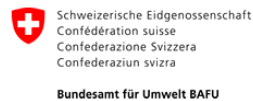


# Material-Efficiency in Swiss Industry based on systematic Ecodesign

3 Case industrial Cases with big potential

Workshop Organisers:



WRF 2015  
Davos

Rainer Züst  
Züst Engineering AG

# Content Workshop

**Opening speech:**

Bruno Oberle, Director of the Swiss Federal Office for the Environment (FOEN)

**Introduction:**

Rainer Züst: From small improvements to big jumps – Ecodesign in Swiss Industry”

Stefan Gürtler: Ecodesign and economy – which are the challenges?”

**Three examples:**

Michael Biemann: „natural light” instead of expensive chemistry – how ebeam-Technology is revolutionizing the systems efficiency of Tetrapack

Christian Berg: Vacuum-Sensors for efficient processes in production equipment – intelligent systems as an example for scaling effects

Christoph Klahn: How additive manufacturing processes are reducing material input in production and usage phases of new products

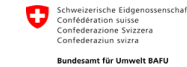
**Conclusion:**

Stefan Gürtler: Trap of ROI, cost curve and economy of scales – how economy could support technical improvements



WRF 2015  
Davos

Rainer Züst  
Züst Engineering AG



## Introduction

### From small improvements to big jumps - Ecodesign in Swiss Industry

Rainer Züst

Dr. sc. techn., Dipl. Ing. ETH, former Professor at ETH Zurich, since 2004: own company / independent engineer

Content:

a) Potential of Ecodesign and material efficiency

Radical efficiency?

More with less?

Maximal added value with minimal resource input?

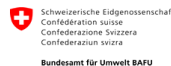
b) From Ecodesign 1.0 to Ecodesign 3.0, and 2 examples from

FRANKE and MAG



WRF 2015  
Davos

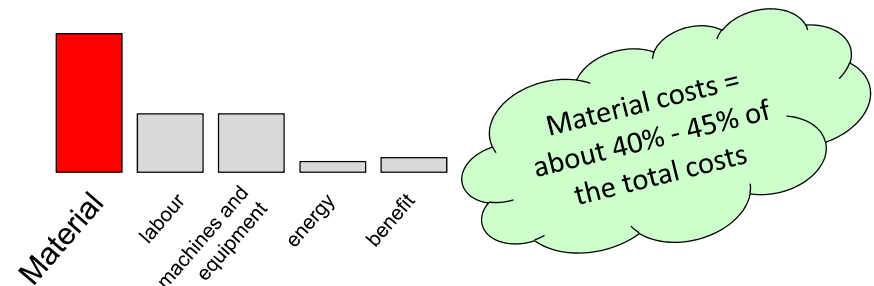
Rainer Züst  
Züst Engineering AG



Radical efficiency?

More with less?

Maximal added value with minimal resource input?



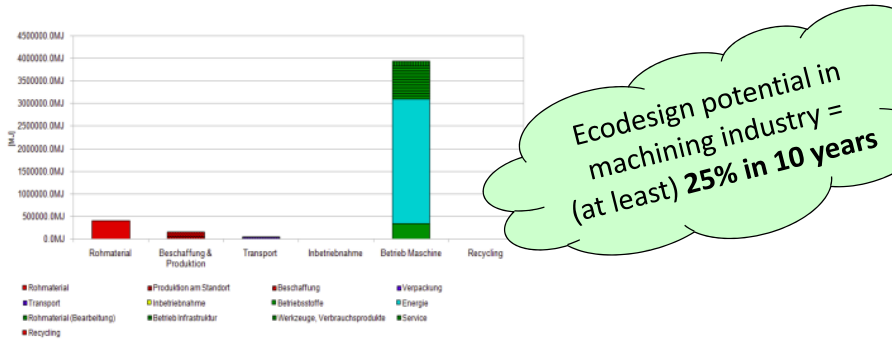
**sources:**

«Ressourceneffizienz in KMU – Einsatz und Recycling von Werkstoffen»; Rainer Züst, Züst Engineering AG; im Auftrag des Bundesamtes für Umwelt (BAFU), Oktober 2013.

[http://www.zuestengineering.ch/downloads/Schlussbericht\\_BAFU\\_Materialeffizienz.pdf](http://www.zuestengineering.ch/downloads/Schlussbericht_BAFU_Materialeffizienz.pdf)

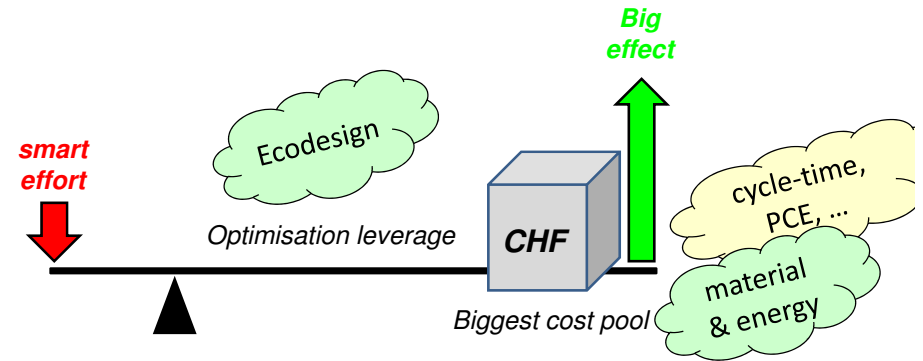
FAZ, 16.10.2008, Seite 14: „... Ausgaben für Material machen durchschnittlich 43 % der Gesamtkosten (in der deutschen Industrie) aus“

Radical efficiency?  
 More with less?  
 Maximal added value with minimal resource input?



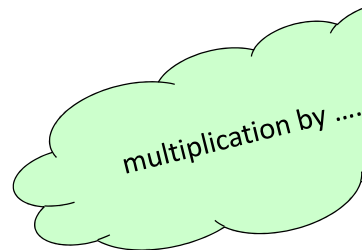
**sources:**  
 «Ecodesign-Potenzialanalyse in der Schweizer MEM-Industrie - eine explorative Studie» (Kurzbericht);  
 Rainer Züst, Simon Züst, Sonja Studer; im Auftrag Swissmem sowie Bundesamtes für Umwelt (BAFU), 2010.

Radical efficiency?  
 More with less?  
 Maximal added value with minimal resource input?



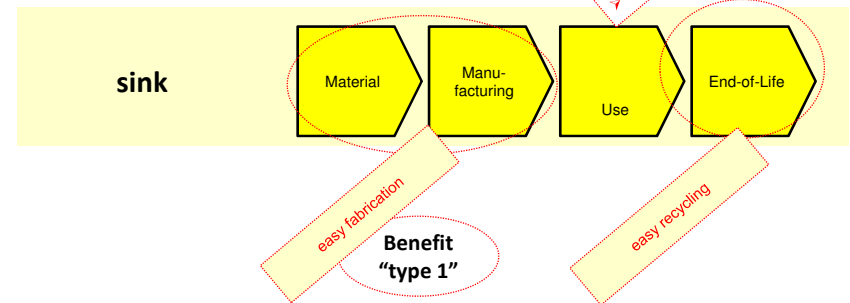
Radical efficiency?  
 More with less?  
 Maximal added value with minimal resource input?

- numbers of products
- life time (if "passive & stationary")
- hours of use / numbers of cycles / ...
- produced products are used in further products
- ...



**Ecodesign 1.0**

Example: **FRANKE**



## Evolution EVX 220 (new product): double bowl sink

- Monobloc
- Annealed
- Stainless steel 1.4301
- SlimTop with FastFix
- 18 gauge, 9inch deep bowls
- Tap ledge
- Production in Thailand



**FRANKE**

(Source: Franke)

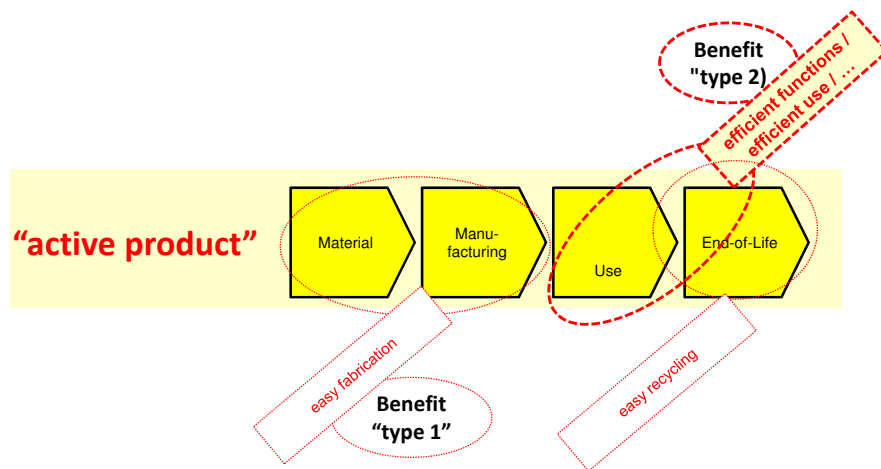
## Savings new vs. old

- 230'000 pieces per year
- Savings purchasing: 1'448'938 kg Cr-Ni-steel per year
- Savings production: 28'971'720 MJ electricity per year
- Savings transportation: 9'015'798 MJ per year (oil)

(Source: Franke)

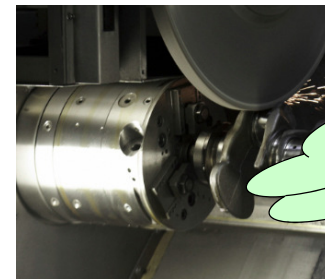
► multiplication by high numbers of (heavy) products

## Ecodesign 2.0



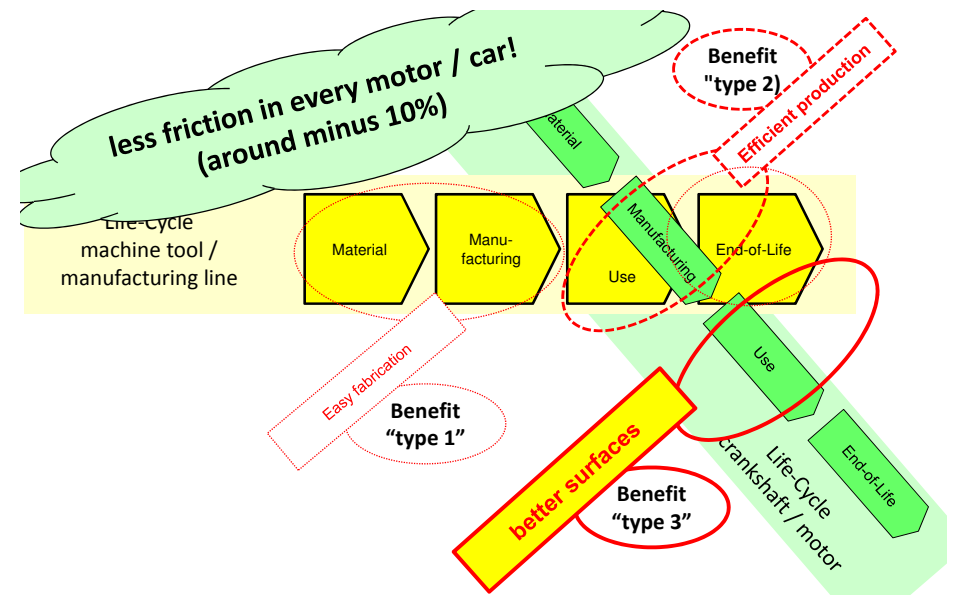
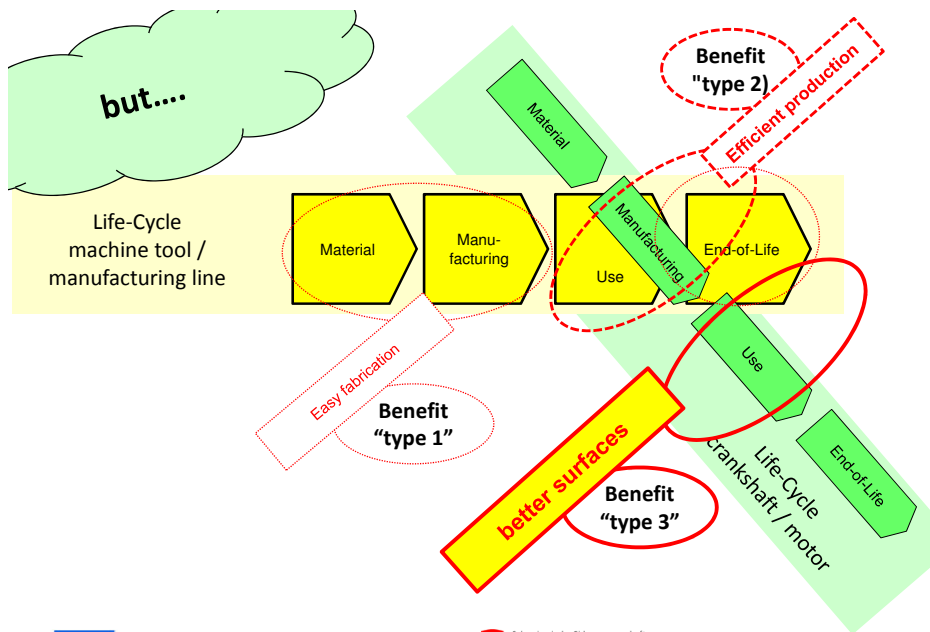
## Example: machine tool manufacturer

Focus on an efficient production process:  
hard milling (dry) and electro-chemical finishing  
(instead of wet grinding and finishing)



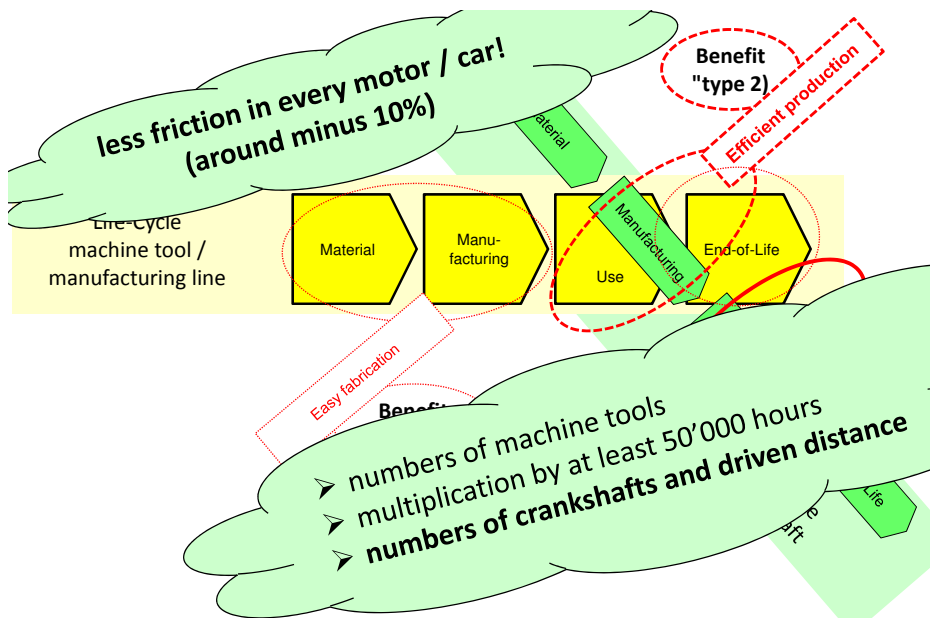
Efficient manufacturing of crankshafts

► numbers of machine tools multiplication by at least 50'000 hours/machine



Source:

«Best Practice Guide – Energieeffizienz, Materialeffizienz, Produktionseffizienz»; Maurice Jutz, Rainer Züst, Sonderausgabe Umwelt Perspektiven, 2013, Seite 8ff.  
[http://www.zuestengineering.ch/downloads/JP\\_Broschuere\\_R\\_Zuest\\_Web.pdf](http://www.zuestengineering.ch/downloads/JP_Broschuere_R_Zuest_Web.pdf)



«Small animals are also producing muck....»

What's happen, if cars are using 1% less petrol due to optimized crankshafts?

**Benefit "type 3"**

One machine = 125'000 crankshafts per year / 1'000'000 in 8 years

**Total savings per machine: between 70 – 240 Mio. CHF**

- less petrol: about 70 Mio. CHF
  - less CO2-fee: about 170 Mio. CHF
- ("economical efficiency indicator": 1:35 till 1:120)

Source:

«Best Practice Guide – Energieeffizienz, Materialeffizienz, Produktionseffizienz»; Maurice Jutz, Rainer Züst, Sonderausgabe Umwelt Perspektiven, 2013, Seite 8ff.  
[http://www.zuestengineering.ch/downloads/JP\\_Broschuere\\_R\\_Zuest\\_Web.pdf](http://www.zuestengineering.ch/downloads/JP_Broschuere_R_Zuest_Web.pdf)

... and a similar effect with **light weight**

Weight reduction per car in kg	Savings petrol in litre	Benefit "type 3"	
		Savings petrol in CHF	reduction in CO <sub>2</sub> -emissions (tonne)
0.100 kg	41'600'000	74'800'000	109'400
1.000 kg	416'000'000	748'000'000	<sup>18</sup> 1'094'000
10.000 kg	4'160'000'000	7'480'000'000	10'940'000

Cost saving potential and reduction of CO<sub>2</sub>  
(based on: 1 Mio cars per year; 104'000 km per car)

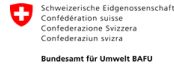
**Source:**

Ressourceneffizienz ganzer Prozessketten am Beispiel „hochfeste Stähle für neue Anwendungen“; Rainer Züst, Züst Engineering AG; im Auftrag des Bundesamtes für Umwelt (BAFU), Mai 2015.

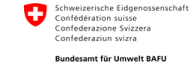
[http://www.zuestengineering.ch/downloads/Schlussbericht\\_Ressourceneffizienz-Prozessketten\\_Final-1.pdf](http://www.zuestengineering.ch/downloads/Schlussbericht_Ressourceneffizienz-Prozessketten_Final-1.pdf)



WRF 2015 Davos  
Rainer Züst  
Züst Engineering AG



WRF 2015 Davos  
Rainer Züst  
Züst Engineering AG



## Contact

Rainer Züst  
Züst Engineering AG

Email: [rainer.zuest@zuestengineering.ch](mailto:rainer.zuest@zuestengineering.ch)  
Mobile: +41 (0) 79 420 39 27