

## ***SMARTLOG-seminar***

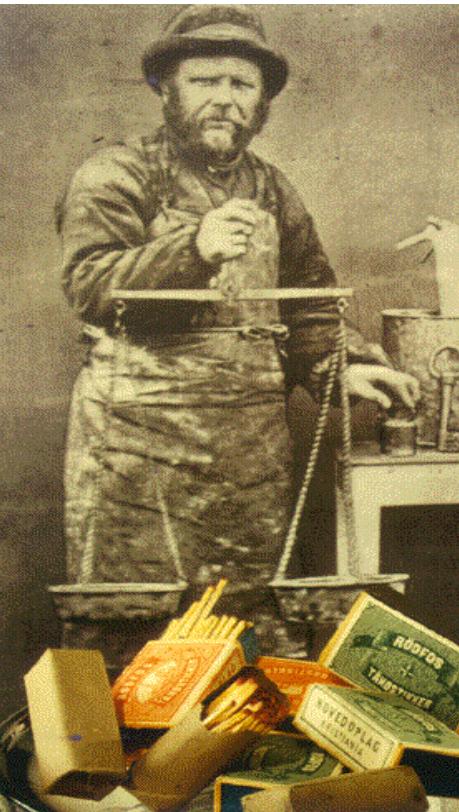
# **Produksjonslogistikk— Rask og effektiv produksjon i praksis**

***Raufoss/Gjøvik 12.-13. oktober 2004***

1845-1930

Presentasjon av Raufoss Chassis Technology (RCT):  
"Automatisert produksjon med raske gjennomløpstider"  
v/Ottar Henriksen, adm. dir., RCC

# The Raufoss History



# Utfordringene ved slutten av 90-tallet

- Globaliseringsprosessen i ferd med å øke dramatisk
- Raufoss ASA-
  - Børsintroduksjonen i 1990 hadde ikke gitt grunnlag for å hente inn ny kapital
  - Staten som hovedeier ønsket seg nye eiere
  - Industrikonglomerat med flere små og svært konkurranseutsatte produktområder
  - Slutt på mulighet for offentlige bidrag til forskningsmidler (og finansiell bistand via politiske kanaler)

# Strategisk valg

- Satse på å utvikle langsiktig konkurransedyktighet for flest mulig av industrivirksomhetene på Raufoss, selv om dette kunne gå ut over kortsiktig lønnsomhet
- Oppsplitting og fokusering av forretningsvirksomheter
- Søk etter kompetente private og industrielle eiere
- **Fra tungt manøvrerbar tank-båt til "speed-boats"**



MJØSKRAFT ➤ 

Raufoss Beredskap AS

MJØSKRAFT ➤

Raufoss Nett AS

MJØSKRAFT ➤

Raufoss Industri Service



Raufoss ISS AS (RISS)

**MULTISPED**



Raufoss Industrial Tools

**RAUFOSS  
TECHNOLOGY**



P  
**plastal**



Forsvarets logistikk-  
organisasjon / Land

 RTIM

**Raufoss**

AI Aalberts  
Industries



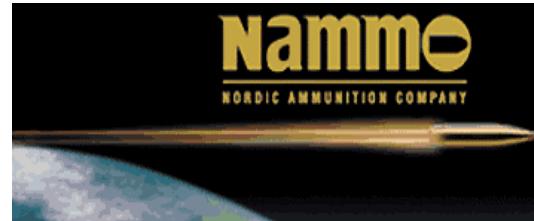
**STEERTEC RAUFOSS AS**



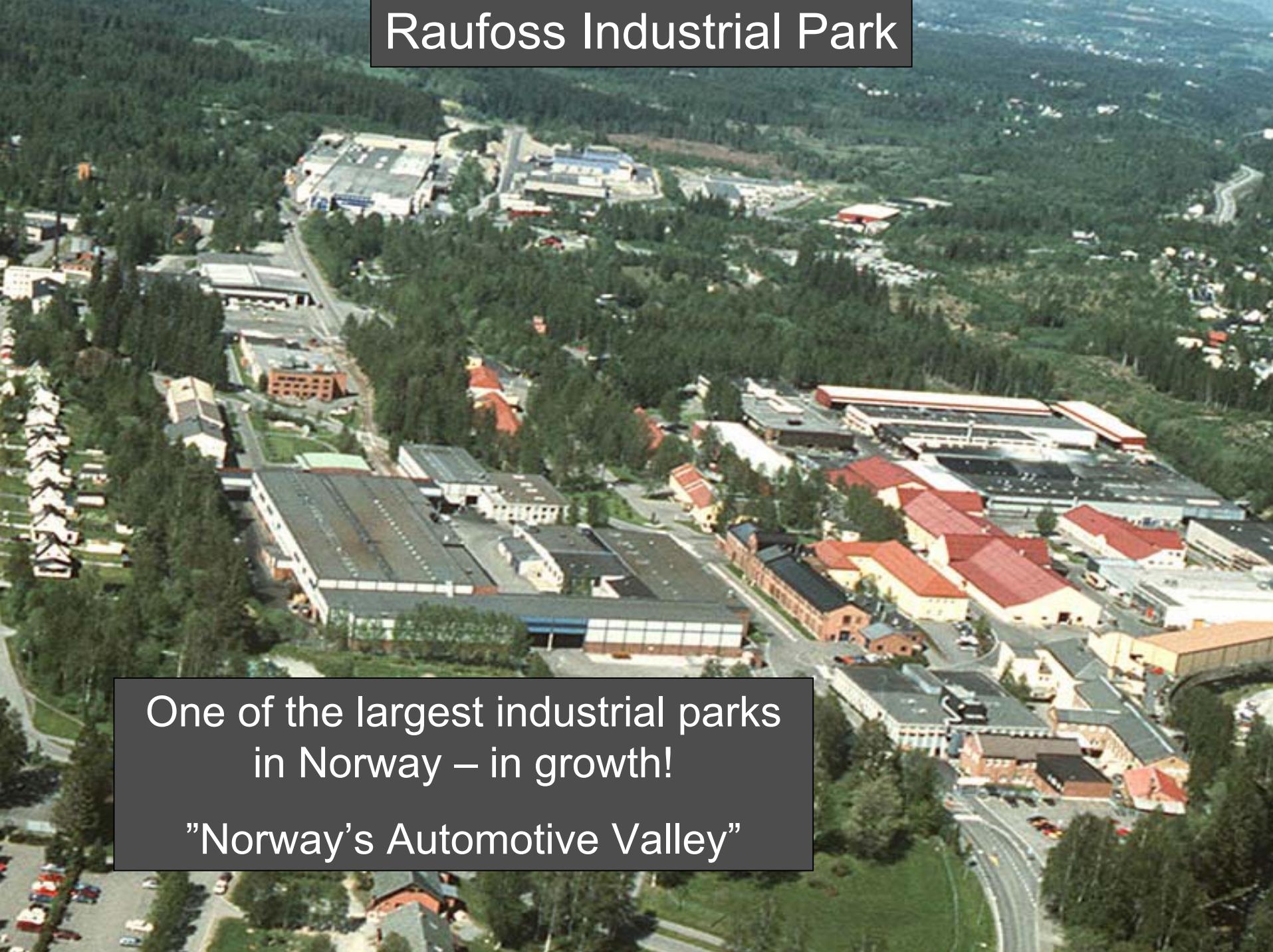
Hydro Automotive  
Structures

Hydro Aluminium Profiler

**HYDRO**



# Raufoss Industrial Park



One of the largest industrial parks  
in Norway – in growth!

"Norway's Automotive Valley"

# Raufoss Industrial Park – a cluster of innovative technology driven companies

- 3000 employees
  - 2000 within automotive
- 11 manufacturing companies
- Defence – Automotive – Aluminium Extrusion – Composites gas storing systems – Metal components
- More than 80% export

## History: 1999 - 2000

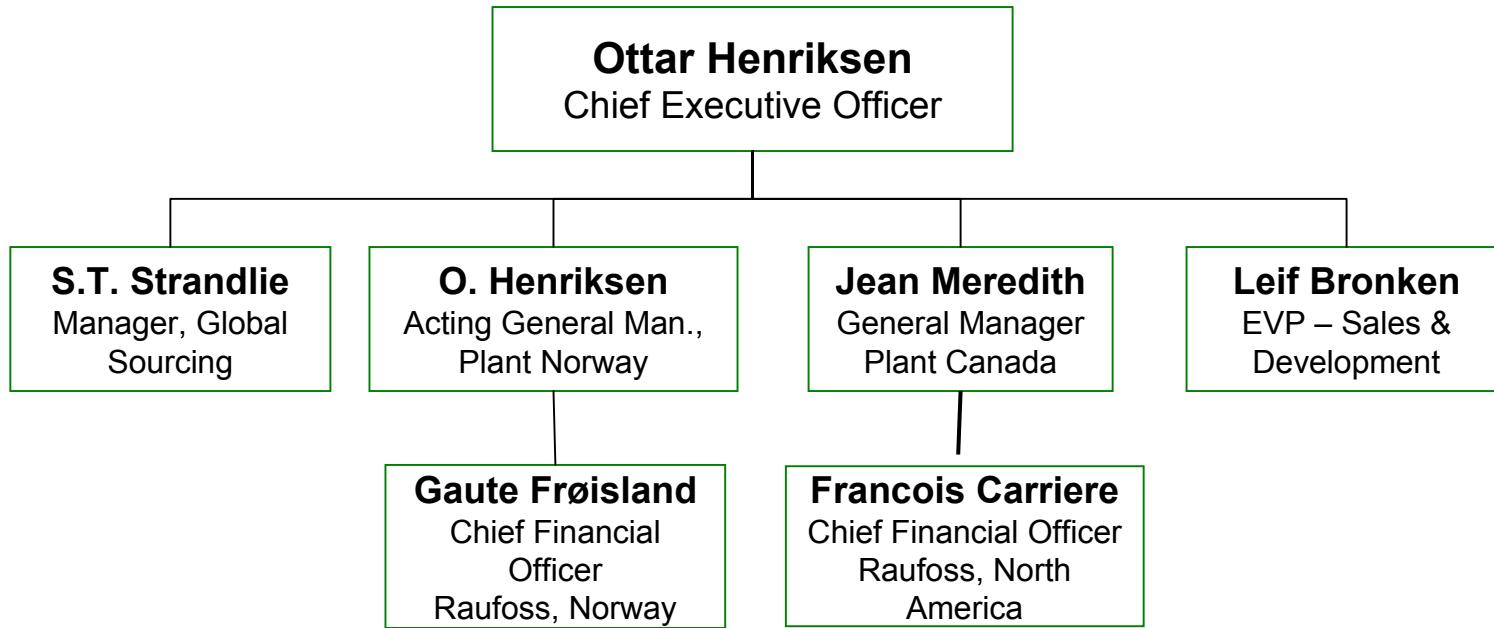


***RT Development co-operation with GM, SAAB for a new GM platform 1998 – 1999 result in new, innovative aluminium solutions***

- **GM Europe 1999:** nomination of RT as sole supplier of complete aluminium control arms for the new "Epsilon" GME platform to be introduced spring 2002. Investments of 25 mill USD – revenue 35 mill USD per year
- **GM North America 2000:** nomination of RT as sole supplier of same / similar products to "Epsilon" GMNAO platform to be introduced late 2002. Investments of 42 mill USD – revenue 48 mill USD per year

***Building on over 20 years of manufacturing  
aluminum chassis components!***

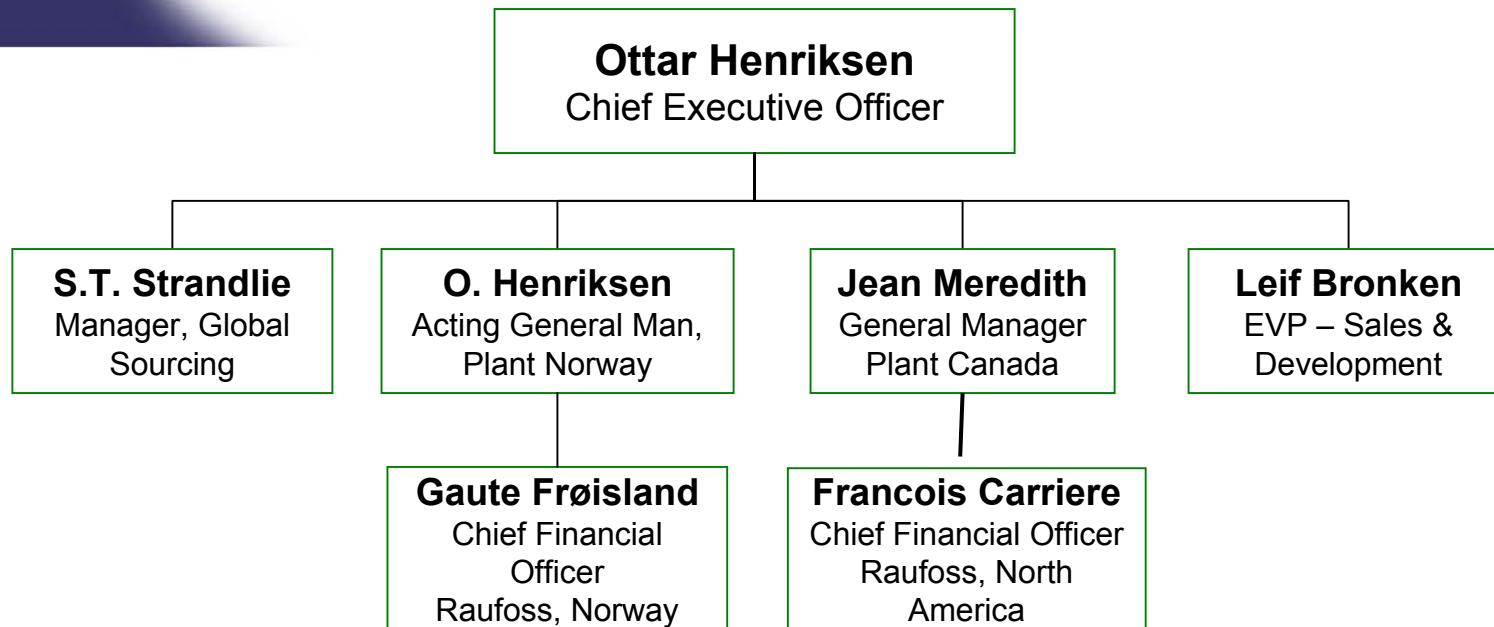
# RT Operating Organization



- ✓ Average tenure of 17 years
- ✓ 70 years of industry experience

***Strong & Dedicated Management Team!***

# RT Operating Organization



2004:  
Fabrikk Norge:  
Omsetning: 200 mill NOK  
EBITDA: 28 mill NOK

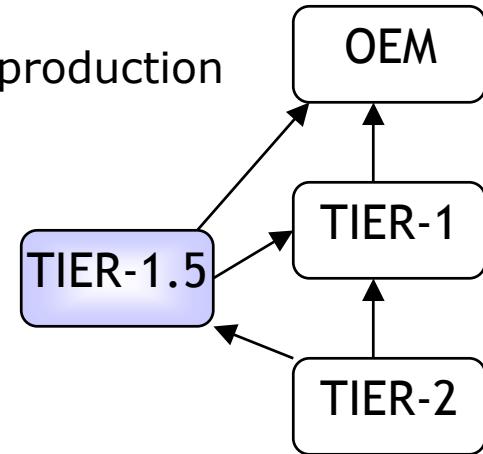
2004:  
Fabrikk Canada:  
Omsetning: 110 mill NOK  
EBITDA: 15 mill NOK

2004:  
Salg, utvikling og global  
ledelse:  
23 mill NOK

## RT Overview – Tier 1.5 Focus

Supplier of functional components requires:

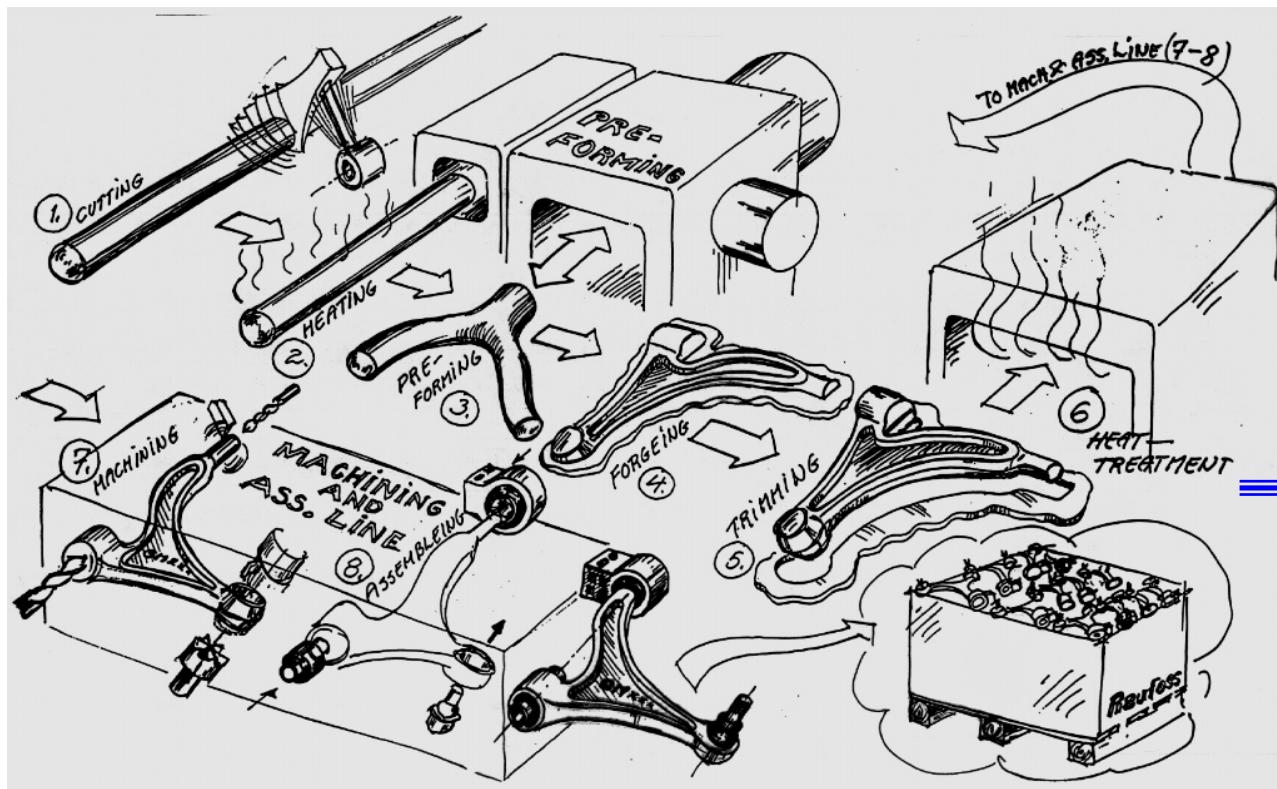
- Product design, analysis, testing
- Process and material knowledge/technology
- High industrialisation level, highly automated production
- Cost competitive light-weight components
- Completely assembled units
- Supply to OEM's, 1st Tier module suppliers
- Global player – local partner



***RT has all the attributes to be a global supplier of functional suspension components!***

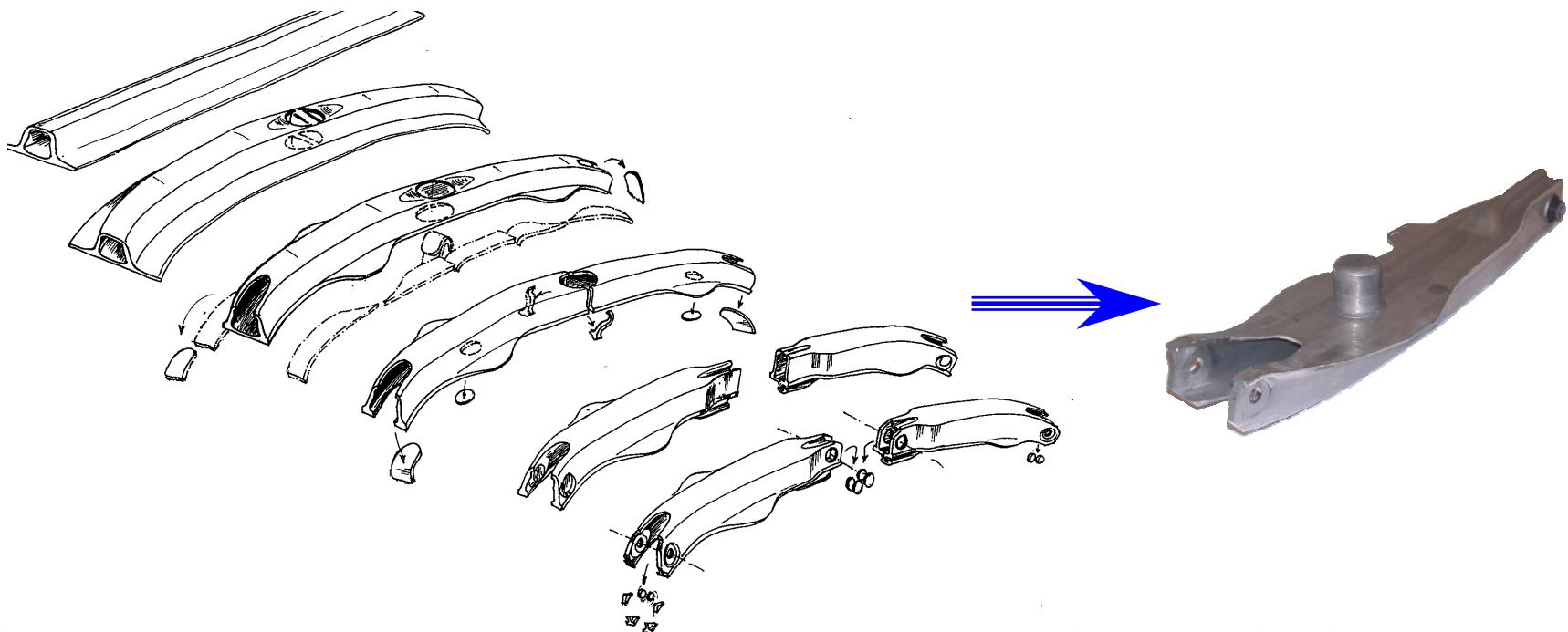
# Operations – PreFormForge Process

- Unique Time-Temperature control w/o conventional crack control!
- For statistical reasons over 100,000 parts produced with conventional crack test performed parallel w/o one single crack detected!

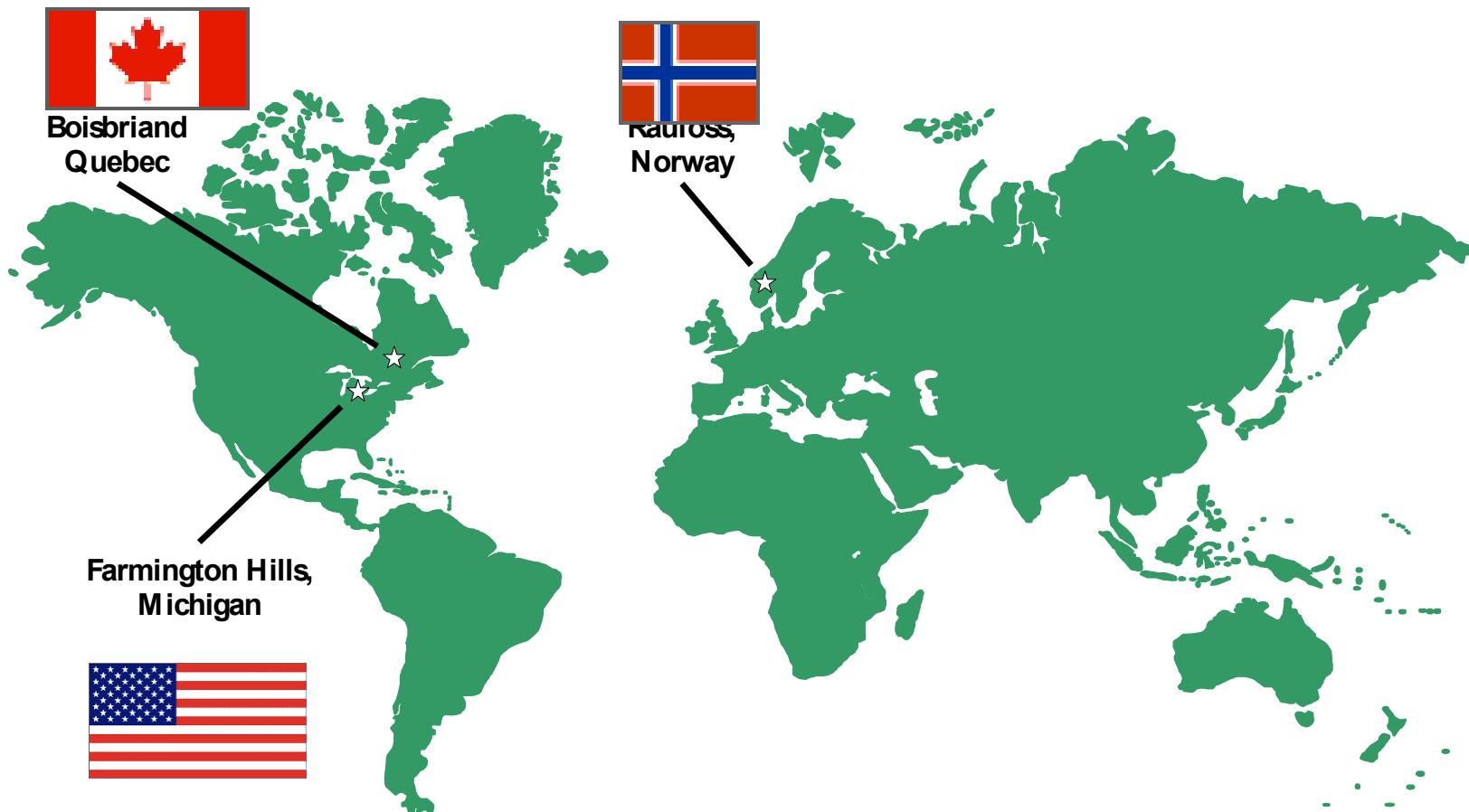


## Operations – ExtruForm Process

- In house knowledge in following process:
- Extruded Aluminum Profile +
- Stretch Bending +
- Stamping & Impress operations
- Optimized to less input material and high speed inline production.

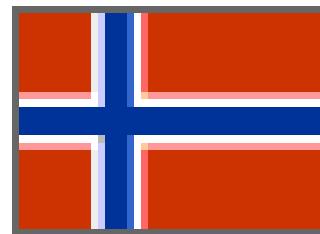


# Global Operational Footprint



## Facilities – Raufoss, Norway

- Part of Raufoss Industrial Park
- Two leased buildings
- Bldg. I - 60,708 sq. ft. (5,640 sq. mt.)
- Bldg. II – 5,813 sq. ft. (540 sq. mt.)
- 14 salaried in Manufacturing & Managem.
- 51 hourly in Manufacturing
- 11 salaried in Sales & Development
- Jern og Metall union
- €16.20 average hourly wage
- Design & engineering
- QS 9000 / ISO 14001



### ➤ Manufacturing Equipment

- Renovated in 2001 – €30 million
- Fully integrated production
- 26 robots
- 6 presses
- Insert filtration system desc.
- Fully automated assembly

## Facilities – North America

### Boisbriand, Quebec

- Duplicate of Raufoss facility
- Owned facility
- 42,055 sq. ft. (3,907 sq. mt.)
- Additional 5000 sq. ft in construction
- 17 salaried
- 5 expatriates
- 35 hourly
- 9 temporary
- Union in place: 3 yr contract signed
- €12.34 average hourly wage
- Currently filing ISO/TS16949
- Specialized operator work force: college education in automation
- Product & process engineering support



- Manufacturing Equipment
  - Total new installation 2002/2003
  - Integrated production lines
  - 21 robots
  - 6 presses
  - Additional automation being incorporated to increase capacity
  - All equipment parameters fully monitored with custom-made data logging system

# Labour costs in Europe

for different countries\* in comparison with Raufoss Technolgy AS

<b>Countries</b>	<b>Salary per hour in 2003</b>	<b>Social expenses</b>	<b>Salary and social expenses</b>
	Euro	Euro	Euro
Norway	18,96	9,19	28,15
Denmark	20,63	6,7	27,33
W-Germany	15,13	11,96	27,09
Switzerland	16,79	8,81	25,60
Finland	13,58	10,45	24,03
Belgium	12,46	11,34	23,80
The Netherlands	12,90	10,3	23,20
Sweden	13,30	9,47	22,77
Greece	6,07	4,12	10,19
Portugal	3,98	3,02	7,00
Czech	2,35	1,95	4,30
Hungary	2,28	1,76	4,04
Poland	2,06	1,2	3,26

\* Report from project in the german "Institut der deutchen Wirtschaft" in 2003 presented in the norwegian newspaper "Aftenposten", August 24.2004

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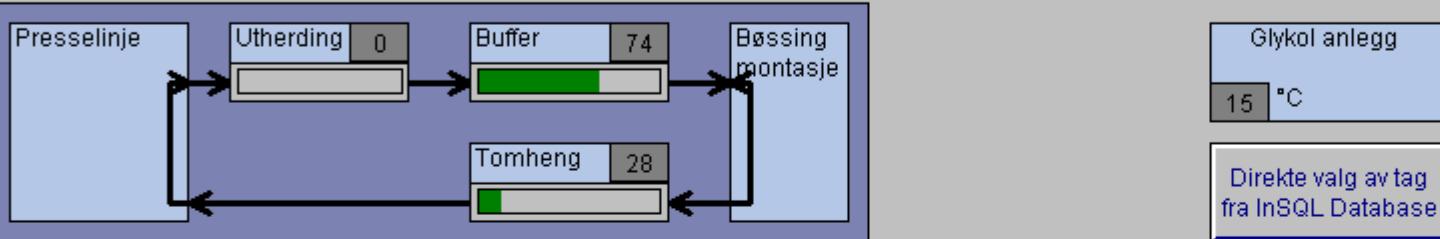
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<b>Raufoss Technology, 1.1 2005</b>		**	
Skilled worker	16,52	5,16	21,68
Semi skilled worker	15,57	4,90	20,46
Unskilled worker	14,74	4,67	19,41
Development work	32,56	9,50	42,06

\* Report from project in the german "Institut der deutchen Wirtschaft" in 2003 presented in the norwegian newspaper "Aftenposten", August 24.2004

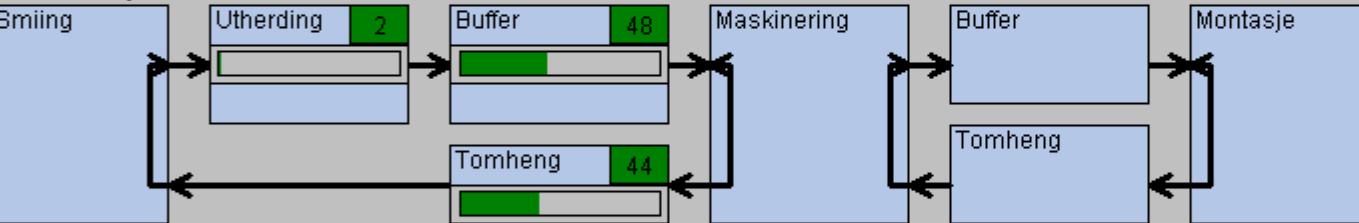
# Intranet- process and productivity control

- <http://b260wincc-3.corp.raufoss.com/project.asp>
- [hovedside\\_smie.asp](#)
- [hovedside\\_maskinering.asp](#)
- [hovedside\\_montasje.asp](#)
- [Intranet - Raufoss Chassis Technology](#)
- [ukes-og-årsrapporter.asp](#)

## Bakre linje



## Fremre linje



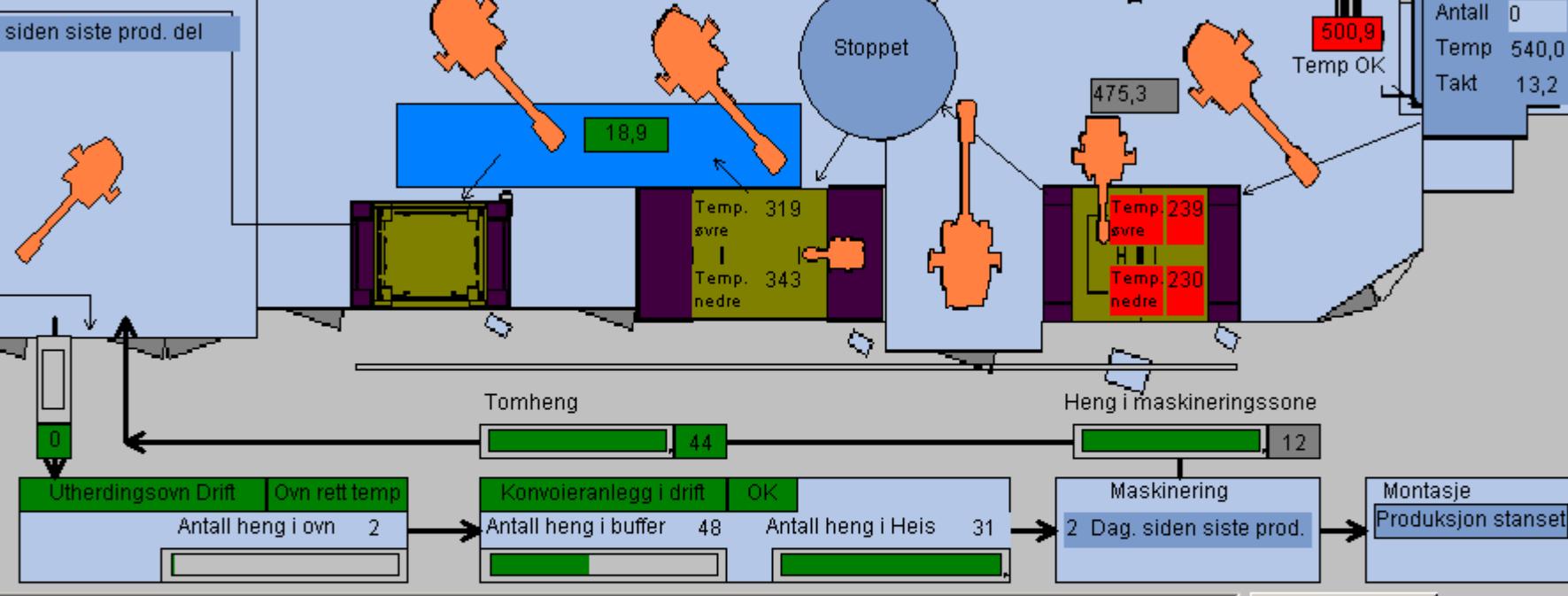
[startbilde](#)

## Smiing

Råvare inn → Sag

[til gammel side](#)

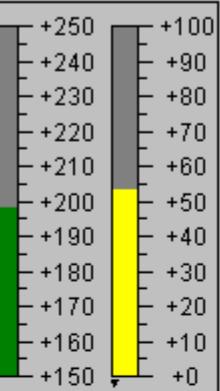
0 Dager siden siste prod. del



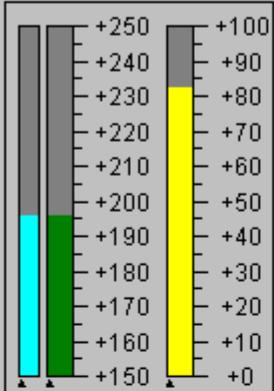
[Smiling](#)[Til startbilde](#)

## Utherding fremre

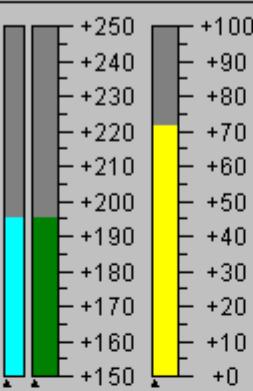
Sone 1

punkt **198,0**verdi **197,9**Pådrag **53,4**

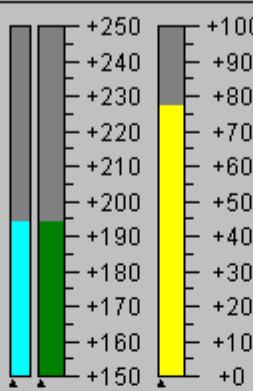
Sone 2

Setpunkt **196,0**Erverdi **195,0**Pådrag **82,5**

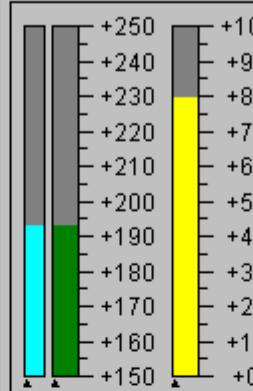
Sone 3

Setpunkt **195,0**Erverdi **195,0**Pådrag **71,6**

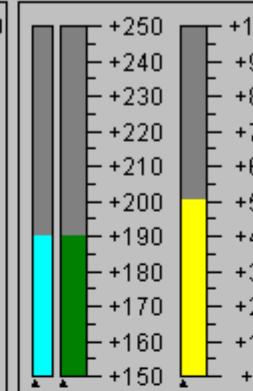
Sone 4

Setpunkt **194,0**Erverdi **194,0**Pådrag **76,9**

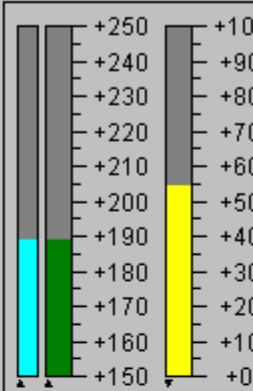
Sone 5

Setpunkt **193,0**Erverdi **193,0**Pådrag **79,2**

Sone 6

Setpunkt **190,0**Erverdi **190,0**Pådrag **50,4**

Sone 7

Setpunkt **189,0**Erverdi **189,0**Pådrag **54,0**

Kurve

Kurve

Kurve

Kurve

Kurve

Kurve

Kurve

InSQL Database

[Sregnskap](#)[Produksjon pr. uke](#)

2004-10-07 / Dag

[NÅ](#)[Natt](#) [Dag](#) [Kveld](#)**Nøkkeltall**

Antall produsert	:	2258
Planlagt stopp	:	8,6 %
Ekstern venting	:	0,1 %
Ikke planlagt stopp	:	17,1 %
Faktisk produktiv tid	:	74,2 %
Kvalitetsutbytte	:	98,9 %
Takttidsutbytte	:	90,9 %
Teknisk tilgjengelighet	:	81,2 %
OEE	:	73 %

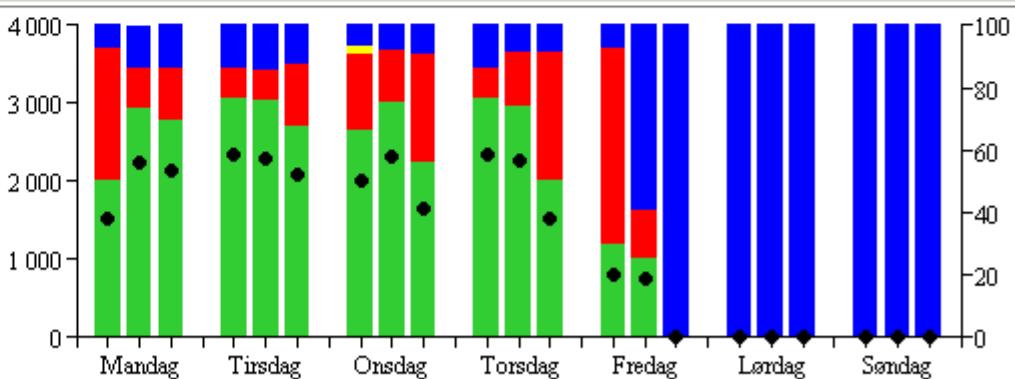
**Stopp og stoppårsaker**

Dato / Skift	T	Fra	Til	Lengde	Kode	Observasjon	Tiltak	Edit
2004-10-07	D 4	13:21:27	13:24:50	00:03:24	00			
2004-10-07	D 4	12:57:13	13:15:04	00:17:51	00	vedlikehold.		
2004-10-07	D 4	12:50:33	12:54:04	00:03:31	00			
2004-10-07	D 4	12:42:32	12:48:03	00:03:31	00			
2004-10-07	D 2	10:35:29	11:13:27	00:37:58	18	Samme.		
2004-10-07	D 2	10:27:49	10:31:04	00:03:14	18	Matpause.		
2004-10-07	D 4	07:50:37	08:09:54	00:19:18	10	bommet med k		
2004-10-07	D 4	07:45:07	07:49:22	00:04:15	14	samme.		
2004-10-07	D 4	07:23:33	07:28:32	00:04:59	14	del gikk ikk		
2004-10-07	D 4	06:45:10	06:49:03	00:03:53	17	heng stoppet		
2004-10-07	D 4	06:33:13	06:36:42	00:03:29	10	dårlig vacum		

**Vrak og Vrakårsaker**

Antall : 26

- Ant. produsert
- Teknisk tilgjengelig tid
- Ikke planlagt stopp
- Ekstern venting
- Planlagt stopp
- Feil i overordnet system



Planlagt stopp

TotalNDKNDKNDKNDK

Ekstern venting

TotalNDKNDKNDKNDK

Ikke planlagt stopp

TotalNDKNDKNDKNDK

**kesrapporter**

[Smie](#)  
[Maskinering A](#)  
[Maskinering B](#)  
[Montasje](#)  
[Presselinje \(kopp\)](#)  
[Bøssingcelle](#)

**Uttak % siste 52 uker**

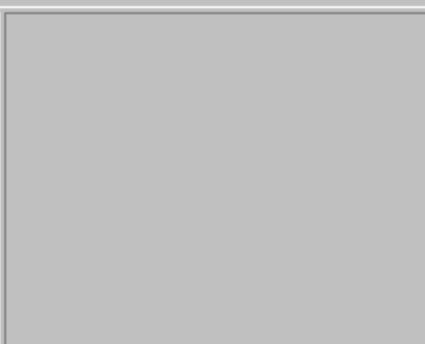
[Smie](#)  
[Maskinering A](#)  
[Maskinering B](#)  
[Montasje](#)  
[Presselinje \(kopp\)](#)  
[Bøssingcelle](#)

**Produksjon siste 52 uker**

[Fremre](#)  
[Bakre](#)

**Tall Produsert**

[Smie](#)  
[Maskinering A](#)  
[Maskinering B](#)  
[Montasje](#)  
[Presselinje \(kopp\)](#)  
[Bøssingcelle](#)

**OEE siste 52 uker**

[Smie](#)  
[Maskinering A](#)  
[Maskinering B](#)  
[Montasje](#)  
[Presselinje \(kopp\)](#)  
[Bøssingcelle](#)

**Produktivitet siste 52 uker**

[Fremre \(dvs. Montasje\)](#)  
[Bakre \(dvs. Bøssingcelle\)](#)



## Noen erfaringer...

- Positive
  - Høy og stabil kvalitet
  - Høy effektivitet/produktivitet
  - Enkel logistikk
  - Gir godt grunnlag for bra arbeidsmiljø
  - Få belastningsskader
  - Interessant arbeidsplass både i produksjon og salg/utvikling-krever høy kompetanse
- Utfordringer
  - Fleksibilitet begrenset til spesiell type produkter for framhjuls- og bakhjulsoppeng
  - Høy OEE- krever omfattende kompetanse hos operatører og vedlikehold
  - "Launch teamet" avgjørende for nybygging og igangkjøring

# Unik teknologi, effektiv produksjon og innovative løsninger skaper ny muligheter

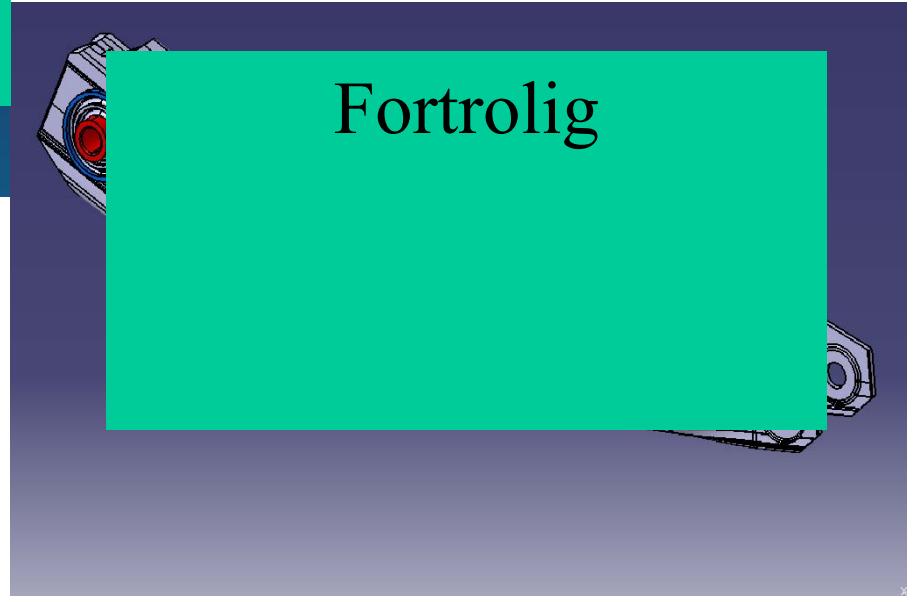
- Vi arbeider aktivt med å utvikle nye løsninger til bilfabrikker som General Motors, BMW, Mercedes, Audi, Hyundai
- Flere av løsningene vi utvikler kan produseres effektivt I Norge og sendes nedover til Europa og til Asia/Nord-Amerika
- Stor tro på at det er mulig å øke aktivitetsnivået I Norge før vi må bygge nye fabrikker, f.eks I ASIA
- I morgen kan vi forhåpentlig vise dere en fabrikk som forklarer noe av årsaken til at vi ser ganske optimistisk på fremtiden til tross for at vi har vært nær døden

Ny hjulophengs arm for en ny "SUV"  
skal leveres fra Raufoss til  
ASIA og USA fra slutten av 2006



Fortrolig

Integrt utvikling med  
kunde siden sommeren  
2004 og i sterk global  
konkurranse



Fortrolig