TDC-Tech GmbH & KGaA -The Foil experts

Producing EPDM-Foils for ponds, roofs, pools and more.

Research and Development in EPDM – rubber products

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Business Concept

- Buying a property with existing infrastructure
- Invest in maschinery for foil production:

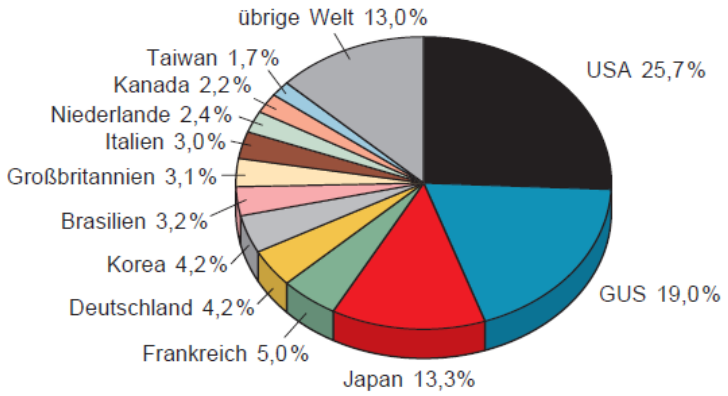
  Banburry mixer, calander, winder etc.
- Invest in own R&D
- Produce high quality EPDM foil below market price

Marketanalysis

- The rubber and plastic industry moves more and more abroad. Therefore we want to supply with our Company in the first instance the German market.
- Germany (with 4,2%) provides relatively little synthetic rubbers such as EPDM based on the entire world. (old statistics, today much more)
- EPDM production 2005 --> 1,1 Million tons per Year
- The rubber industry is becoming more and more important, 80% goes into the manufacture of tires and the rest for special applications such as pond liners, roofing membranes, seals, brake hoses, etc.
- Many large companies produce and invest big amounts in the rubber industry.
- Against these companies we can't compete and therefore we want to produce EPDM- liners like a special area for ponds, pools and roofs for our customers. We produce tailor-made liners for our Customers with an excellent quality at a cheap rate.

Marketanalysis

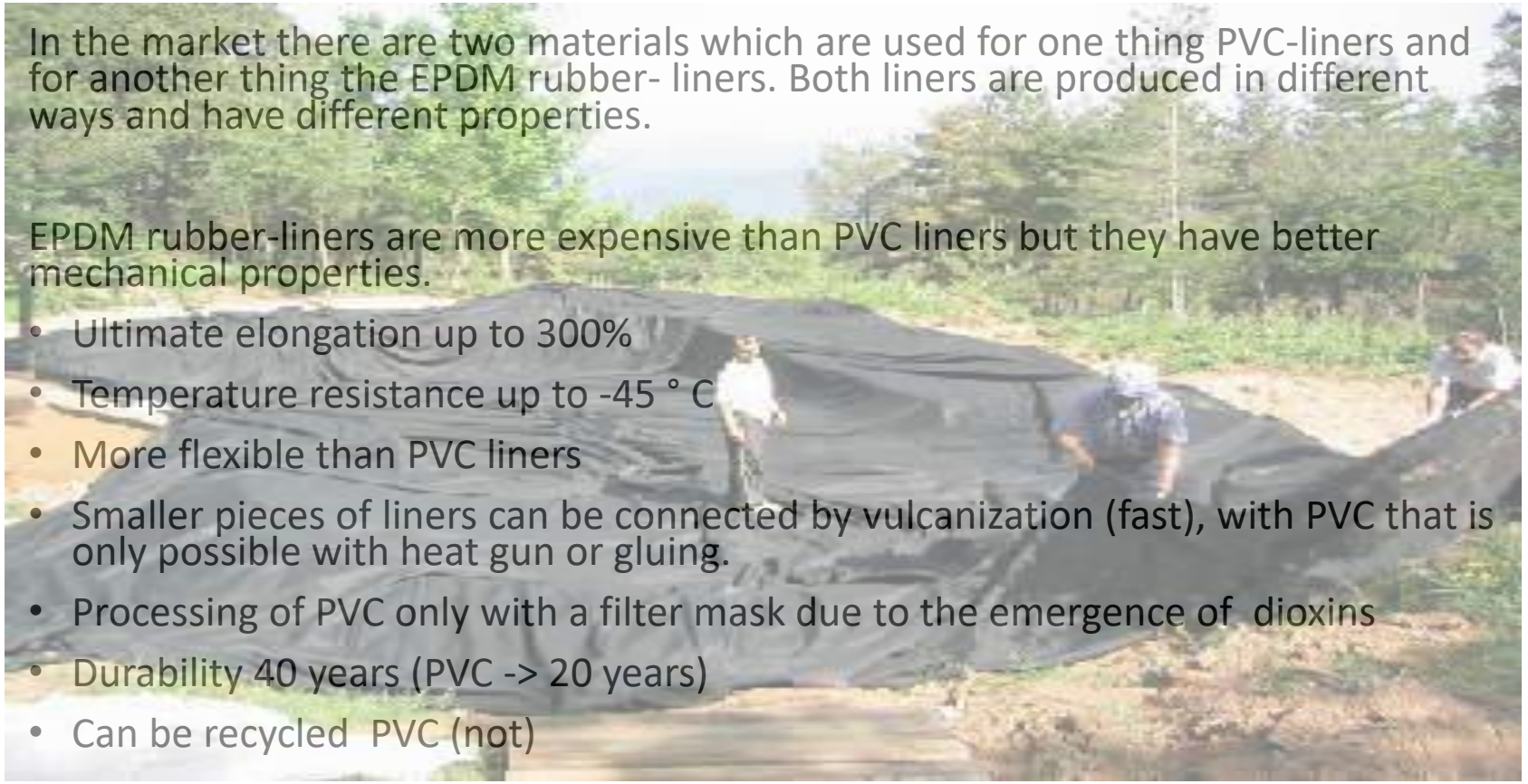
The main producing countries for synthesis rubbers, divided by capacity from 1998



Jahr	NR	SBR	BR	EPDM	NBR	CR
1990	5000	4960	1490	610	340	310
1997	6080	5150	1740	750	340	270
2002	6540	5710	1940	860	390	280

World rubber consumption by selected types (in 1000 t / a)

Marketanalysis

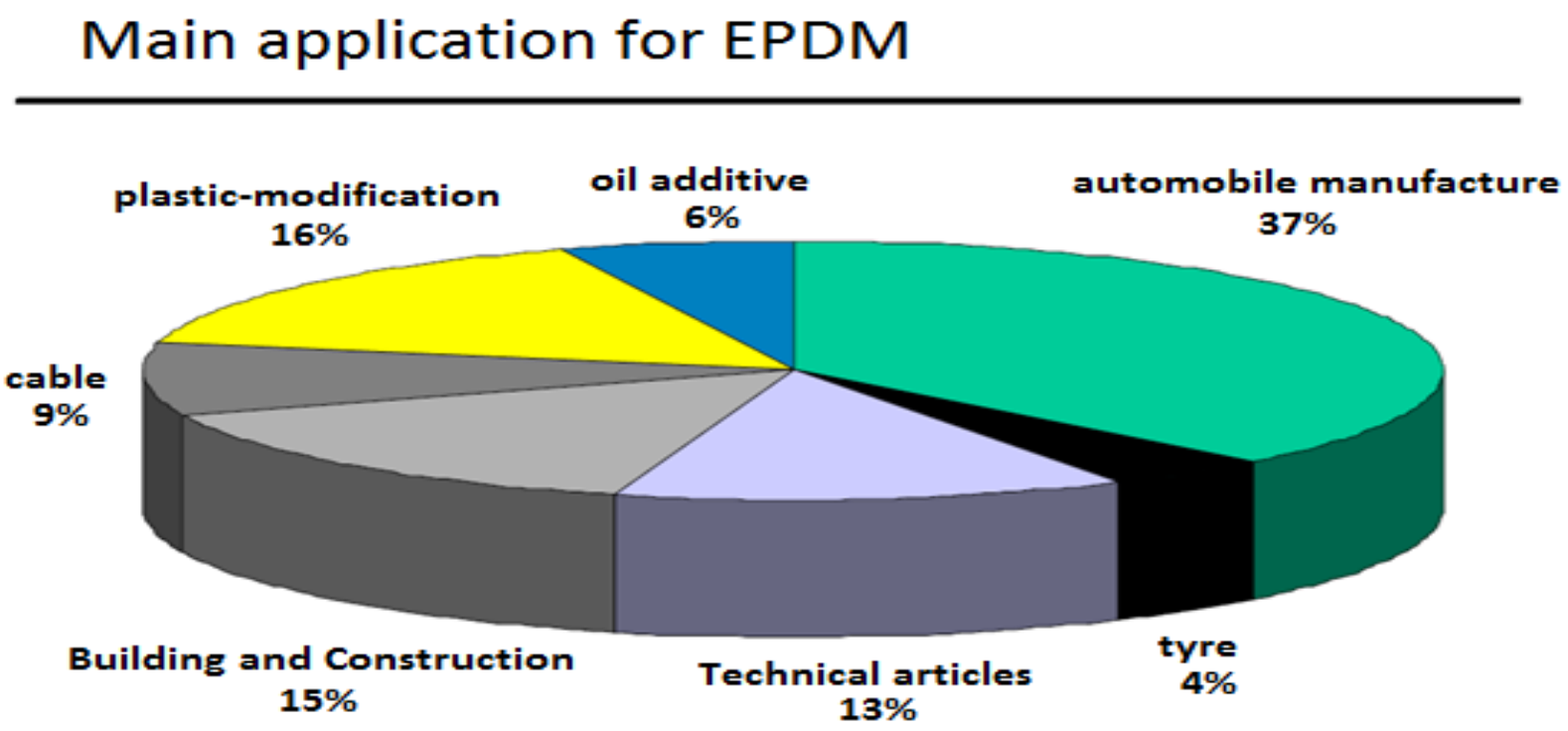


In the market there are two materials which are used for one thing PVC-liners and for another thing the EPDM rubber- liners. Both liners are produced in different ways and have different properties.

EPDM rubber-liners are more expensive than PVC liners but they have better mechanical properties.

- Ultimate elongation up to 300%
- Temperature resistance up to -45 ° C
- More flexible than PVC liners
- Smaller pieces of liners can be connected by vulcanization (fast), with PVC that is only possible with heat gun or gluing.
- Processing of PVC only with a filter mask due to the emergence of dioxins
- Durability 40 years (PVC -> 20 years)
- Can be recycled PVC (not)

Marketanalysis



Field of application for EPDM

Automotive industry	- wiper rubber - brake Hose - Seals for windows and doors
construction	- Seals (windows, doors, facades) - Roofing sheets - Swimming Pool - Pond Liners - Floor covering - Pipe seals
electrical industry	- Cable sheathing - insulation
rubber products	- Hoses - O-Rings - Conveyor belts

Competition

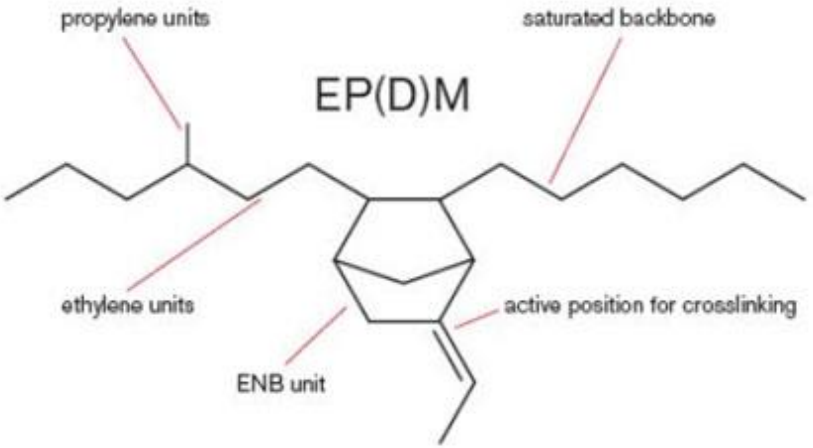
competitors	Price €/m²
Firestone (LLC)	7,49
Hertalan GmbH	7,35
Teichprofi Stahl GmbH	8,64
Aquiva GmbH	8,95

Here is just given a small selection of our competitors. Unfortunately, we can't give "produced quantitative date" of EPDM liners from the competitors because the companies in this list are mostly limited companies (GmbH) and therefore not publication obligation.

Our company would like to offer EPDM-Liners for 6,56 € / m².

Technology

- EPDM (synthetic elastomer): Copolymer of ethylene and propylene with small amounts of diene (double bonds) in order to cross link the material.
- After the cross linking step with sulfur or peroxide, EPDM is more resistant to ozone than natural rubber.
- EPDM is maybe the only elastomere used today for roofing membranes because of its broad range of performance properties
- Resistant against Sunlight, UV, Water, Moisture and extreme Temperature/ climates
- Producing of EPDM with Ziegler-Natta-catalyst --> bales and with metallocene catalysts --> pellets



Foil Production Line

The Production Process

1. Internal Mixer 500L: mixing and compounding of raw materials to a rubber mixture.
2. Calander: roll out to foil
3. winder: winding the foil to a roll

Productivity

- How many rolls can we produce per year?
- How many tons are these?
- Dimension of foil roll (1,5 mm thick). How many square meters per roll?

productivity of one production line per batch

$V_{Innenmischer}$	500L
Füllgrad	0,8
$\rho_{Mischung}$	1,25kg/L

$$V_{Quader} = l * d * b$$

$$m_{Charge} = V_{Innenmischer} * \rho_{Mischung} * 0{,}8$$

$$V_{Charge} = V_{Innenmischer} * 0{,}8$$

m_{Charge}	500kg
V_{Charge}	400L

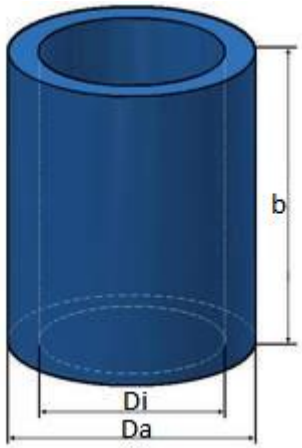
roll dimensions

$$V_{Quader} = l * d * b$$

$$V_{Zylinder} = \frac{\pi}{4} * (D_a - D_i)^2 * b$$

$$V_{Quader} = V_{Zylinder}$$

$$D_a = \sqrt{\frac{4 * l * d}{\pi} + D_i^2}$$



a) foil length

V_{Charge}	400L
b	2m
d	1,5mm
l	**133,33m**

b) roll diameter

D_i	0,1000m
D_a	**0,5144m**

$$D_a = \sqrt{\frac{4 * l * d}{\pi} + D_i^2}$$

$$l = \frac{V_{Charge}}{d * b}$$

conclusion

Charge		**roll dimension**	
m_{Charge}	500 kg	D_i	0,1000 m
V_{Charge}	400 L	**D_a**	**0,5144 m**
$\rho_{Mischung}$	1,25 kg/L	**l**	**133,33 m**
A_{Charge}	**266,67 m²**	d	1,5 mm
1 m² weights	**1,875 kg**	b	2 m

time per batch				
	mixture	calander*	winder	**ges**
t/min	10	13,33	<10	**13,33**
	*drawing speed 10 - 12 m/min			
	*berechnet mit		10 m/min	

brutto productiontime/day		8 h
	cleaning	1 h
	set up	1 h
netto productiontime/day		**6** h
batches/day		27
number productionslines		7
days of work/year		250
total batches/year		**47250**
m_{Charge}		500 kg
Production/t		**23625 t**

Location

Steinhagen, Germany

Officespace: 897 m^2
Productionspace: 8.611 m^2

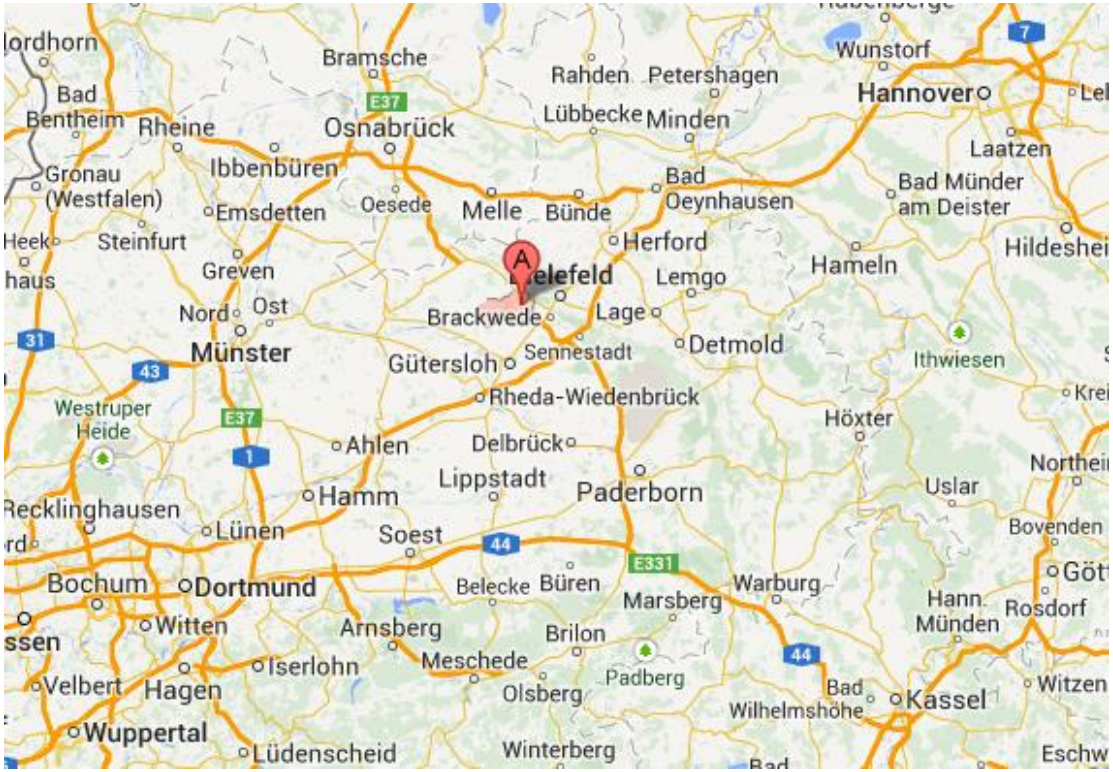
Location

Next to:

- Münster (63km)
- Dortmund (104km)
- Hannover (129km)
- Köln (158km)

Next Shippingstation:

- Bremerhaven (204km)
- Amsterdam (285km)



Cost calculation – Investment 1

Description	Investment	Depr.[years]	Depr. In € p.a
Property	2.590.000,00 €	-	
Sum of Property	**2.590.000,00 €**		

Installation			
Production hall	80.000,00 €	20	4.000,00 €
R&D	163.000,00 €	20	8.150,00 €
Reconstruction	70.000,00 €	20	3.500,00 €
-Administration Part	30.000,00 €	20	1.500,00 €
-Production Part	20.000,00 €	20	1.000,00 €
-Stock Part	20.000,00 €	20	1.000,00 €
Sum of Installation	**313.000,00 €**		**15.650,00 €**

Machinery			
7 internal mixer 500L	455.000,00 €	10	45.500,00 €
7 calander	210.000,00 €	10	21.000,00 €
7 unwinder	70.000,00 €	10	7.000,00 €
R&D	125.500,00 €	10	12.550,00 €
Sum of machinery	**860.500,00 €**		**86.050,00 €**

Cost calculation – Investment 2

Description	Investment	Depr.[years]	Depr. In € p.a
Vehicles			
8 Trucks	600.000,00 €	5	120.000,00 €
3 Fork truck	60.000,00 €	5	12.000,00 €
Crane	100.000,00 €	5	20.000,00 €
Sum of vehicles	**760.000,00 €**		**152.000,00 €**

Overview

Description	Investment	Depr.[years]	Depr. In € p.a
Property	2.590.000,00 €		
Buildings	313.000,00 €	20	15.650,00 €
Machinery	860.500,00 €	10	86.050,00 €
Vehicles	760.000,00 €	5	152.000,00 €
Unexpected	200.000,00 €	0	0,00 €
Circulating capital	100.000,00 €	0	0,00 €
Total investment	**4.823.500,00 €**		**253.700,00 €**

Cost calculation – Bank

Year	Balance of dept	Interest rate [%]	Interest Cost Paid p.a.	Repayment p.a.
0	3.376.450,00 €	7	236.351,50 €	0
1	3.612.801,50 €	7	252.896,11 €	240.853,43 €
2	3.371.948,07 €	7	236.036,36 €	240.853,43 €
3	3.131.094,63 €	7	219.176,62 €	240.853,43 €
4	2.890.241,20 €	7	202.316,88 €	240.853,43 €
5	2.649.387,77 €	7	185.457,14 €	240.853,43 €
6	2.408.534,33 €	7	168.597,40 €	240.853,43 €
7	2.167.680,90 €	7	151.737,66 €	240.853,43 €
8	1.926.827,47 €	7	134.877,92 €	240.853,43 €
9	1.685.974,03 €	7	118.018,18 €	240.853,43 €
10	1.445.120,60 €	7	101.158,44 €	240.853,43 €
11	1.204.267,17 €	7	84.298,70 €	240.853,43 €
12	963.413,73 €	7	67.438,96 €	240.853,43 €
13	722.560,30 €	7	50.579,22 €	240.853,43 €
14	481.706,87 €	7	33.719,48 €	240.853,43 €
15	240.853,43 €	7	16.859,74 €	240.853,43 €

Total interest paid	2.023.168,84 €	
Total repayment		3.612.801,50 €

Total investment	**4.823.500,00 €**
30% own captital funds (Limited Company)	**1.472.050,00 €**
70% Bank loan	**3.376.450,00 €**

A special contract with the bank allows us to start repayment one year later.

In the first year, (contruction year) we do not pay any interests to the bank. Because of that the balance of debts increases in the year 1 up to 3.612.801,50 €

Energy consumption per year

Machine	costs / Euro	consumption [kWh]
Production		
7 Internal mixer	54.936,00 €	420
7 Calander	36.624,00 €	280
7 Winder	13.734,00 €	105
R&D	13.995,60 €	107
other/year	1.308,00 €	20000
Sum of consumption	**120.597,60 €**	

Labour costs

type	total	headcount	Salary per year	total public dues per individual	total costs per individual
production					
company technician	73.170,00 €	2	30.000,00 €	6.585,00 €	36.585,00 €
labourer	175.608,00 €	8	18.000,00 €	3.951,00 €	21.951,00 €
storeman	76.828,50 €	3	21.000,00 €	4.609,50 €	25.609,50 €
doorman	51.219,00 €	2	21.000,00 €	4.609,50 €	25.609,50 €
cleaner	11.707,20 €	1	9.600,00 €	2.107,20 €	11.707,20 €
managing director	207.315,00 €	2	85.000,00 €	18.657,50 €	103.657,50 €
engineer	67.072,50 €	1	55.000,00 €	12.072,50 €	67.072,50 €
driber	257.558,40 €	8	26.400,00 €	5.794,80 €	32.194,80 €
R&D					
lab assistent	68.292,00 €	2	28.000,00 €	6.146,00 €	34.146,00 €
students	23.414,40 €	2	9.600,00 €	2.107,20 €	11.707,20 €
engineer	67.072,50 €	1	55.000,00 €	12.072,50 €	67.072,50 €
Outsourcing					
consultant	36.585,00 €	1	30.000,00 €	6.585,00 €	36.585,00 €
lawyer	36.585,00 €	1	30.000,00 €	6.585,00 €	36.585,00 €

Total	**1.152.427,50 €**	**34**
R&D Total	158.778,90 €	5

The rubber receipt

Expendable material	Function	Laborformula	Calkulationformula	Price	phr*price
		[phr]	[%]	[€/Kg]	[%€/Kg]
Vistaoln 7500	EPDM	100	29,85	2,05	61,1925
Ruß N 550	grime	120	35,82	0,7	25,074
Silitin Z 86	bright filler material	50	14,93	0,89	13,2877
Flexon 876	flexibilizer	45	13,43	0,89	11,9527
Silan A 172		3	0,9	4,58	4,122
PE-Wachs	flow promoter	3	0,9	2,13	1,917
Calciumoxid	dryer	5	1,49	0,98	1,4602
TAC	Coagenz	1	0,3	2,33	0,699
Perkadox 14.40	cross linking	8	2,39	4,1	9,799
Sum of Expandable material		335	100		129,5041

Price [€/Kg]	1,295 €
Price [€/m²]	2,428 €

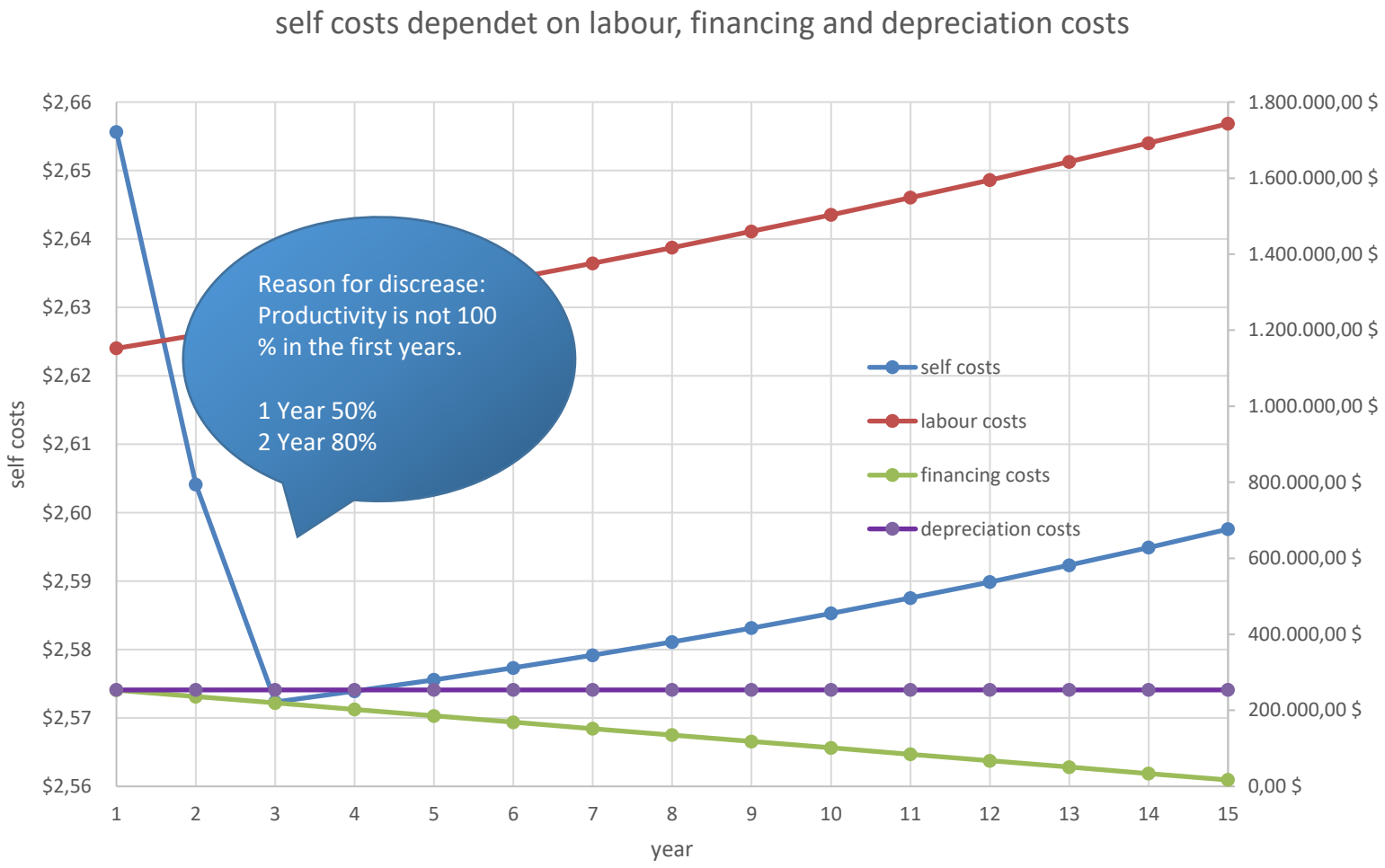
Cost calculation – Self Costs

	1. Year/T	1. Year	2. Year	3. Year	4. Year	5. Year	6. Year
Utilization of capacity	60	50	80	100	100	100	100
Quantity produces [T]	14175	14175	18900	23625	23625	23625	23625
Costs	Costs / [T]	Cost p.a.	Cost p.a.	Cost p.a.	Cost p.a.	Cost p.a.	Cost p.a.
Depreciation costs	17,898 €	253.700,00 €	253.700,00 €	253.700,00 €	253.700,00 €	253.700,00 €	253.700,00 €
Financing costs	17,841 €	252.896,11 €	236.036,36 €	219.176,62 €	202.316,88 €	185.457,14 €	168.597,40 €
Labour costs	81,300 €	1.152.427,50 €	1.187.000,33 €	1.222.610,33 €	1.259.288,64 €	1.297.067,30 €	1.335.979,32 €
Raw Material	1.295,041 €	18.357.206,175 €	24.476.274,900 €	30.595.343,625 €	30.595.343,625 €	30.595.343,625 €	30.595.343,625 €
Electricity costs	4,25	60298,80	96478,08	120597,60	120597,60	120597,60	120597,60
Total costs		20.076.528,58 €	26.249.489,67 €	32.411.428,18 €	32.431.246,75 €	32.452.165,67 €	32.474.217,95 €
Self costs / T	**1.416,3336 €**	**1416,333586**	**1388,861887**	**1371,912304**	**1372,751185**	**1373,636642**	**1374,570072**
Self costs / Kg	1,4163 €	1,4163 €	1,3889 €	1,3719 €	1,3728 €	1,3736 €	1,3746 €
Self costs / m²	2,6556 €	2,6556 €	2,6041 €	2,5723 €	2,5739 €	2,5756 €	2,5773 €

Cost calculation – Self Costs

7. Year	8. Year	9. Year	10. Year	11. Year	12. Year	13. Year	14. Year	15. Year
100	100	100	100	100	100	100	100	100
23625	23625	23625	23625	23625	23625	23625	23625	23625
Cost p.a.	Cost p.a.	Cost p.a.	Cost p.a.	Cost p.a.	Cost p.a.	Cost p.a.	Cost p.a.	Cost p.a.
253.700,00 €	253.700,00 €	253.700,00 €	253.700,00 €	253.700,00 €	253.700,00 €	253.700,00 €	253.700,00 €	253.700,00 €
151.737,66 €	134.877,92 €	118.018,18 €	101.158,44 €	84.298,70 €	67.438,96 €	50.579,22 €	33.719,48 €	16.859,74 €
1.376.058,70 €	1.417.340,46 €	1.459.860,68 €	1.503.656,50 €	1.548.766,19 €	1.595.229,18 €	1.643.086,05 €	1.692.378,64 €	1.743.150,00 €
30.595.343,625 €	30.595.343,625 €	30.595.343,625 €	30.595.343,625 €	30.595.343,625 €	30.595.343,625 €	30.595.343,625 €	30.595.343,625 €	30.595.343,625 €
120597,60	120597,60	120597,60	120597,60	120597,60	120597,60	120597,60	120597,60	120597,60
32.497.437,59 €	32.521.859,61 €	32.547.520,09 €	32.574.456,17 €	32.602.706,12 €	32.632.309,37 €	32.663.306,50 €	32.695.739,34 €	32.729.650,96 €
1375,552914	**1376,58665**	**1377,672808**	**1378,812959**	**1380,008725**	**1381,261772**	**1382,57382**	**1383,946639**	**1385,382051**
1,3756 €	1,3766 €	1,3777 €	1,3788 €	1,3800 €	1,3813 €	1,3826 €	1,3839 €	1,3854 €
2,5792 €	2,5811 €	2,5831 €	2,5853 €	2,5875 €	2,5899 €	2,5923 €	2,5949 €	2,5976 €

Self Costs


self costs dependet on labour, financing and depreciation costs
self costs
year
Reason for discrease:
Productivity is not 100
% in the first years.
1 Year 50%
2 Year 80%
self costs
labour costs
financing costs
depreciation costs
$2,66
$2,65
$2,64
$2,63
$2,62
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$2,60
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1.800.000,00 $
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Revenue

Price / Kg	**3,50 €**
Price / m²	**6,56 €**

Year	Load factor	Total Production	Price	Revenue
	[%]	[T]	[€/Kg]	[€]
1	50	14175	3,50 €	24.806.250,00 €
2	80	18900	3,50 €	52.920.000,00 €
3	100	23625	3,50 €	82.687.500,00 €
4	100	23625	3,50 €	82.687.500,00 €
5	100	23625	3,50 €	82.687.500,00 €
6	100	23625	3,50 €	82.687.500,00 €
7	100	23625	3,50 €	82.687.500,00 €
8	100	23625	3,50 €	82.687.500,00 €
9	100	23625	3,50 €	82.687.500,00 €
10	100	23625	3,50 €	82.687.500,00 €
11	100	23625	3,50 €	82.687.500,00 €
12	100	23625	3,50 €	82.687.500,00 €
13	100	23625	3,50 €	82.687.500,00 €
14	100	23625	3,50 €	82.687.500,00 €
15	100	23625	3,50 €	82.687.500,00 €

Cost calculation

	construction	1. Year	2. Year	3. Year	4. Year	5. Year
Revenue	0	24.806.250,00 €	52.920.000,00 €	82.687.500,00 €	82.687.500,00 €	82.687.500,00 €
Depreciation costs	253.700,00 €	253.700,00 €	253.700,00 €	253.700,00 €	253.700,00 €	253.700,00 €
Financing costs	252.896,11 €	236.036,36 €	219.176,62 €	202.316,88 €	185.457,14 €	168.597,40 €
Labour costs	0	1.152.427,50 €	1.187.000,33 €	1.222.610,33 €	1.259.288,64 €	1.297.067,30 €
Raw material	0	18.357.206,18 €	24.476.274,90 €	30.595.343,63 €	30.595.343,63 €	30.595.343,63 €
Electricity costs	0,00	60298,80	96478,08	120597,60	120597,60	120597,60
Loss carried forward		506.596,11 €				
Profit after tax	-506.596,11 €	4.239.985,06 €	26.687.370,07 €	50.292.931,56 €	50.273.112,99 €	50.252.194,07 €
Taxes (40%)	0	1.695.994,02 €	10.674.948,03 €	20.117.172,62 €	20.109.245,19 €	20.100.877,63 €
Profit after tax	-506.596,11 €	2.543.991,03 €	16.012.422,04 €	30.175.758,93 €	30.163.867,79 €	30.151.316,44 €
Cash flow	-252.896,11 €	2.797.691,03 €	16.266.122,04 €	30.429.458,93 €	30.417.567,79 €	30.405.016,44 €
Repayment credit	0,00 €	240.853,43 €	240.853,43 €	240.853,43 €	240.853,43 €	240.853,43 €
Dividend	-252.896,11 €	2.556.837,60 €	16.025.268,61 €	30.188.605,50 €	30.176.714,36 €	30.164.163,01 €

Share capital	25.000,00 €	37.784,19 €	117.910,53 €	268.853,56 €	419.737,13 €	570.557,95 €

Cost calculation

6. Year	7. Year	8. Year	9. Year	10. Year
82.687.500,00 €	82.687.500,00 €	82.687.500,00 €	82.687.500,00 €	82.687.500,00 €
253.700,00 €	253.700,00 €	253.700,00 €	253.700,00 €	253.700,00 €
151.737,66 €	134.877,92 €	118.018,18 €	101.158,44 €	84.298,70 €
1.335.979,32 €	1.376.058,70 €	1.417.340,46 €	1.459.860,68 €	1.503.656,50 €
30.595.343,63 €	30.595.343,63 €	30.595.343,63 €	30.595.343,63 €	30.595.343,63 €
120597,60	120597,60	120597,60	120597,60	120597,60
50.230.141,79 €	50.206.922,15 €	50.182.500,13 €	50.156.839,66 €	50.129.903,58 €
20.092.056,72 €	20.082.768,86 €	20.073.000,05 €	20.062.735,86 €	20.051.961,43 €
30.138.085,07 €	30.124.153,29 €	30.109.500,08 €	30.094.103,79 €	30.077.942,15 €
30.391.785,07 €	30.377.853,29 €	30.363.200,08 €	30.347.803,79 €	30.331.642,15 €
240.853,43 €	240.853,43 €	240.853,43 €	240.853,43 €	240.853,43 €
30.150.931,64 €	30.136.999,86 €	30.122.346,64 €	30.106.950,36 €	30.090.788,71 €

721.312,60 €	871.997,60 €	1.022.609,34 €	1.173.144,09 €	1.323.598,03 €

Cost calculation

11. Year	12. Year	13. Year	14. Year	15. Year
82.687.500,00 €	82.687.500,00 €	82.687.500,00 €	82.687.500,00 €	82.687.500,00 €
253.700,00 €	253.700,00 €	253.700,00 €	253.700,00 €	253.700,00 €
67.438,96 €	50.579,22 €	33.719,48 €	16.859,74 €	0
1.548.766,19 €	1.595.229,18 €	1.643.086,05 €	1.692.378,64 €	1.743.150,00 €
30.595.343,63 €	30.595.343,63 €	30.595.343,63 €	30.595.343,63 €	30.595.343,63 €
120597,60	120597,60	120597,60	120597,60	120597,60
50.101.653,62 €	50.072.050,37 €	50.041.053,24 €	50.008.620,40 €	49.974.708,78 €
20.040.661,45 €	20.028.820,15 €	20.016.421,30 €	20.003.448,16 €	19.989.883,51 €
30.060.992,17 €	30.043.230,22 €	30.024.631,94 €	30.005.172,24 €	29.984.825,27 €
30.314.692,17 €	30.296.930,22 €	30.278.331,94 €	30.258.872,24 €	30.238.525,27 €
240.853,43 €	240.853,43 €	240.853,43 €	240.853,43 €	0,00 €
30.073.838,74 €	30.056.076,79 €	30.037.478,51 €	30.018.018,81 €	30.238.525,27 €
1.473.967,23 €	1.624.247,61 €	1.774.435,00 €	1.924.525,10 €	2.075.717,72 €

Total Dividend after 15 years 410.143.544,40 €

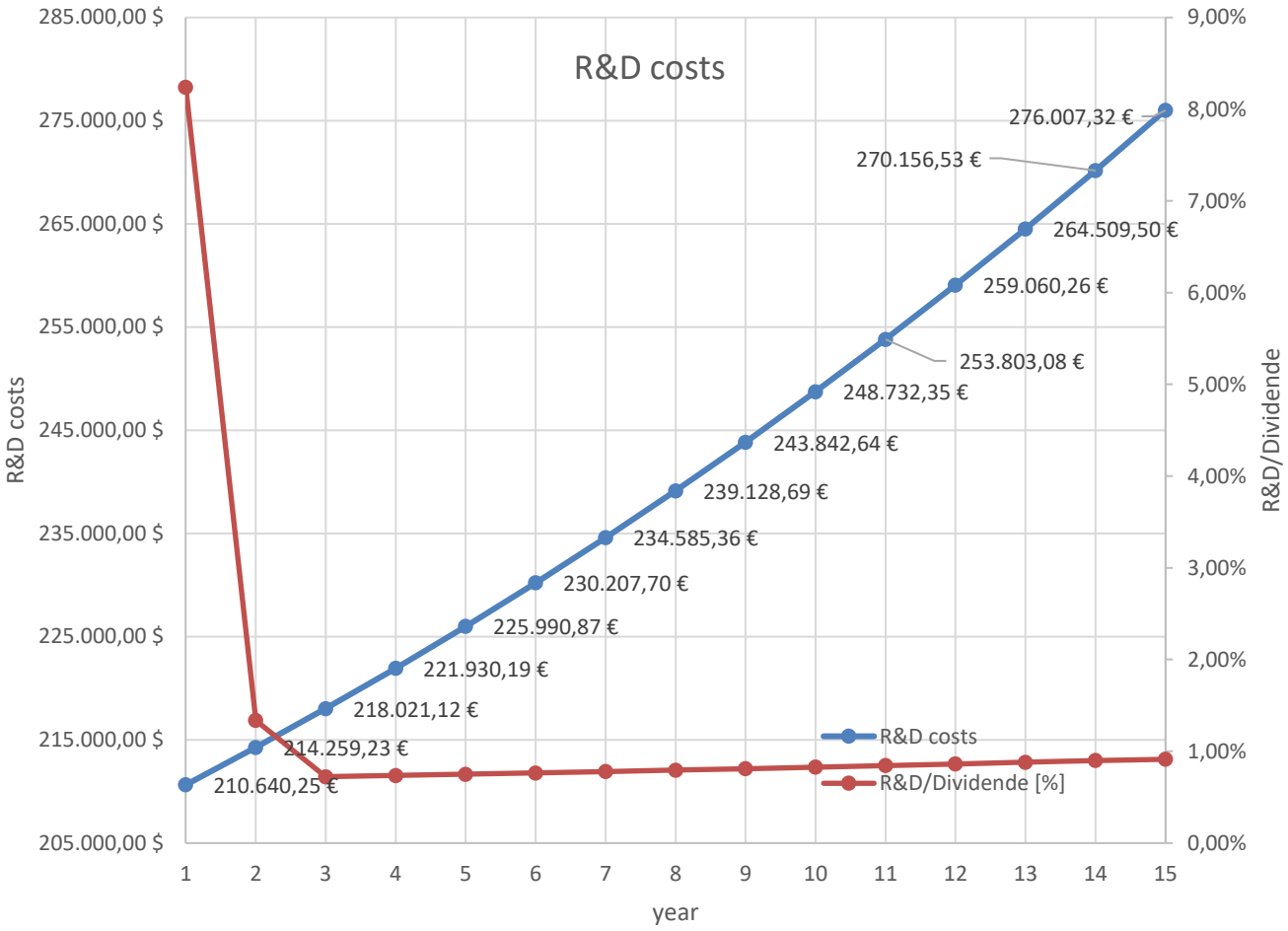
Increase of Labour and share capital

R&D

R&D because of:

- Innovations ->New products = New markets
- Better mixtures -> lower prices
- Quality control

R&D



- Using our own R&D causes costs. The diagram shows the costs during a period of 15 years.
- Also the relation between R&D costs and dividende are shown in %

Which legal company form?

Company form: GmbH & KGaA

Reasons:

- Complementary GmbH -> Limited Liability
- Kommandist -> shareholder = broad capital base
- Shareholder have not big influence on company management ->Good resistance against takeover
- Controll stays by owners

Which legal company form?

Foundation GmbH	25.000,00 €
Foundation KGaA	50.000,00 €
own capital funds	1.472.050,00 €
sum	**1.547.050,00 €**

Owner 1	150.000,00 €
Owner 2	150.000,00 €
Owner 3	150.000,00 €
sum own capital	**450.000,00 €**
relative own capital	**29%**

Rest capital needed	**1.097.050,00 €**
relative	**71%**

to finance the rest capital we need to sell shares. because of the good dividend our company will generate we decide to sell one share for 50€

stock price	**50,00 €**
shareholders	**21941**

Conclusion

Producing EPDM-Foils for ponds, roofs and pools is very profitable.

We can sell foil for 6,56 €/m². That is under the current market prices.

The company form GmbH & KGaA is convenient because of the broad capital base and the good control for the owners.