays ensure mechanical stability. Doors made of other polymers must be made flame resistant by other means

Reason to change door from aluminum to polyvinyl chloride

This is due to their good aesthetics, durability, noise proofness, low maintenance requirement, best air & water tightness, and their ability to provide excellent thermal insulation, thereby helping save air-conditioning power costs in homes, offices and commercial centers. PVC doors come with a very high quality surface finish, soft contoured profiles and a variety of styles to meet the needs of the most demanding architects, designers and users. The environmental benefit of using PVC doors instead of aluminum doors is phenomenal. Due to their ability to conserve energy throughout their lifetime (from raw material stage to inuse stage), PVC doors are recognized as Green doors thereby scoring over traditional wood and metal doors. PVC doors are the best fit for all weather conditions.

PVC consist of 9 component:

–Pvc profile
–Galvanized reinforced metal
-Rubber gasket
-Glass
-Panes
-Thermal barrier
-Muntin
-Door sill
-Latches

Process, Door, Personnel (3P approach):

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Rubber gasket	2/10	3/10	6/10	8/10	11/10	11/10	19/10	22/10	N/A	N/A
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C	Special Characteristics ☐ DA 4	Process FMEA ☐ DA 4	Error & Mistake Proofing ☐ DA 2	First Piece Approval ☐ DA 5	Rework / Repair ☐ DA 5	Packaging ☐ DA 4	SQE Audit ☐ DA 3	Lessons Learned ☐ DA 4	Planning of Matchability / Benestare ☐ DA Y
D	Design Acceptance ☐ DA 5	Tooling & Equipment ☐ DA 5	Gages & Measuring Devices ☐ DA 5	Layered Process Audit ☐ DA 3	Training ☐ DA 2	Sequenced Part Delivery (SPD) ☐ DA 5	Safe-Launch Activity ☐ DA 4	Warranty ☐ DA 3	IMDS ☐ DA N
E	Change Management ☐ DA 4	Sub-tier Approval ☐ DA 1	Outgoing Inspection ☐ DA 2	Safety / Report Characteristics ☐ DA 4	Environment Health & Safety ☐ DA 3	Miscellaneous Processes ☐ DA 3	Annual Validation / Periodic Recertification ☐ DA 5	Quality Certification & Records Retention ☐ DA 5	

NA - Not Applicable NV - Not Evaluated	1 - JOB STOPPER	2 - JOB STOPPER Risk	3 - Moderate Issue	4 - No Risk	5 - Implemented Activity

☐ DA = DOCUMENTS ACCEPTABLE

Supplier Resp.:		Program Mgr:		SQE / SQ TL:		SQ CMS / SQ CMT:	
Name	Sign.	Name	Sign.	Name	Sign.	Name	Sign.

Stakeholders and their requirements:

Stakeholder	Requirement	Inclusion
Customers	Quality lifelong use	Lifelong use between 25-40 years
Suppliers	Purchase agreement Safety Documented Quality System	Able to fallow up according to agreement
Employees	Flexible time of work Suitable environment for work payment	fulfilling expectations Minimum level take employees on maximum level
Society	environmental impact sensitivity	Environmental hesitating necessary
Regulatory bodies	Applications for the benefit of workers Improving the business environment	Application is necessary for efficiency
NGOs	Giving employee's rights	Work organized with NGOs

List of Manufacturing Procedure:

Process	Place	Time duration
Casting (metals)	Own factory	3 days
Molding (plastics)	Own factory	3 days
Joining (welding, bonding)	Own factory	Max 30 min
Machining	External supplier	Max 3 hours
Assembling	External supplier	Max 2 hours
Others (logistics)	External supplier	Max 4 hours

Information about PVC Door:

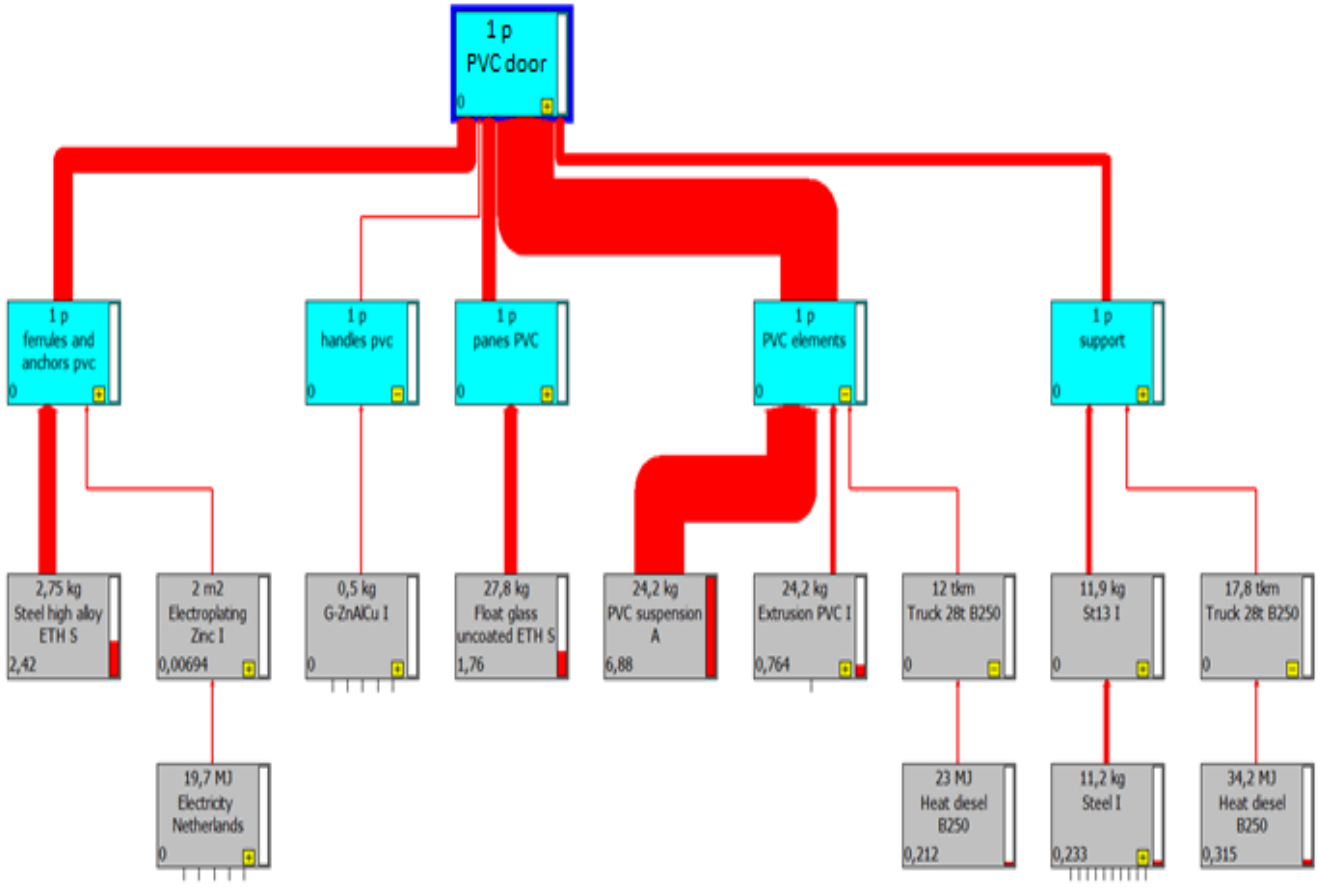
The full process tree for the PVC door, developed by the software Sima Pro, is shown in Figure below. In Figure a single element, a process box, of the process tree is described. Each process box contains the following information:

The value of the calculated quantity (partial environmental index, selected emissions, normalized or weighted damage indicators, etc.).

The quantity (in pieces, kilograms, liters, etc.).

The name of the material.

The process of life stage (e.g. Electroplating, truck, high steel alloy, etc.).



Potential users:

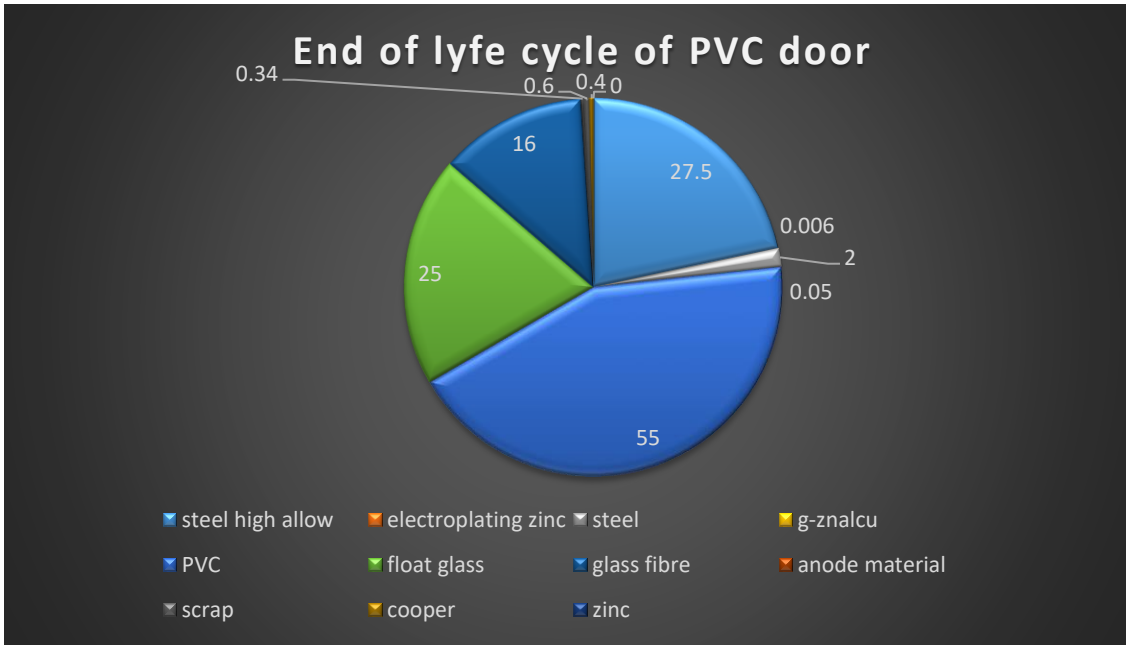
The type of prod what we produce for normal standard home which is located mostly cold place, because it`s made of organic elements. For the same reason, it`s more susceptible to the vagaries of climate, and in case of huge temperature amplitudes the structure of the material breaks down and the profile gets easily distorted and places where the climate is generally constant.

Maintenance scenario:

Maintenance Features	Critical care	Medium care	Standard care
Gaskets		✓ once a four year mostly in the autumn	
Fittings (moving parts)	✓ 1-2 times in 3 year		
Profiles			✓ Remote care

Our maintenance mandatory is made and for the costumers the company support for maintenance until the end of two years. But the new generation PVC frame door so strong that life lasts up to 65 years. PVC maintenance is more expensive then aluminum and more hard and it brings more affordability and money. The reason we chose that product to have easy production and flexibility.

End-of-life scenarios:



Environmental Aspect Risk Analysis Table:

Activity or product service	Environmental aspects	Benefits(B) and impacts (I)	safety	Natural & Cultural Resources (NCR)	performance	Repudiation & Stallholder (R&S)	Cost	Highest Impacts/ levels	Priority level	Notes /Comments
Felicities Management	Energy Consumption	I	3	4	3	4	5	3	H	Energy saving
	Sustainability(LEED)	B	2	4	3	3	4	4	H	Operational cost expensive
	Water Consumption	B	3	4	2	3	3	2	M	Water cost acceptable
Laboratories	Hazardous Materials	B	2	3	2	4	5	2	M	Chemical mgmt. cost high
	Regulated waste	I	3	2	2	2	3	3	M	Mgmt. controls place
Propulsion testing	Air Emissions	B	3	4	3	4	3	3	M	Mgmt. controls
	Water quality	B	3	4	3	4	3	3	H	Mgmt. controls
Logistics Management	Solid waste	I	2	2	2	3	2	2	L	Mgmt. controls
	Solid waste (Recycling)	B	3	4	2	4	4	2	H	Recycling beings benefit
Environmental Management	Remediation Restoration	I	2	4	2	4	4	3	H	Contamination Acceptable for the environment
	Nature! Resources Habitat Enhancement	B	4	2	1	2	2	1	H	Area available for improvement
Transportation Management	Efficient Fleet Management	B	3	3	2	4	4	4	H	Fuel spend higher then excepted
	Fuel, Oils& Lubricants	I	3	3	1	3	3	3	L	Spills occur 2-3 times per year
Contracting	Sustainable Acquisition	B	1	2	3	2	2	2	M	Mgmt. controls in - place

Further Improvement:

After changing life cycle scenario, kind a supply method to material of door, further Improvement is presented below:

PVC doors are the best in energy efficiency
PVC doors have a very good cost-benefit ratio
PVC doors are easy to care for
PVC doors are remarkably durable
PVC doors boast an excellent eco balance
With recycling initiative, the PVC door sector is committed to a sustainable development and to increasing the recycling quota for old doors, to 100 % where possible. The PVC content is shredded and treated to produce granules and can be recycled at least seven times.

Compare Aluminum and PVC door:

Recycling offers the potential to save primary energy and materials for all door frames. These are especially important potentials for PVC and aluminium. The recycling of PVC and aluminium (and the use of secondary material) can significantly improve their environmental performance. Producers need to construct recycling systems (if not already existent), to be able to work with their own compounds of specific polymers to produce secondary PVC of a higher quality. Further improvement of the recycling and use of secondary materials seems possible and advantageous.
Maintenance related to painting does not apply to PVC and aluminium doors.
windows need to be painted at certain intervals. No studies could be identified that analysed Wooden windows treated with oil instead of coating/paint.

Door Type	Estimated Service Life (years)			Characteristics
	Mean	Median	Inter-quartile Range	
Aluminum	43.6	40	12.5	Low maintenance
PVC	24.1	22.5	15	Low maintenance, difficult to repair

Sr. No.	**Properties of door**	**PVC door**	**Aluminum door**
1	Energy Consumption	Low Embodied energy, Low energy consumption during extrusion	Low Energy consumption similar to PVC
2	Convenience in Installation	Easy	Fair
3	Usage	Never	Yes
4	Does heat or cold transmit through the material	Only if kept dry	Yes
5	Is it cool all year?	Only if kept dry	No
6	Will it require painting or other maintainace	Yes- if scratched	Yes- if scratched
7	Will scratches show as a different colour under the paint	Yes	Yes
8	Does soap and water cleaning make material look new again	No	No
9	Aesthetics	Good	Good
10	Waste Disposal	Up to 99% after separation from Hardware and reinforcement	Recycling difficult as profiles are treated with paint, silicon and various protection coatings
11	Life Time	50-100 years. PVC windows are in market since 50 years	Have to be painted & maintained
12	Cost Per sqft	Rs. 500/- to 700/- for fixed and Rs 800 to 900 for sliding	Rs 150/- to 300/- per sqft as per no. of track, size and thickness and type(sliding or fixed window) of aluminum section.

Conclusion:

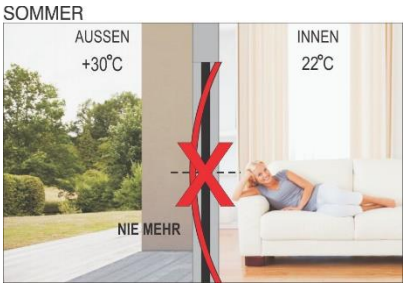
The aluminum door is best suited for construction, as it has low cost, easily available & can be molded in any shape & size. In addition, it has high degree of elegance and good appearance when powder coated. It is light in weight & having high scrap value as compared to PVC door.

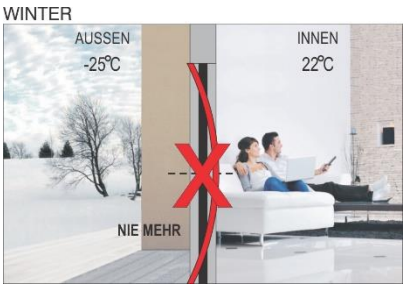
An ALUMINIUM entrance door is a good choice - for you!

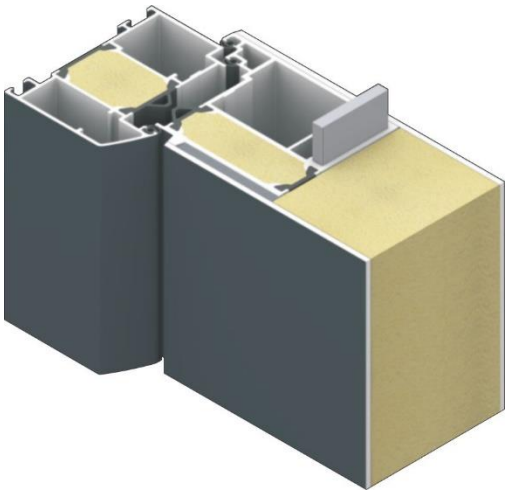
You will quickly realize that aluminum entrance doors possess many advantages compared to PVC or wooden entrance doors. Aluminum is light, strong, corrosion resistant and easy to maintain − a material with a long life. Aluminum is precisely malleable to produce energy-saving components with high density. In addition to an extraordinarily rich selection of door models and equipment, the EXCLUSIVE programme also offers numerous features that are included as standard equipment!

Extraordinary high stability - without deformation:

The door aluminum entrance door is made of exceptionally thick profiles. In addition, doors from the Oversized programme are reinforced with special profiles so that in extreme weather conditions, a bimetal effect or deformation will not arise. With a stable door like that, you will have no problems opening and closing it in all weather conditions.







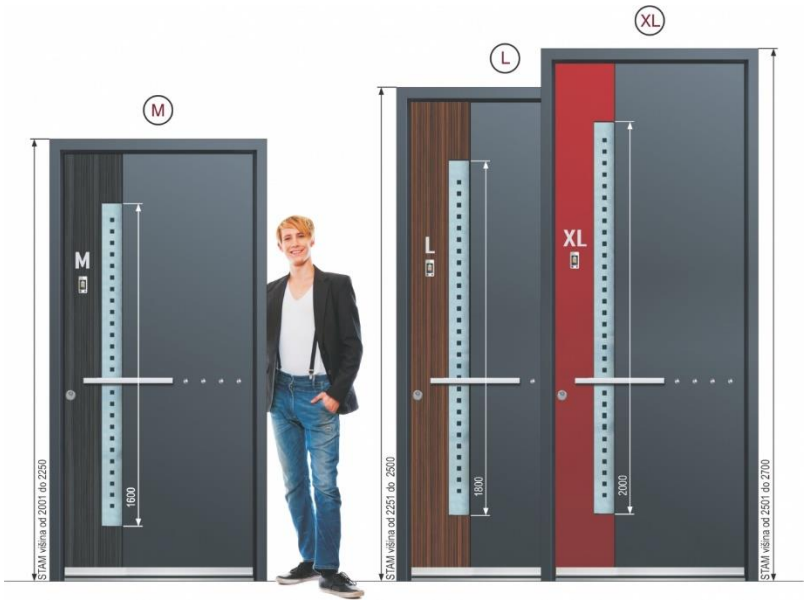
Extraordinary thermal insulation:

In times of expensive energy and the importance of energy savings, the entrance doors of the EXCLUSIVE series provide extraordinary thermal insulation of a European dimension 2 Ud starting at W/m K. With leaf-enclosing infills on both sides (85 mm thick), three circumferential seals and three panes of window protection glass (U-value 0.5 W/m2K), you can ensure savings and comfort in your home.

High degree of safety as a standard feature - no surcharge:

Due to the compactness of the selected materials, the above-average thickness of the profiles and leaves, the exterior rosette and the 3-point latch lock, the door is virtually burglar-proof against intruders. Optionally, you can choose the RC1 or RC2 version of the IFT Rosenheim certificate, thereby asserting your carefree security

XL door sizes - up to a height of 2700 mm!



Modern construction is increasingly requiring doors of extraordinary dimensions, with structural stability of the products being of great importance. The exclusive range of entrance doors with unique technical solutions ensures smooth functionality even with a height of 2251 mm up to 2700 mm and a width of up to 1260 mm. For these dimensions the, XL form also includes an installed equipment package (for a surcharge) with a fourth hinge and an extended locking mechanism with a four-pin design and reinforced stainless steel profile. Even the vision panel can be adapted against a surcharge.

Guaranteed long life:

The aluminum entrance doors are extraordinarily resistant to diverse weather conditions. The aluminum doors are powder painted in your chosen colour and still look new even after a number of years of use. Subsequent recoating is not required.

Environmentally friendly:

thinkgreen

All materials used are recycled and eco-friendly and have a long lifetime.

A/U/F

Aluminum and environment in windows - and facades
In the construction sector the Recyclables circulatory system A / U / F exists. Aluminum cutting waste from the factories and developed Alt-components are supplied to the recycling.

References:

https://www.balt.net/assets/Sutartys/Rules-for-the-provisions-of-internet-connection-and-data-transmission-services.pdf
http://www.internetsociety.org/sites/default/files/Internet_Service_Provision_Terminology_and_Principles.pdf
https://ruforum.files.wordpress.com/2015/06/call-for-proposal-internet-june2015.pdf
http://www.internetsociety.org/internet/what-internet/history-internet/brief-history-internet
https://www.ncbi.nlm.nih.gov/books/NBK44715/
https://cmhc.utexas.edu/internetuse.html
http://www.slideshare.net/ksverdze/internet-market-segmentation
http://sugatsune.com/products/ProductDetails.cfm?catid=11&subcatid=2&productid=AF-25D
http://www.houzz.com/aluminium-doors
http://www.intres.com/inpage/pub/window_design_guide.pdf
http://www.windowsanddoors.build/site/DefaultSite/filesystem/documents/Catalogues/SSG%20SEPTEMBER%20BROCHURE.pdf
http://www.overheaddoor.com/Documents/commercial-aluminum-door-systems-brochure.pdf
https://en.wikipedia.org/wiki/Glass_recycling
https://en.wikipedia.org/wiki/Aluminium_recycling