Fokusert ,fleksibel reservedelsproduksjon

Utvikling av operativ enhet hos Benteler på Raufoss

BENTELER Automotive

Bildelhistorien til Benteler Aluminium Systems Norway

- Raufoss Ammunisjonsfabrikker 1958 - 1997
- Hydro Aluminium 1997 - 2010
- **Benteler Al-Systems Norway** **2010-**

BENTELER Automotive

Referanse platform

- Bilindustriens generelle krav til sertifisert kvalitet
  - Original kvalitetsstandard – produktfunksjonelle krav

- Bilenes levetid og globale std krav

- Generelt krav fra « bilindustriens kvalitetsplatform » er at reservedeler med original kvalitetsstandard skal være tilgjengelig

  15 år etter avsluttet serieproduksjon

« Problemstilling : Gir dette grunnlag for et levedyktig business case ? »

Bildeler fra Raufoss

Basis - Historie - Kontinuitet – Utvikling

1958 2012

1966 Al støtf til Volvo PV

1972 Markedsekspansjon Porsche,Audi,VW,Saab

1976 Produkt- og MarkedsekspansjonVolvo LV, BMW

1980 Produkt- og teknologi ekspansjon: plast/lakk

1982 Produkt – og teknologi ekspansjon :chassis ,styresystem

1989 etablering av nye prod.enheter i Belgia og Sverige

1991-1995 «divisjonalisering –fokus -ekspansjon

1995-2000 «eierskap-samarbeide-vekst»

2000 konsekvens

4 « nye eiere»
- Al Structures : Norsk Hydro
- Plastics : Plastal
- Chassis : Neuman Raufoss Technology
- Styresystem : Steertech/Willy Elbe

BENTELER Automotive

Bildeler fra Raufoss forts.

1958

2012

2000-2008

Structures (Hydro)

Raufoss (N),Skultuna(S),Tønder(DK) ,Bromyard &Worcester(UK)
Wackersdorf(G) ,Holland Mi(USA)

Plastics (Plastal)

Raufoss (N),Gent (B),Uddevalla /Simrishamn/Gøteborg(S),Oderzo(I),Gliwize(P)

Chassis (Neuman)

Raufoss(N) , Montreal(Cnd)

Styresystem (Steertech/Willy Elbe)

Raufoss(N) , Tyskland(G)

2008-2010

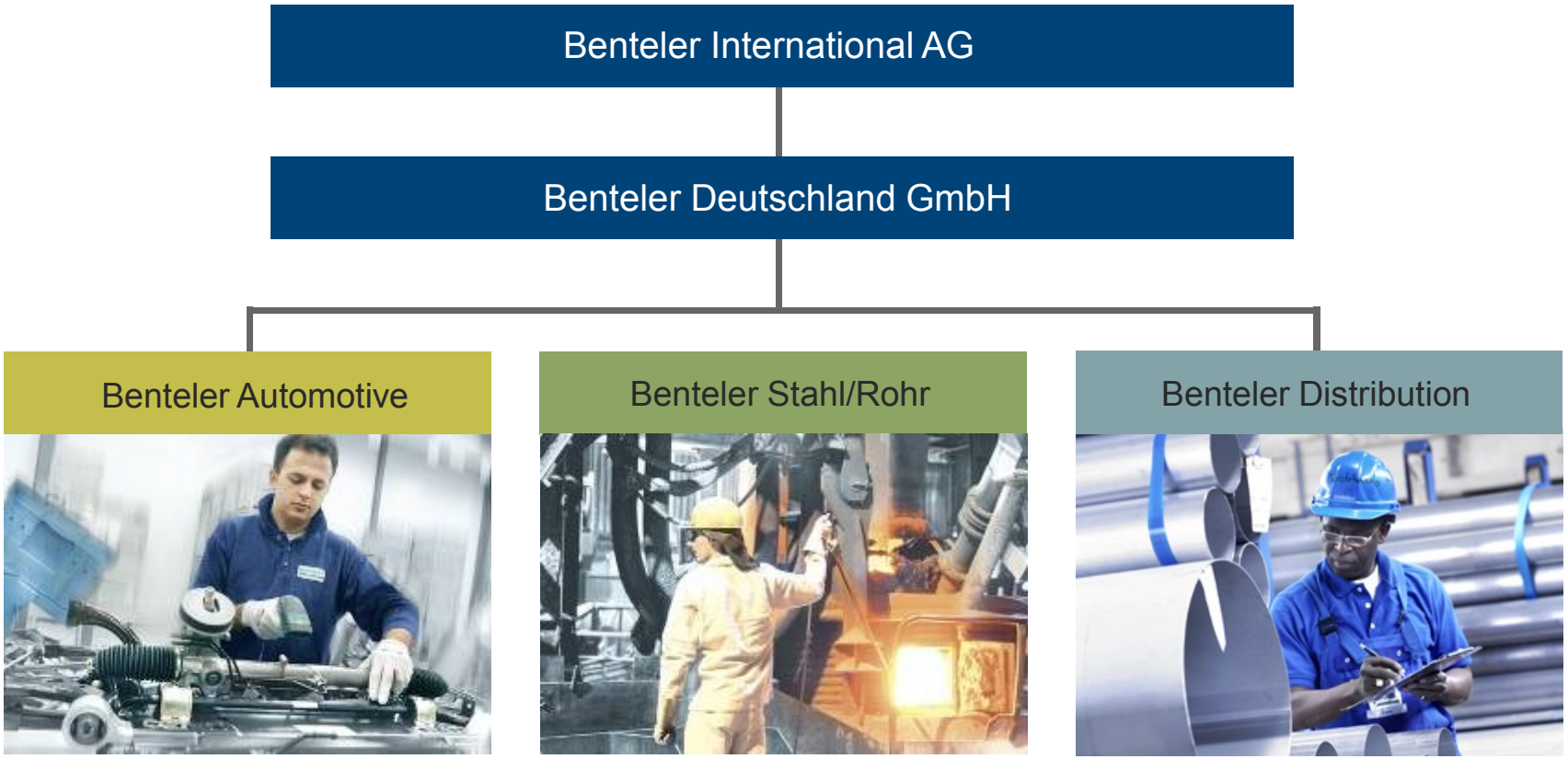
Structures med nye enheter i Tsjekkia og China ,samt overført til Benteler
Plastics/Plastal ny eier og reorganisert
Chassis (Neuman) med ny enhet i China
Chassis (Steertech) konsolidert

BENTELER Automotive

Benteler Al-Systems Norway (BASN)

- **2010 : Benteler overtar Hydro Automotive Structures**
  - **Raufoss (N) , Skutuna(S),Tønder (DK), Louviers (Fr), Wackersdorf (G),Holland (Mi/US)**
- **2012 : Benteler etablerer ny region**
  - **Benteler North Europe**
    - **Raufoss (main hub), Skultuna, Tønder + nyanskaffelse Farsund**

Benteler International AG, Østerrike er et holdingselskap med tre operative virksomheter. Disse er alle organisert som separate juridiske enheter og ledet av Benteler Deutschland GmbH. Hovedkontor I Paderborn, Tyskland. Benteler Aluminium Systems Norway as er eiet av Benteler Deutschland og er en del av Benteler Automotive.



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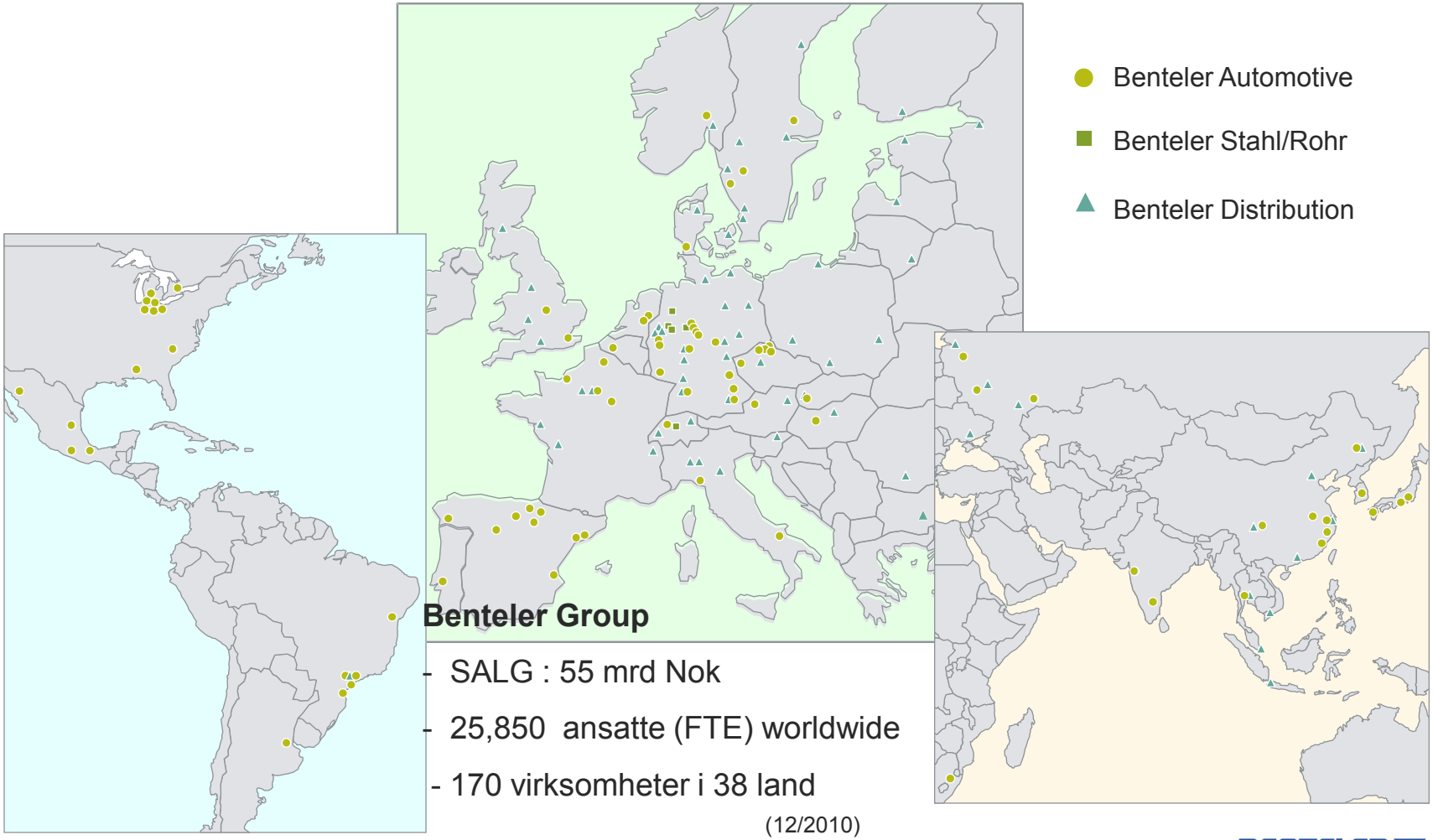
Verdensomspennede virksomhet



Benteler Group

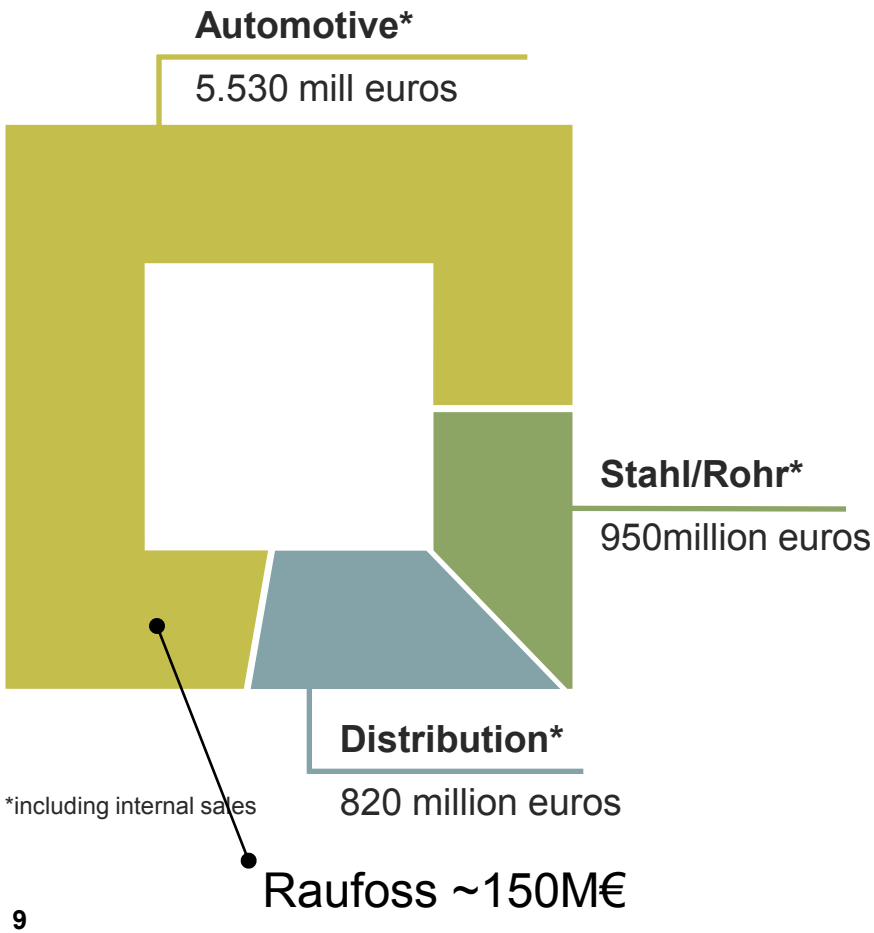
- SALG : 55 mrd Nok
- 25,850 ansatte (FTE) worldwide
- 170 virksomheter i 38 land

(12/2010)

BENTELER Automotive

Group Salg 2011 pr Divisions

Omsetningen i Benteler Group var 7.300 mill euros.



Benteler success factorer

- Skreddersydde produkter
- Verdensledende utviklingskompetanse
- Innovative produkter
- Nye materialer
- Kontinuerlig utvikling av produkter og prosesser
- Global tilstedeværelse

BENTELER Automotive

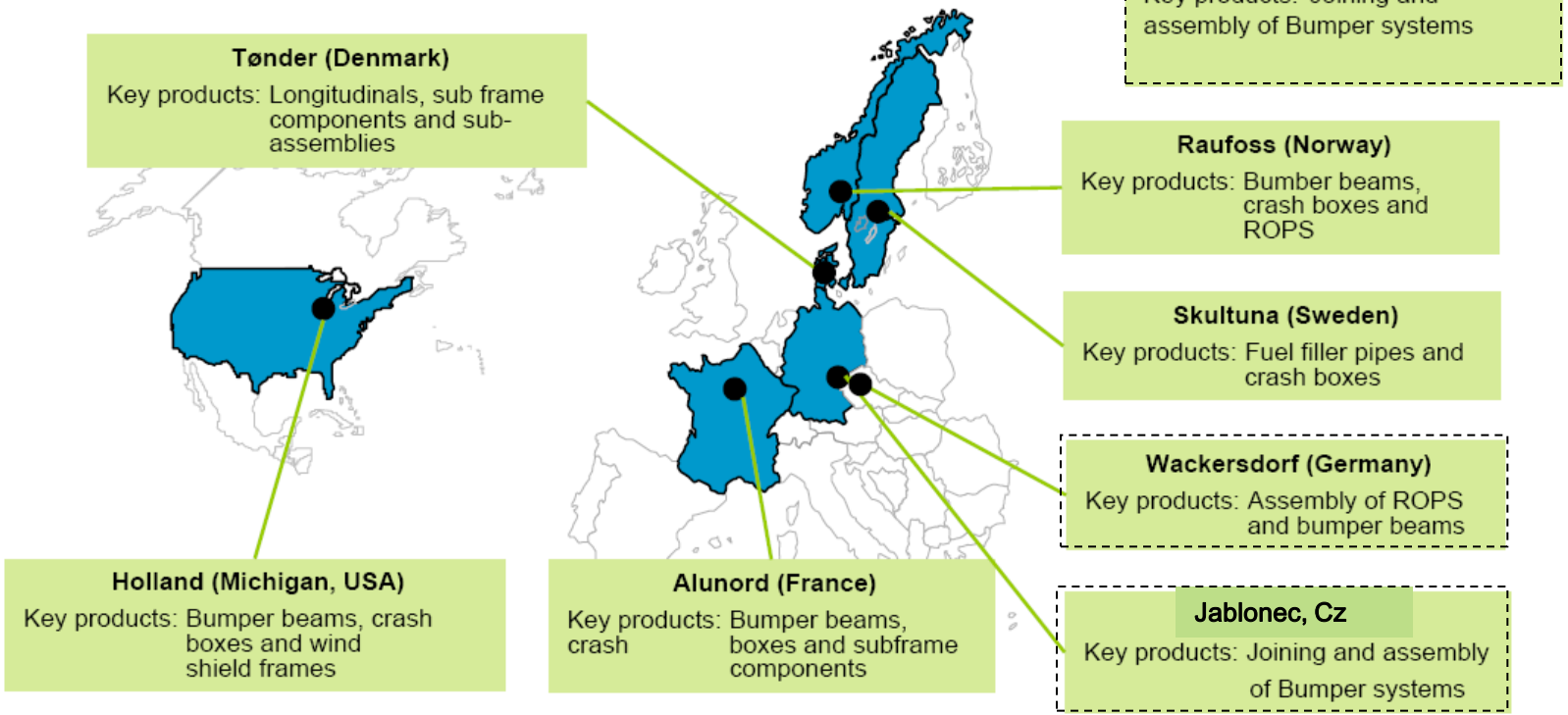
Benteler Aluminium Systems (BAS)

- Oppkjøpt fra Hydro 31/12-2009.
- 5 produksjons enheter (+3 montasje enheter)
- Utviklingssenter Raufoss
- 1000 ansatte
- 300 M€ I omsetning
- 

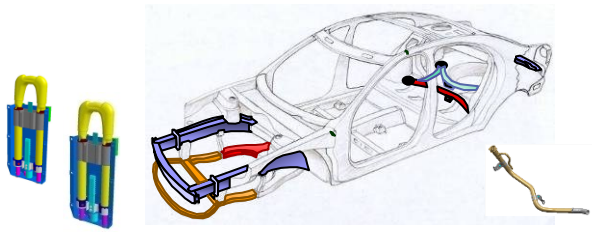
BENTELER Automotive

Overview of BAS

Manufacturing in eight countries on three continents



- World leading supplier of aluminium extruded based components to OEMs in Europe and North America



BENTELER Automotive

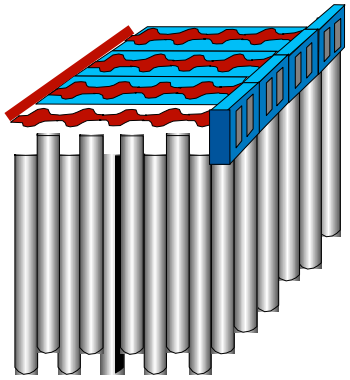
Benteler Aluminium Systems Norway

(BASN = Raufoss)

På Raufoss har Benteler verdensledende teknologi i alle Produksjonsprosesser

Casthouse

- Casthouse optimised for 7000 alloys (high strength)
- Scrap recycling

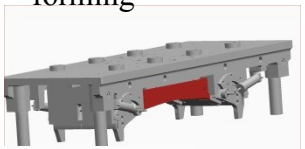


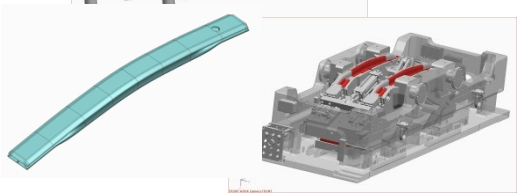
Extrusion

- Process optimized for 6000 and 7000 alloys
- Extrusion die technology
- Improved die-life
- Higher extrusion speed

Presslines

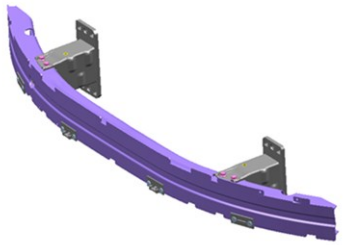
- Integrated press- and stretch-forming technology
- Inline heat-treatment in the forming process at high productivity
- Punching-trimming-machining operations linked directly to the forming





Welding Machining,Assembly

- Robotic deburring
- Robotic machining
- Large-bed CNC machining
- Welding
- Assembly

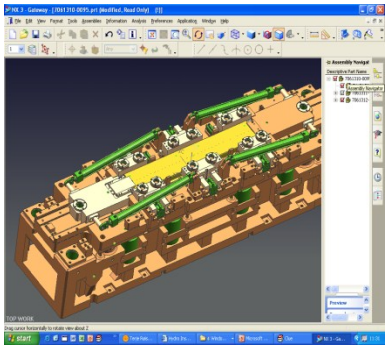


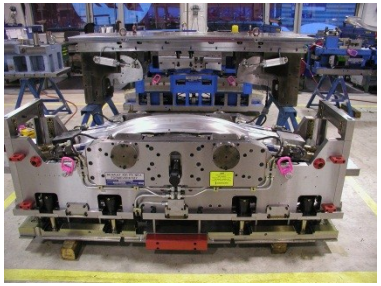
BENTELER Automotive

Fabrication Tools Engineering and Build

Integrated tools package for transfer presslines

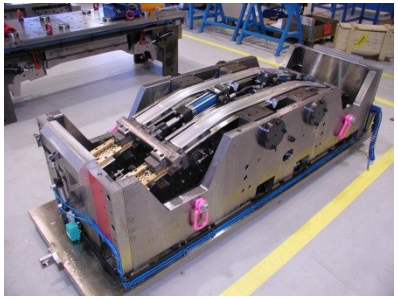
Stretch-forming tool
Re-forming tools
Punching and trimming

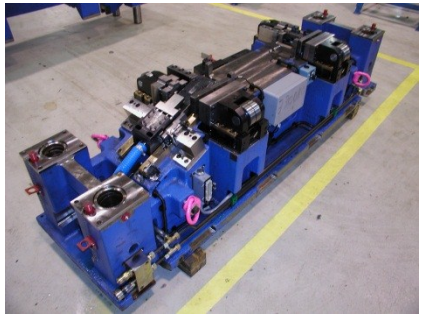




Tandem process tools package

- Stretch-forming tool
- Re-forming tools
- Punching and trimming





Special tools technology

- Calibration tools
- 3D-stretchforming tools and machines
- Flexible tools
- Flexible prototype tools

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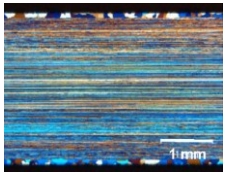
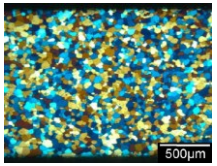
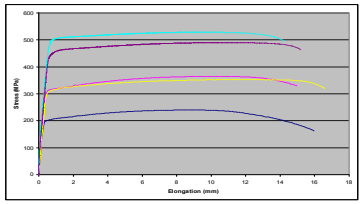
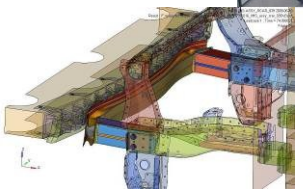
Integrert optimalisering av produkt ,materiale og prosess







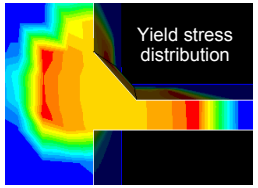


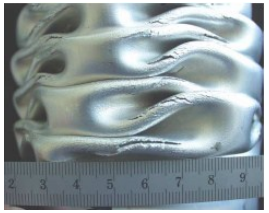
Region / Plant

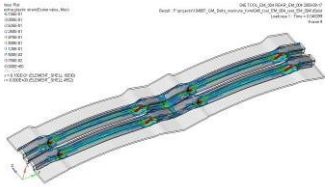
Customer Satisfaction

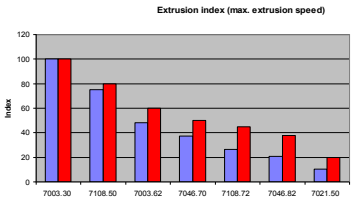
Product Group

Research Programs





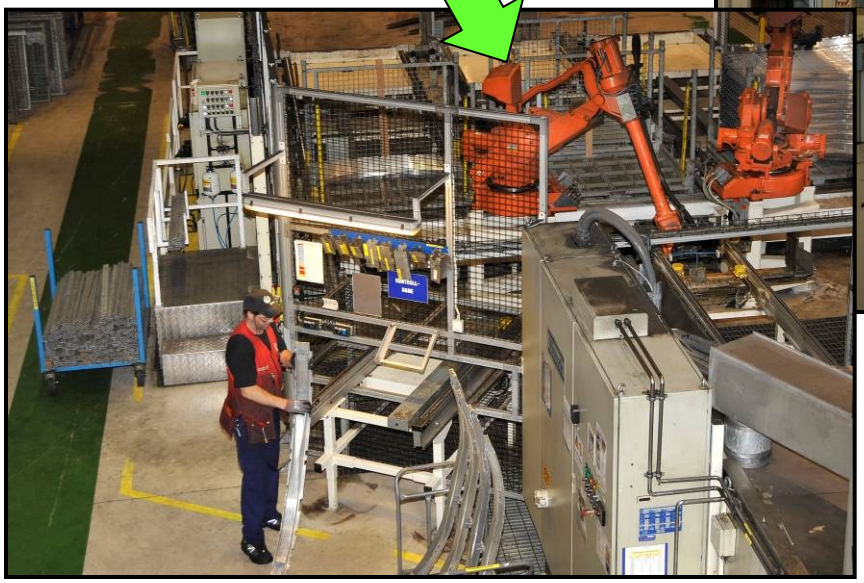




Aluminium technology competence and expertise in all steps

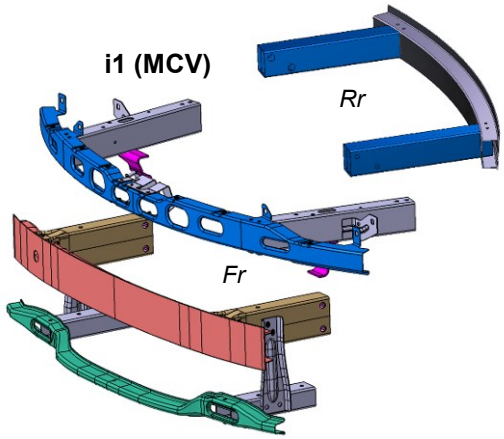
BENTELER Automotive

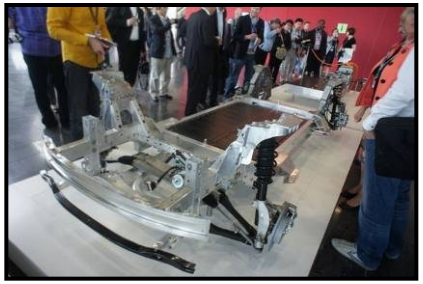
The norwegian costlevel to be managed through innovative product technologies and efficient processes

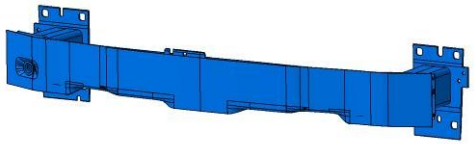


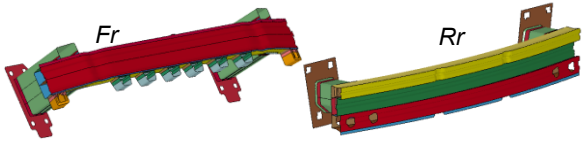
BENTELER Automotive

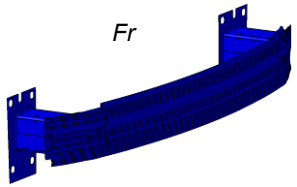
Bumpersystems for most all major OEMs

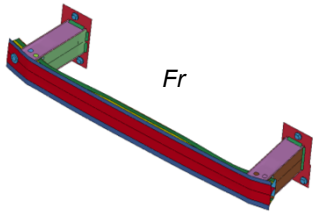










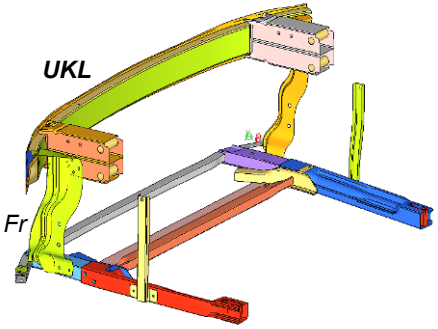


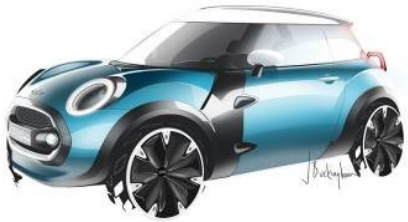
AU37x (A3)

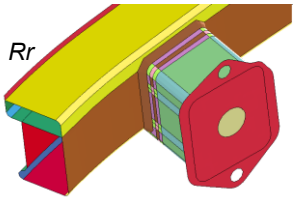
AU736 (Q7)

AU33x (TT)

AU49x (A4)

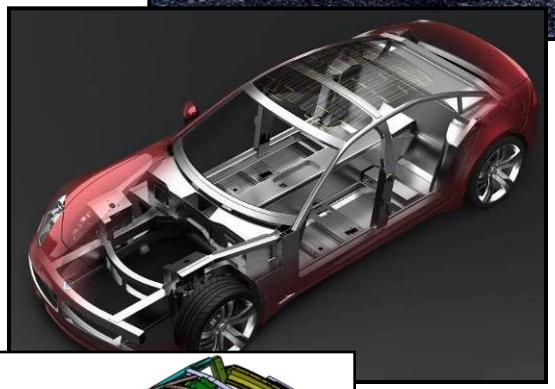


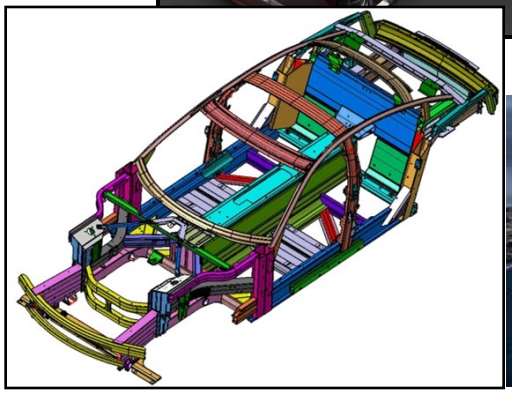




BENTELER Automotive

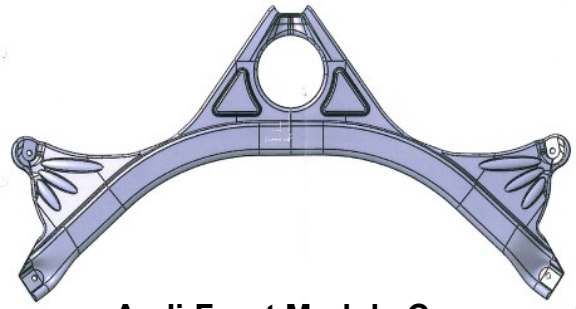
STRUCTURAL components





Fisker Karma

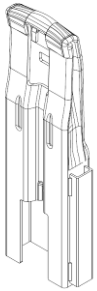
Corvette Windshield Frame
Holland Michigan

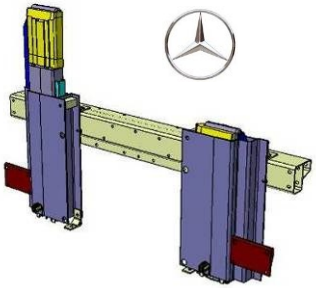


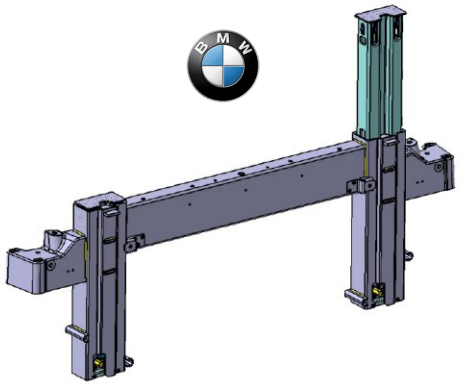
Audi Front Module Component
Tønder DK

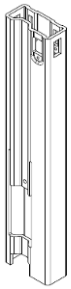
BENTELER Automotive

Roll Over Protection Systems









BENTELER Automotive

The spare part challenge

in an automotive context

Spare Parts definition

- Bumper spare parts are components that you can buy separately to replace old or broken bumpers. They are usually parts that are designed to be easily **removed** or **fitted,** but they are not **interchangeable** (you can't replace them with other year models).

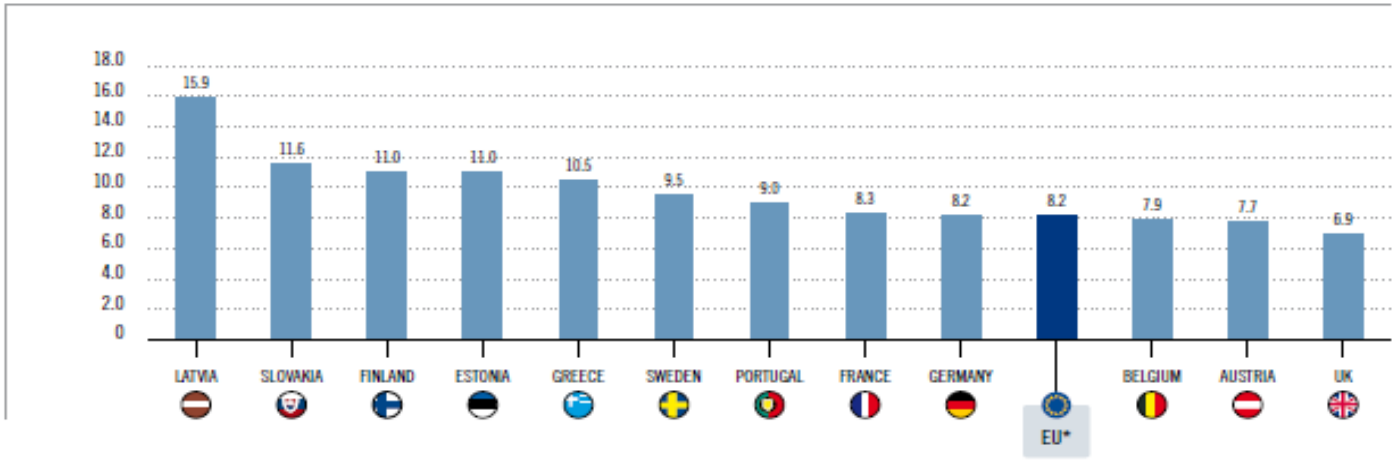
Market elements affecting demand of spare parts

- **Vehicle segment**
  - Upper class , middle class, lower class, utility class,sport
- **Owners view**
  - Privately own ,company car , rental car
- **Car age per country**
  - Examples (Yearly average 2008)
    - UK 6,9 Y , Germany 8,2 Y , Belgium 7,9 Y
    - Sweden 9,5Y , Latvia 15,9 Y , Greece 10,5 Y
- **Number of sold cars**
  - Per car make
    - Per model
  - Per country
- **Driving pattern and attitude**
- **Car accidents per country**
  - Which accidents require spare parts ?
- **Insurance and Pricing**

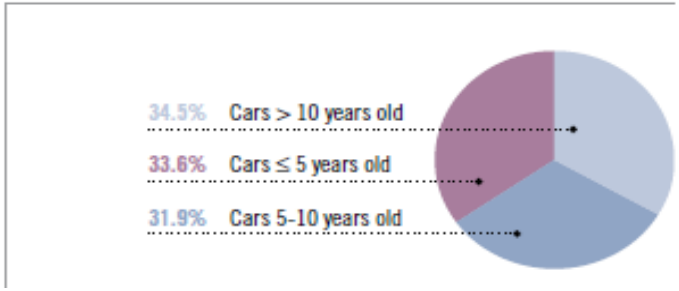
Age of cars

Cars in the EU are on average 8.2 years old

Average Car Age by Country | 2008



Car Fleet* Composition | 2008



BENTELER Automotive

Number of sold cars per make 2010

Manufacturer	Quantity
Toyota	8 420 000
GM	8 390 000
Renault- Nissan	7 280 000
VW	7 140 000
Hyundai-Kia	5 750 000
Ford	5 300 000
Fiat-Chrysler	3 660 000
PSA(Peugeot/Citroen)	3 600 000
Honda	3 550 000
Suzuki	2 890 000
BMW	1 460 000
Mercedes	1 260 000
Mazda	1 300 000
Mitsubishi	1 170 000
Volvo Cars	450 000

Car acccidents statistics /frequency metrics

- Statistics available
- Maturity of market /Registration/Collection

- Typicle performance indicators

  - Injury accidents (n)/100 000 people
  - Injury accidents (n)/ 100 Million Veh.km Traffic

- *Orientation of data to define replacement needs to secure high performance « forecasting » for high efficient «manufacturing» is the real challenge !*

Pricing – Opportunities and Strategies

Price stands out as the most important lever for improving operating profit

but

The most important thing for the customer's choice is not the price

Inventory management

- Spare parts inventory management is a challenge
  - Low and sporadic demand volume
- Lumpy (uncertain) demands may be dealt with in two different directions
  - Managing our stock
  - Using better forecasting methods

Delivery strategy and management

- Spare parts delivery is NOT takttime or sequentially driven by high volume productivity processes (ex.750 cars/shift)
- Spare parts delivery is driven mainly by replenishment monitoring at the OEMs logistical units (Centralized or Distributed)
- Failure in inventory monitoring might cause failure in supporting the local service shop (for his single piece replacement need) – to a customer in person.

« The real customer in the serial phase is a high productive sophisticated production system – making cars , while the Spare parts customer is a defined person with a damaged car which he want back on the road as soon as possible «

Customer satisfaction

- When ordering a car we often accept delivery periods up to many months to get the « car of expectations «
- When ordering a spare part it is normally related to an unexpected situation, which we would like to settle as soon as possible to get the car back on the road «and continue to enjoy driving with the car of expectations»

« Conclusion : *The Spare part customer is probably more important from a reputation point of view than the high volume manufacturing process !!! «*

Spare Parts Concepts and Delivery Phases

Spare Parts- Concept & Delivery phases

Phase 1/ramp up and during serial production

Spare parts are produced as part of regular production. In general only separate packaging and distribution to specific Log units need to be adapted

Phase 2/post serial production and until EoL (15Y)

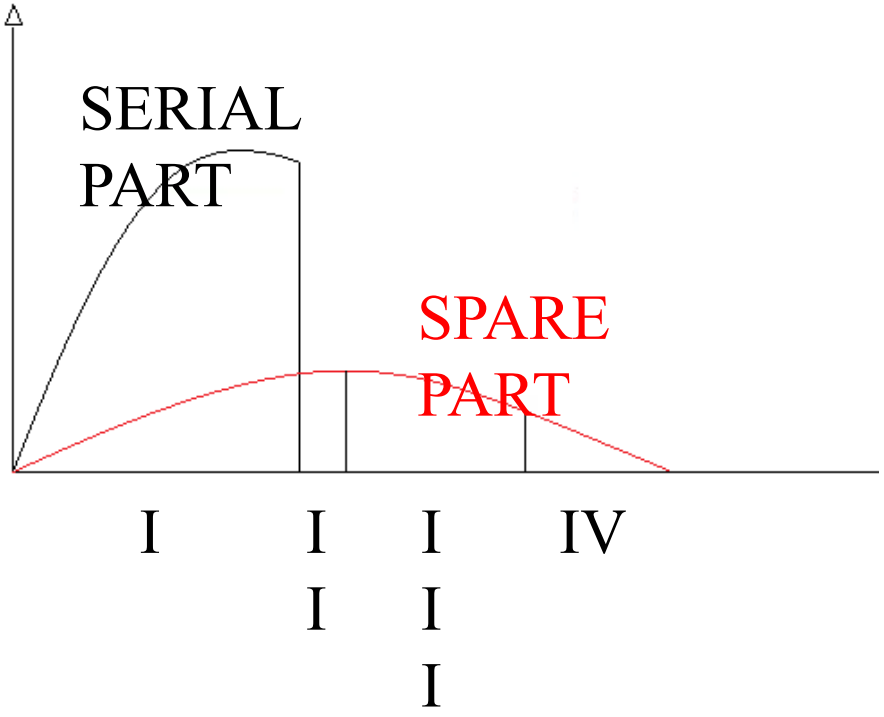
Spare parts are produced and shipped according to Instructions from OEMs Spare Part units. Products need to meet expected technology stds ,but process set ups may be adapted. Deliveries follow general schedule instructions , but Life time volume may be negotiated during phase 2

Phase 3/post general contractual obligation (15Y)

Some OEMs still order the opportunity to support theire customers with ”original manufactured parts”. This may be managed in a fully adapted process concept though fulfilling technology stds

SPARE PARTS CHARACTERISTICS

1) SEPARATED LIFE CYCLE CURVE



Characteristics:

- It is at the and of life cycle
- PLC for serial parts is different for spare parts

Characteristics:

- Often stored at multiple locations
- Very low demand

2) HIGH INVENTORY CO

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BASN concept capabilities

Long experience in delivering Spare Parts(since 1970 for Volvo)

Technology- and Process capabilities to support main stream of products (CMS)

- Available alloys 7xxx/6xxx
- Available extrusion capabilities (P22/P40 and die technology)
- Available forming and punching capabilities (Lines, single presses, tooling plant and capabilities)
- Available finishing capabilities (CNC)
- Available welding and assembly capabilities (robotic and manual welding capabilities)
- Space available for separate finishing operations , warehousing of WIPs , tooling,fixtures and specific manufacturing equipment

Logistical capabilities

- Experienced competence in communication with OEMs
- Weekly/daily shipments to 20 various destinations for main stream customers
- Ability to serve OEMs destinations in Eu within 1-3 days of effective transport
- Over Seas Deliveries are supported accordingly, if wanted by OEMs , but time to destination follow separate agreements (NA /A&P)

Spare Part Business Concept

Phase 1 require full involvement of the plant responsible for serial deliveries

Spare Parts specific issues to be supported by **SPBC**,to safeguard set up and delivery conditions which support the best options for Phase 2 (post DG6) to manage Q,D and Cost with high performance

Q	**0 defect including packaging elements**
D	**100% according to agreement with local destination**
C	**Cost position to secure expected margins within actual process concept**

BAS N (Raufoss) present concept

Spare part activities are integrated in the regular production organisation and set up
Inventory mgmt and customer demand issues are the driving force of activity control

Products during phase 1 are generally ok, but require special attention and agreements of logistical character

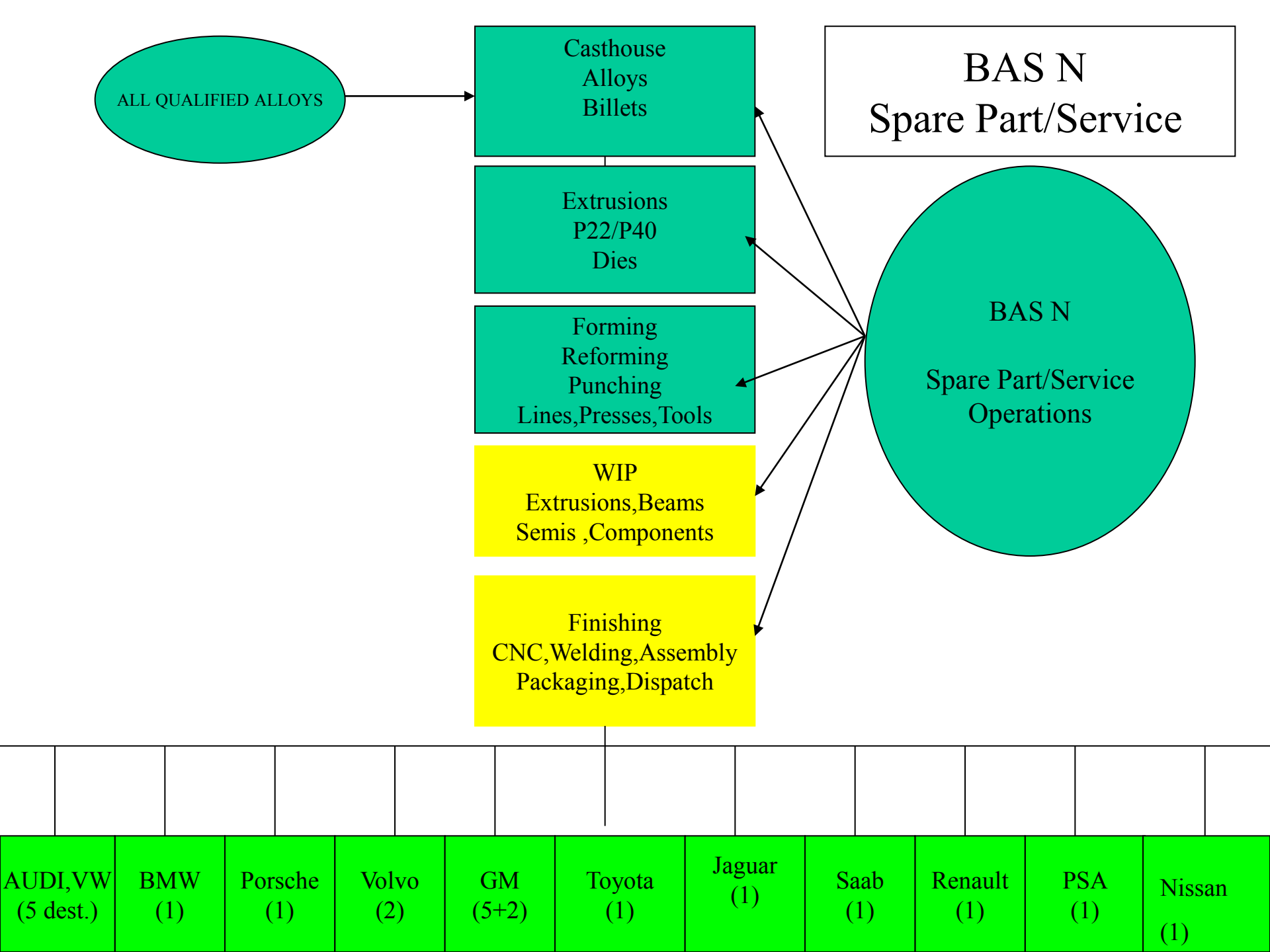
Products during phase 2 are ” in general” fully in the hands of the OEMs Spare part org,and special agreements/arrangements need to be organised(scheduling,forecasts,batches ,ATR etc)

Products during phase 3 are real service and ad hoc , and are generally considered as ”make to order”

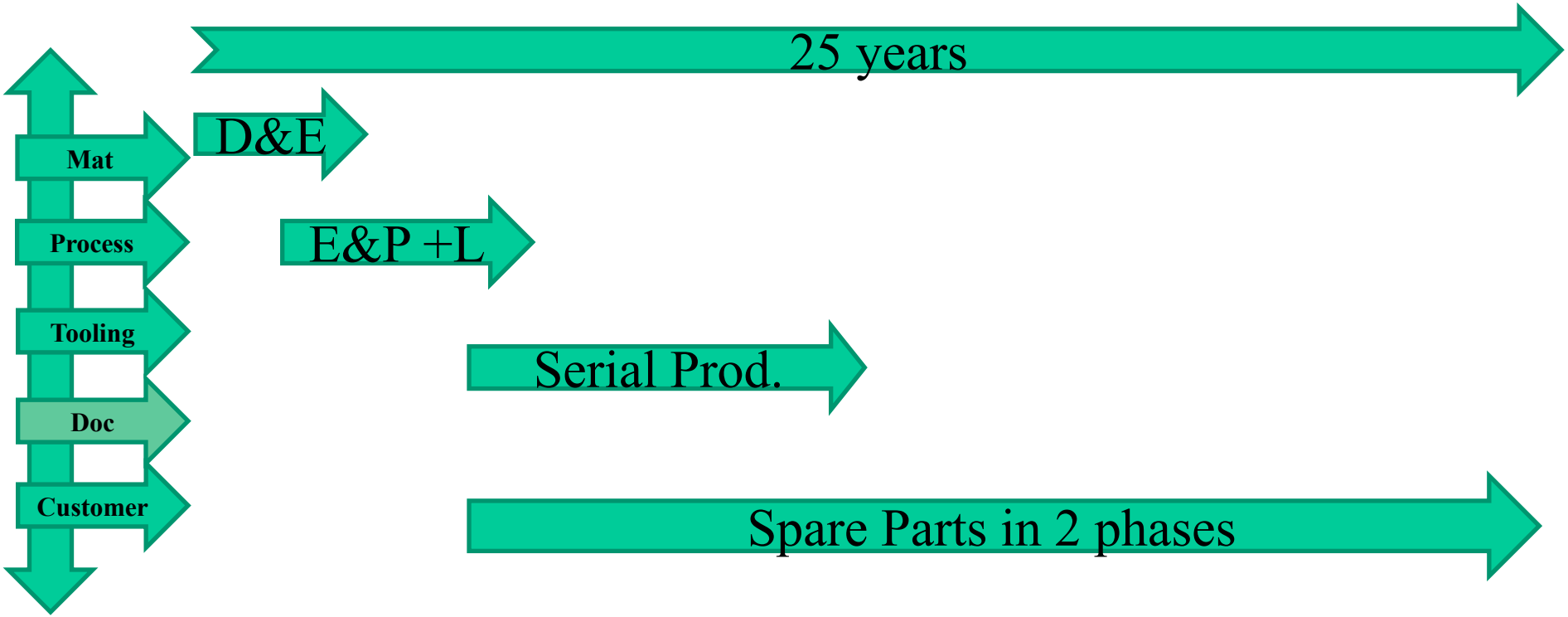
Products in all phases are special , but in different time periods during the technology span of 25 Y there are certain stds for products,processes and contents. In general though always

- Specific extrusion
- Specific forming,reforming,punching tool package

The ability to handle the various technology,process and product characteristics in a low volume and flexible setting and satisfy the customer with 0 ppm and 100% OTD are the key challenges.


ALL QUALIFIED ALLOYS
Casthouse
Alloys
Billets
BAS N
Spare Part/Service
Extrusions
P22/P40
Dies
BAS N
Spare Part/Service
Operations
Forming
Reforming
Punching
Lines,Presses,Tools
WIP
Extrusions,Beams
Semis ,Components
Finishing
CNC,Welding,Assembly
Packaging,Dispatch
AUDI,VW
(5 dest.)
BMW
(1)
Porsche
(1)
Volvo
(2)
GM
(5+2)
Toyota
(1)
Jaguar
(1)
Saab
(1)
Renault
(1)
PSA
(1)
Nissan
(1)

Lifetime reponsbility - “From cradle to grave” - 25 years perspective



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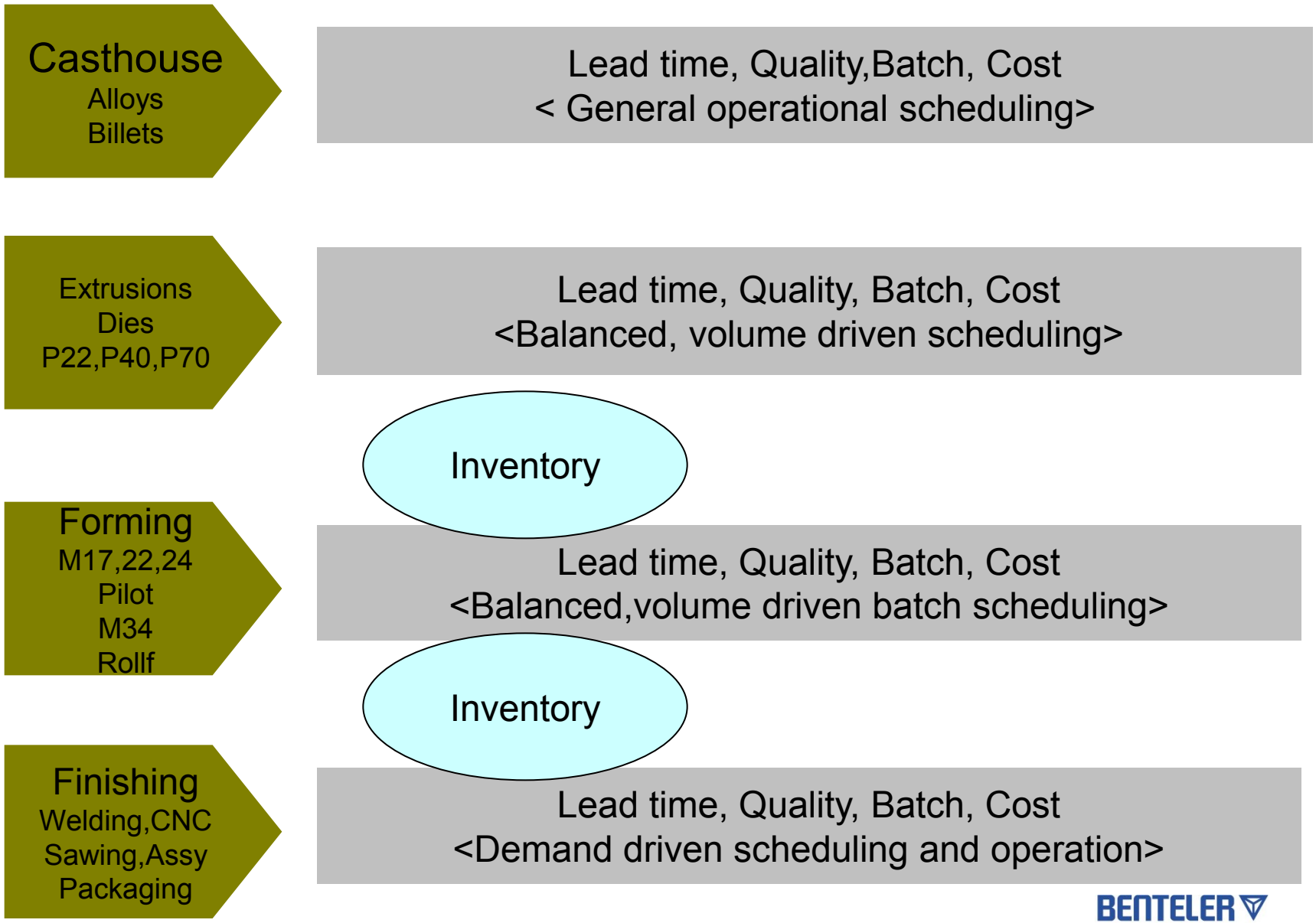
Operational & Logistical Focus



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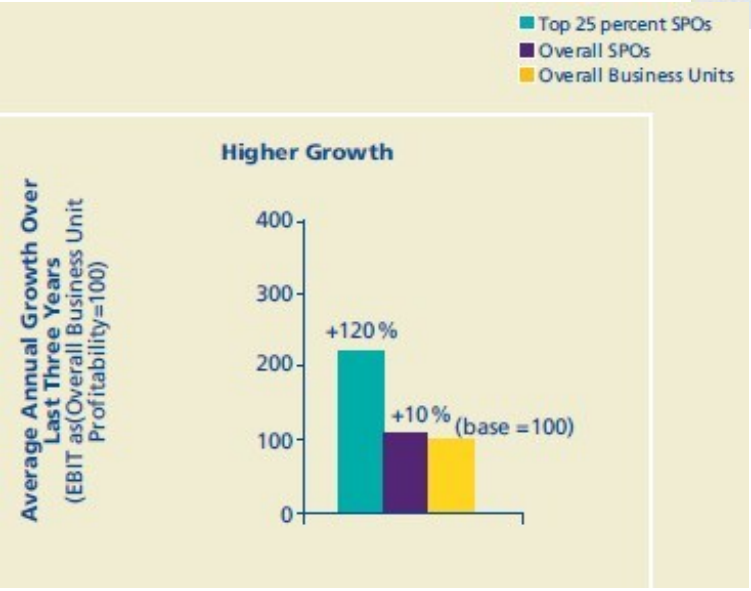
Focus/Organisation/Competence/Localisation

Focus :	OTD 100% ,0 ppm , Profitable, WIP mgmt
Organisation:	Logistics/CSC, Process, Quality, Market liaison
Competence :	Logistics/Scheduling,Tooling,Process equipment, Process cost estimation, Market/KCM support
Localisation of Team :	B230
Operational area :	M17, Pilot Line, B26,B273/206, WIP area

Spare parts: a profitable industry

"Performance in reserve",
IBM, 2008

- Much more profitable industry than the normal business



"The service revolution in global manufacturing industry",
Deloitte, 2006

- Higher growth rate than the normal business
- Very resilient business

Deloitte.

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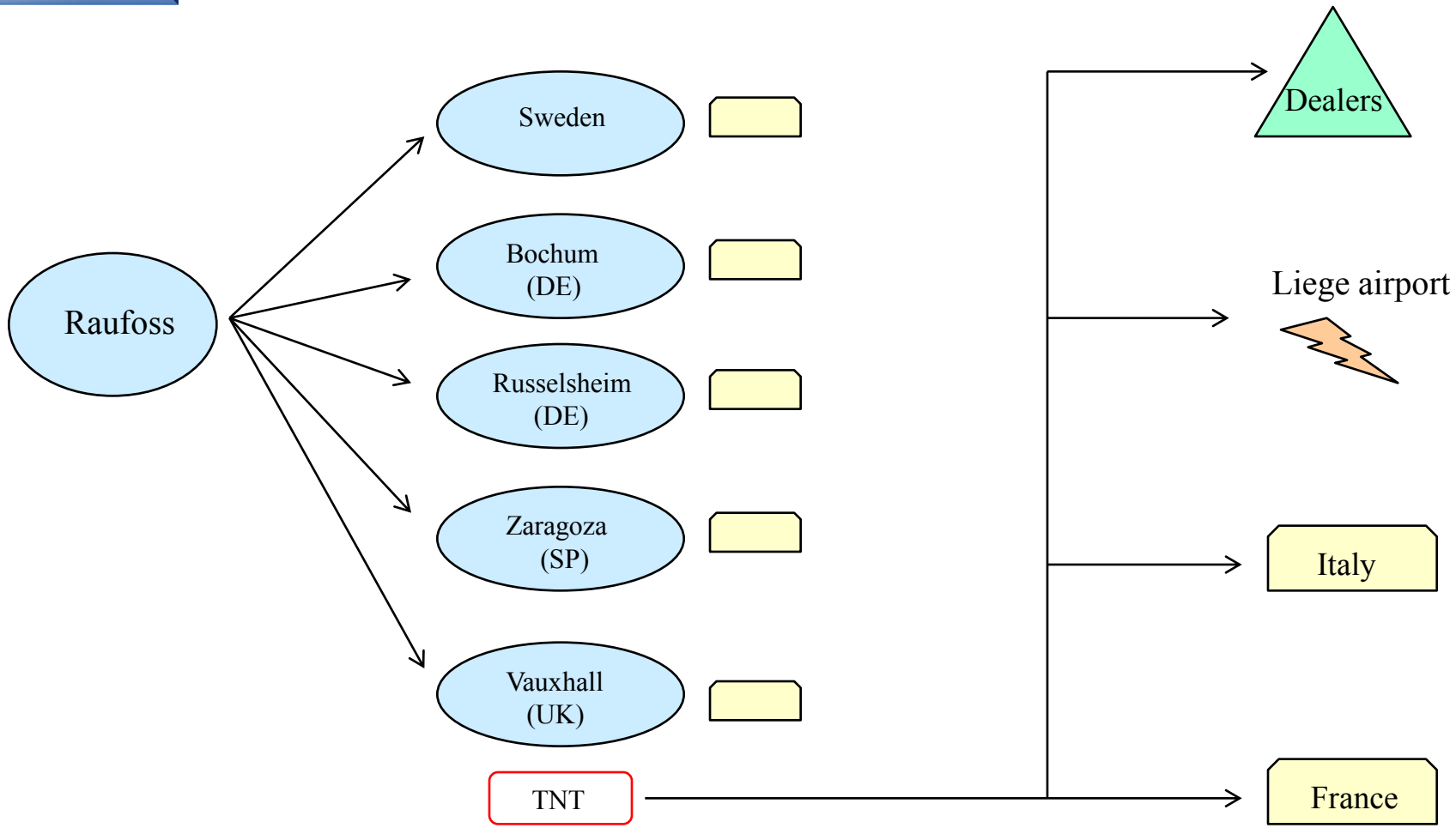
Distribution organization – GM

"The evolution of the European automotive spare parts distribution market",
Bijil and others, 2000



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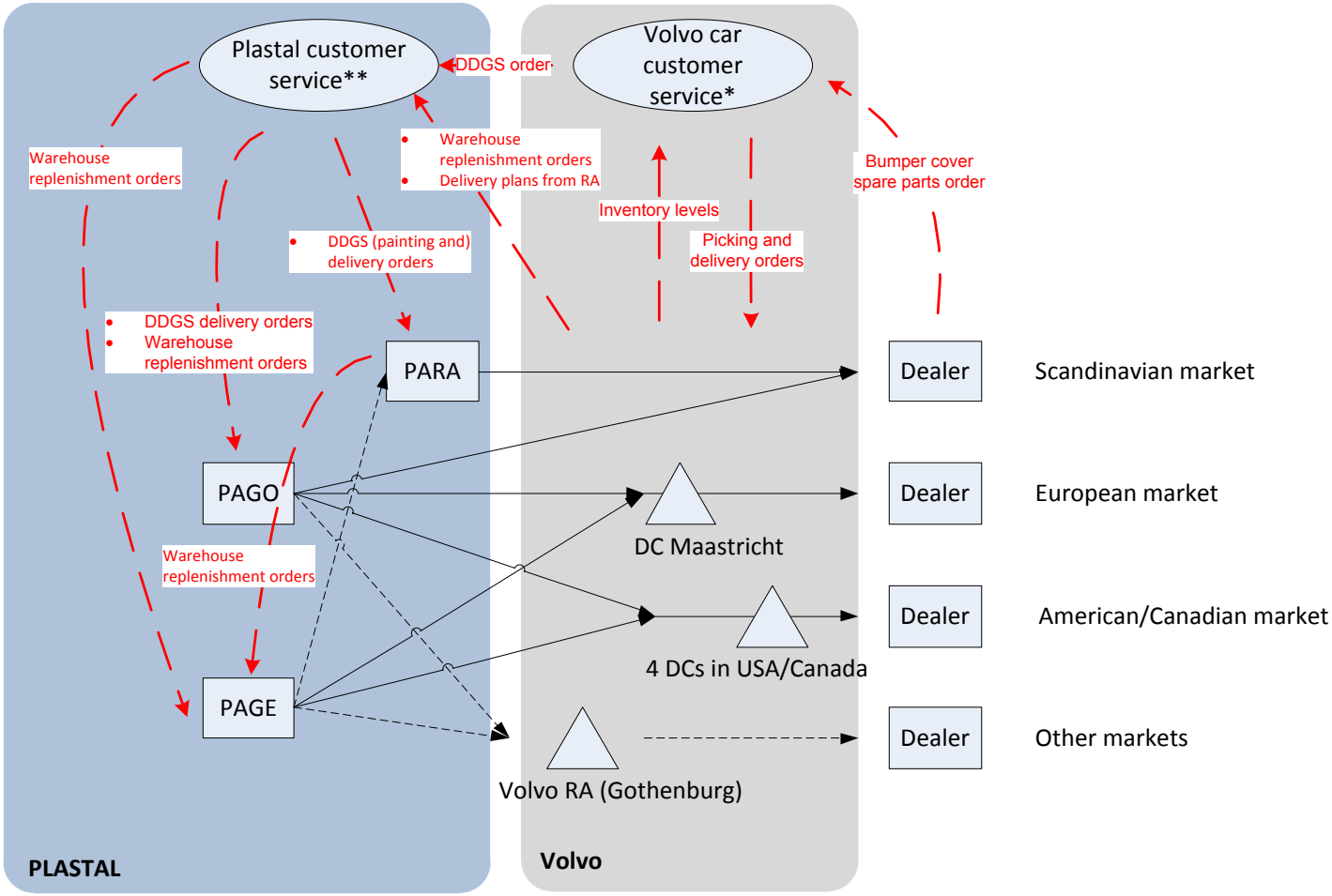
Distribution organization – Plastal direct model



**) Based on molding location and market, Plastal forwards the order to the right plant (see Table 1)

*) Based on market and inventory availabilities, VCCS sends order to a DC, RA or Plastal (see Table 1)

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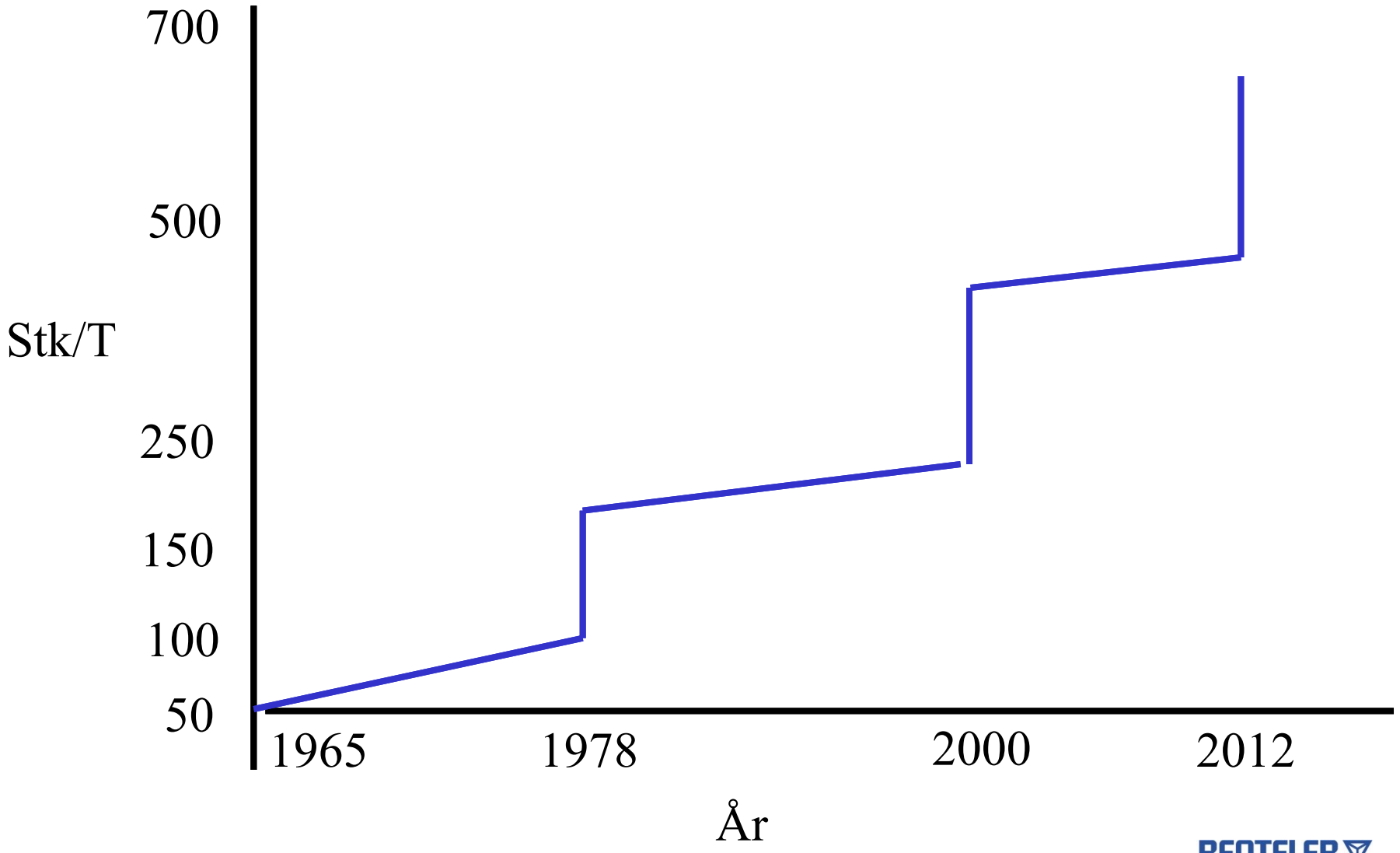
Utfordringer – Retningsvalg - Framtid

Teknologiutvikling – Sprangvis - Kontinuerlig



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Teknologi – Kapabilitet –Kapasitet - Utfordringer

Utfordringer over 25 år

produktivitetskrav , teknologisprang

produksjonslinjer/verktøy/legeringer for gml produkter må «opprettholdes» ihht kontraktsforpliktelser

produksjonslinjer for «nye» og videreutviklede produkter må møte fremtidens konkurransevilkår

Mix av gml og nye produkter er utfordringen og hvordan kan man på best mulig måte operere dette?

1965-1978 Formeprosesser (rollforming/strekkbøying) 50-100 stk/T

1978- 2000 Formeprosesser (strekkforming i presser) 150-250 stk/T

2000-2011 Formeprosesser (strekkforming i presser –tandem) 450-550 stk/T

2011 → Formeprosesser (strekkforming i presser - trippel) 600- 700 stk/T

1965-1976 Spesiallinjer (begrenset krav til omstilling) ,dog vertøyskift

1976-1990 Fleksible linjer –økt variant flora pr.linje –omstilling utfordring

1990-2000 Moderne ,fleksible linjer –høy variantflora –omstilling/OEE/SMED

Serieproduksjon er basert på ny og effektiv teknologi, mens reservedelsproduksjonen generelt må baseres på «gml. Prosesser»

Teknologiutvikling – Kapasitet – Belastningsutvikling
Linjekapasitet

År	Stk/T	3 skift	Antall
• 1965	50	5000T	250 000
• 1978	150	5000T	750 000
• 1990	250	5000T	1 250 000
• 2000	450	5000T	2 250 000
• 2008	550	5000T	2 750 000
• 2012	600	5000T	3 000 000

Prosjekt

Autopart

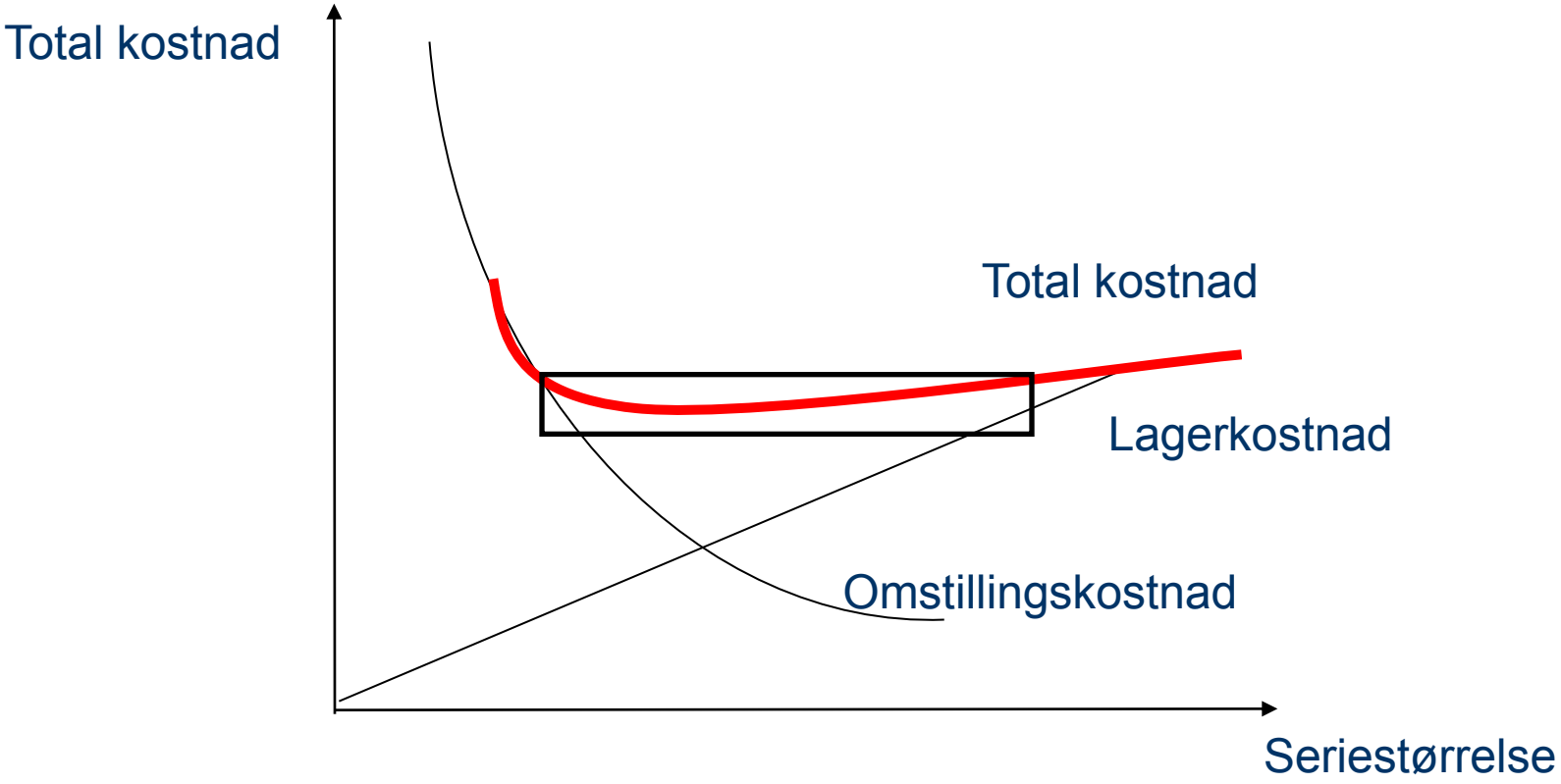
Benteler på Raufoss har i samarbeide med Plastal inngått en avtale med SINTEF/NTNU i prosjektet Autopart om ”å utvikle metodikker,verktøy, metoder og industrielle demonstratorer for etablering av fokusert reservedelsproduksjon i kombinasjon med ordinær bildelsproduksjon.” Prosjektet startet høsten 2011 og er forventet avsluttet høsten 2014.

Reservedelsprosjektet

Reservedelsproduksjonen på Raufoss har over de 2-3 siste årene vært drevet som et prosjekt. Et prosjekt fordi vi stadig har hatt deloppgaver som rydding/sanering i komponenter, sanering av utgåtte ferdigvarer, beholdningsjustering av ferdigvarer, samlokalisering av mellomvarer/ferdigvarer og ikke minst stadige tellinger/beholdningskorreksjoner for å kunne ha et best mulig beslutningsunderlag i SAP.

Nå når dette arbeidet nærmer seg slutten har vi behov for å etablere nye strategiske målsettinger.

Hvilken seriestørrelse bør vi velge?



Kurven er flat => Det er et **område** med realistiske seriestørrelser

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Hvilken seriestørrelse bør vi velge?

EOQ gjør en del urealistiske antakelser og inputtallene er vanskelige å estimere
Rundt EOQ er kurven flat, så det er et **område** med gode seriestørrelser

Beregningene tar IKKE hensyn til alle fordeler ved små serier

- **Større fleksibilitet og raskere respons …**
- **…, som fører til kortere ledetider og …**
- **reduserer behovet for sikkerhetslager**
- **Alle varianter produseres jevnlig, før "alt er glemt"**
- **Jevn produksjon**

Velg derfor en seriestørrelse til venstre i det flate området

- Unntak: Flaskehalser (begrenset kapasitet). Viktig å bruke lite tid på omstilling.

Seriestørrelser-operasjonell fokus

Seriebatcher 3-10000 stk

Omstillingstider 20 min- 2 T i moderne linjer

Kapital bundet i lager må ned (Lageromsetning)

Utstyr må være mer produktivt , fleksibelt , rask omstilling (SMED +OEE)

Respons til marked

Forecasting

Scheduling

Focus

Batch size ,rule of the game ,low vol metrics

Rammebetingelser – lagerbeholdning/-tid ; seriestørrelser

Generell lagringstid

max 1 år ihht kundens planer/prognoser

Generell seriestørrelse

max 500 det (200-700)

Profillager tilpasses seriestørrelse

Mellomlager lokalisert nært til CNC,sveis,mont

Ferdigvarelager lokaliseres i Fabrikk Syd (om mulig)

Prosess – og Produksjonskonsekvens BASN

Støperi

- begrenset konsekvens ,dog spes.legeringer må styres separat

Ekstrudering

- generelt mindre batcher med effekt på recovery og produktivitet (egne KPIs) (verktøylager kan reduseres vesentlig)

Forming

- linjeprodukter kjøres ihht linjestd
- effekt på omstilling og produktivitet må påregnes (egne KPIs)
- pilotlinja opereres med små batcher og nødvendige omstillinger (KPIs)
- spesialprod/-prosesser må styres separat

CNC/Sveising/Mont

- styres etter kundeavrop (JIT)

Prestasjonsrapportering

Separate KPIer etableres

- Ekstrudering
  produktivitet kg/T ,utbytte % ,verktøykost
- Forming
  produktivitet stk/T ,omstillingstid (min),skrap %
- CNC,Sveising
  produktivitet stk/T ,omstillingstid (min),skrap %
- Montasje/pakking
  produktivitet stk/T
- Lager
  Lagerverdi ,Lageromsetning
- Leveranser
  OTD ,ppm

Økonomi

- Kostnadsrapportering månedlig pr prosess og detalj
- Resultatrapportering månedlig pr detalj og res.deler totalt

Nye mål

Etablere egen Reservedelsenhet med BP,og dermed prestasjonsmåling innen kvalitet,levering,ressursbruk og økonomi.

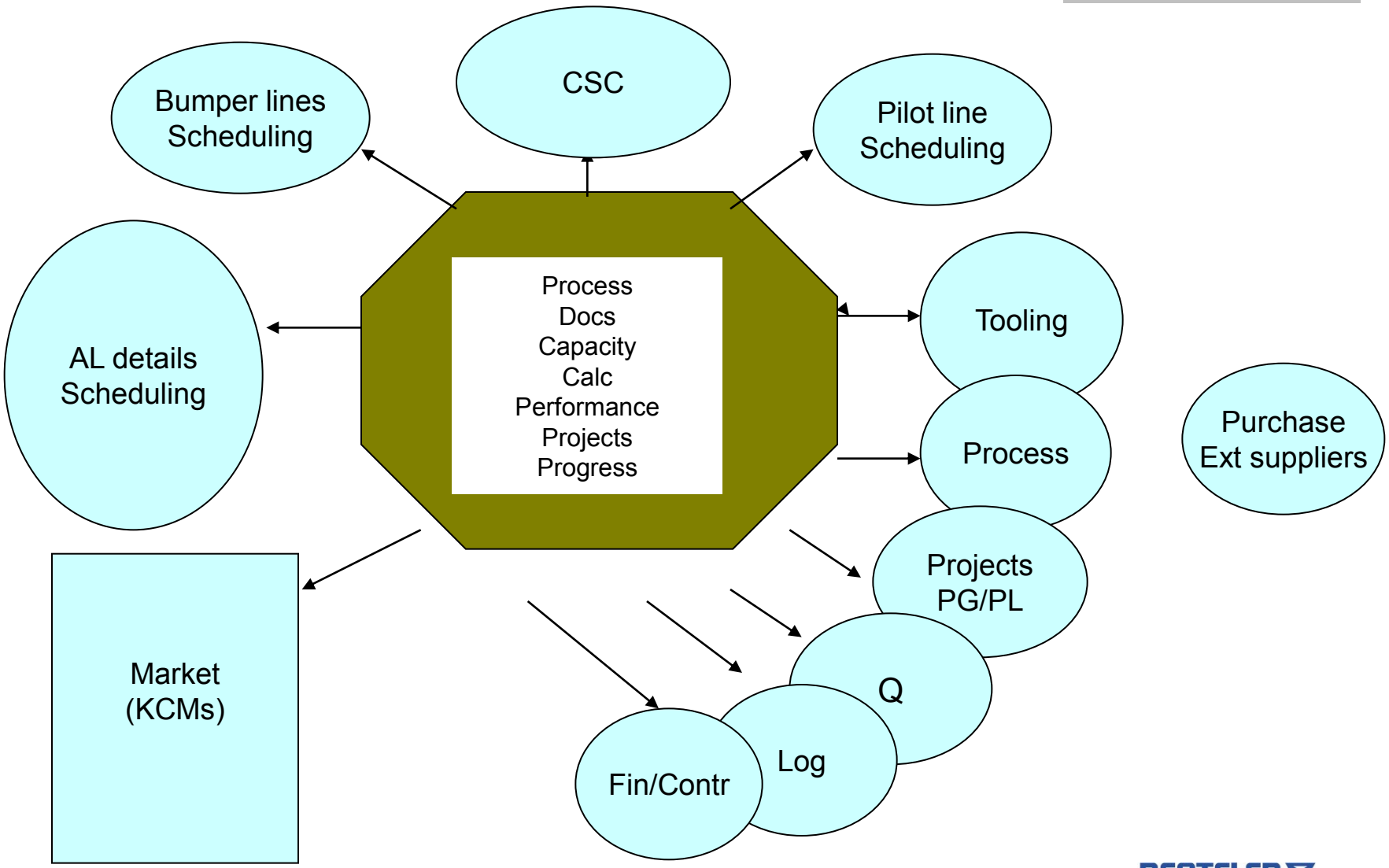
Arbeide for å relokalisere all reservedelsproduksjon innen BAS til Raufoss

Det er her vi har lengst erfaring med slik produksjon. Gjennom bedre utnyttelse av historiske data og forventede resultater fra Autopart vil vi bli bedre i stand til å forutse kunder og bilmodellers fremtidige reservedelsbehov. Dette, sammen med en sterkere kundedialog vil føre til at vi i nær fremtid vil ha riktigere beholdninger og produsere med riktigere seriestørrelser. Dette gjelder såvel profilverk som formelinjer og videre bearbeiding.

En fremtidig strategisk videreføring i denne sammenheng er om vi etterhvert skal gå ut til kunder og tilby å ta over ansvaret for disses reservedelskonsept. Bilhistorien har eksempler på at dette er gjort gjennom f.eks. Unipart og Caterpillar. Forskjellen blir at vi i tillegg til logistiske operasjoner også kan tilby produksjon.

Spare Parts/Interfaces/Organisation/Raufoss

Strategy
Priorities



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Takk for oppmerksomheten

og

nå kan vi ta noen spørsmål