
ELECTRICITY 2018, EILAT-ISRAEL

Session FAM1.3 - November 9, 2018

(The International Annual Convention of SEEEI)



“COST EFFECTIVE SERVICING, REPAIR & REFURBISHMENT”

By: J. Fredrik Bok

(Director Business Development (Board Advisory))



Agenda (Challenges)

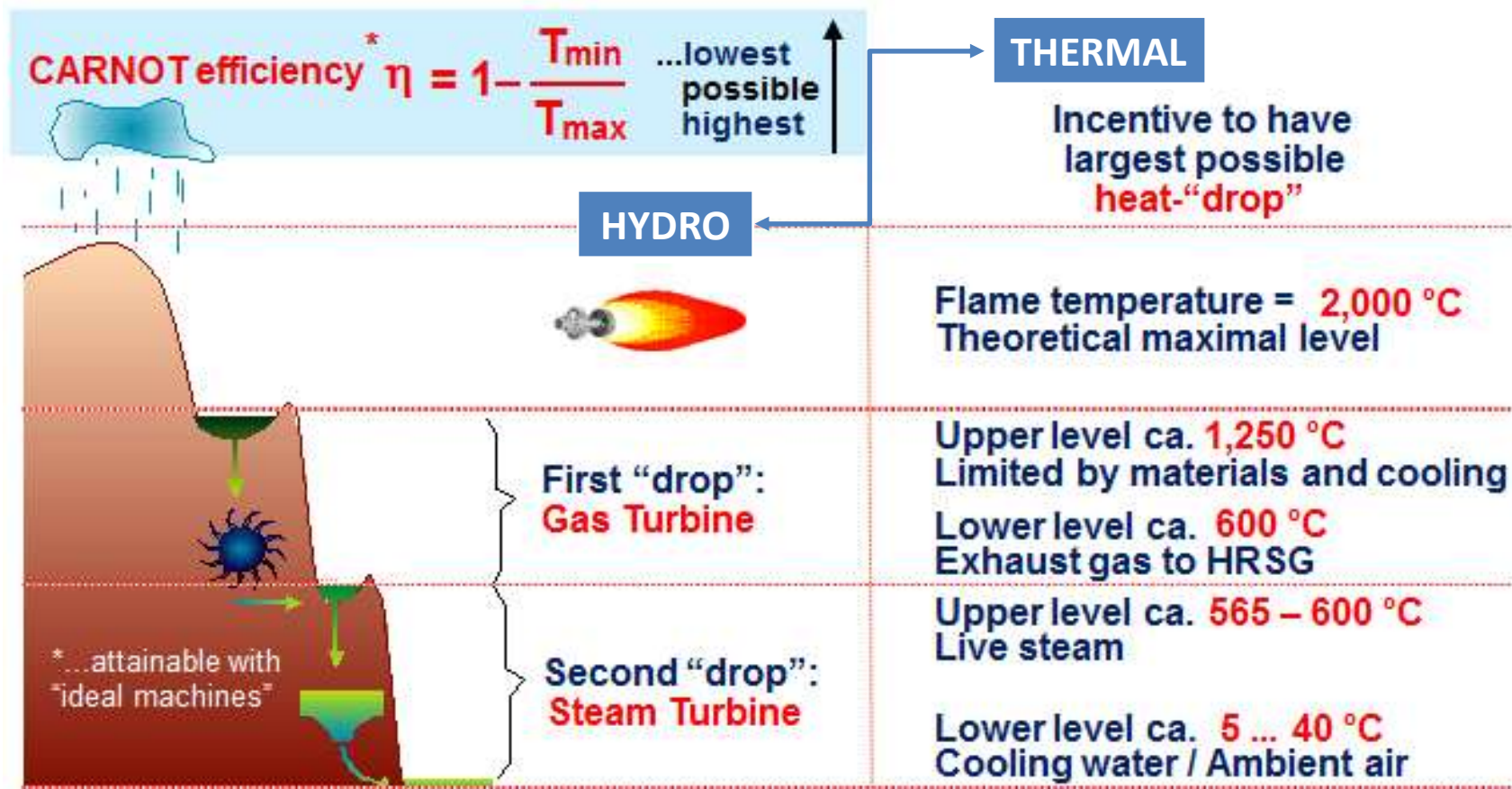
COST EFFECTIVE SERVICING (MAINTENANCE)

Global players (OEMs) faces the challenge of increasing on-site-machining services (Aging fleet).

- Successful validation of machining tools & devices for hydro applications initially in Europe.
- Maintenance improvements by using new generation of special mobile machining tools (OMMT).
- Rapid changes in the power industry (OEMs & ISPs), affecting services for new and old thermal power plants around the globe.

OMMT: Original Manufacturer Machinery Tools

On-Site Machining Rotating Parts

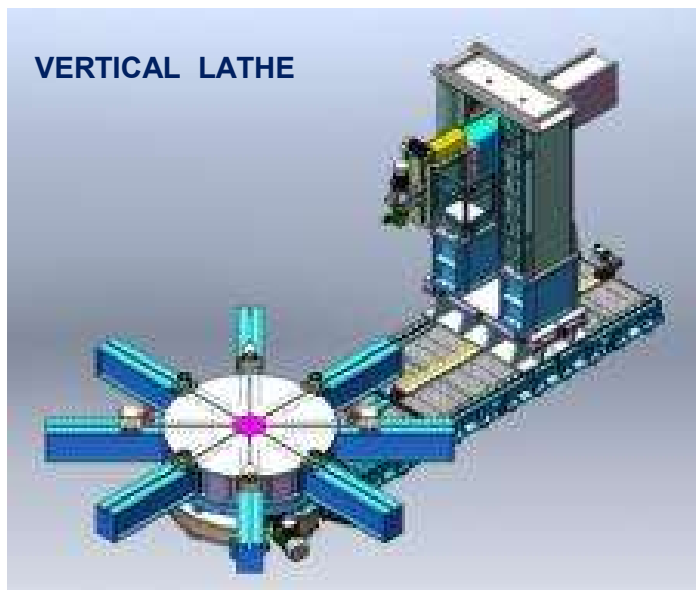


Experience From Thermal to Hydro

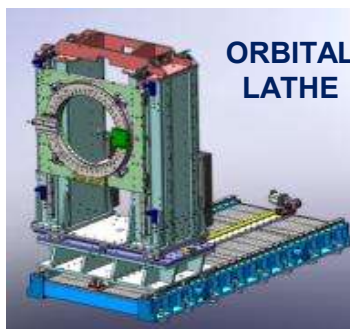
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Challenges

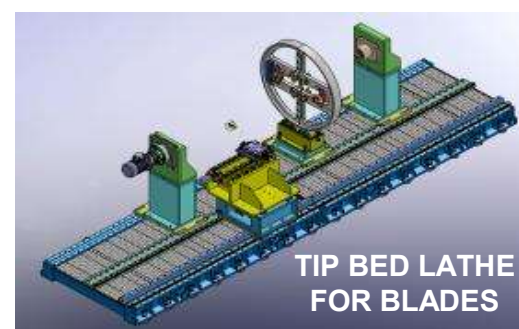
New generation of special mobile machining tools



VERTICAL LATHE



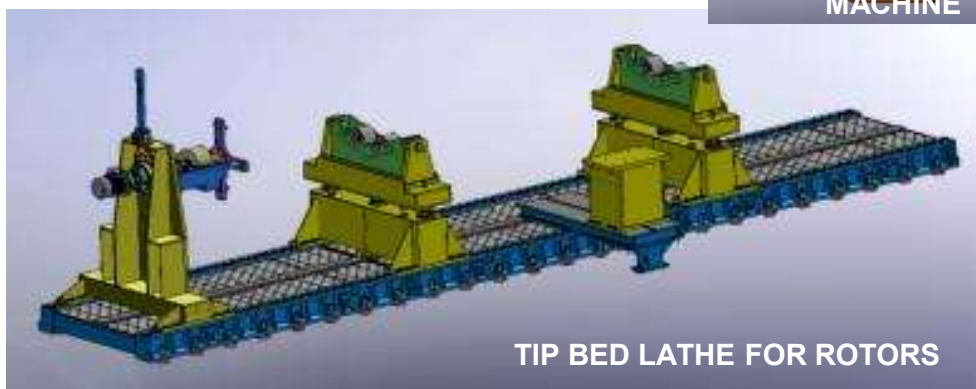
ORBITAL LATHE



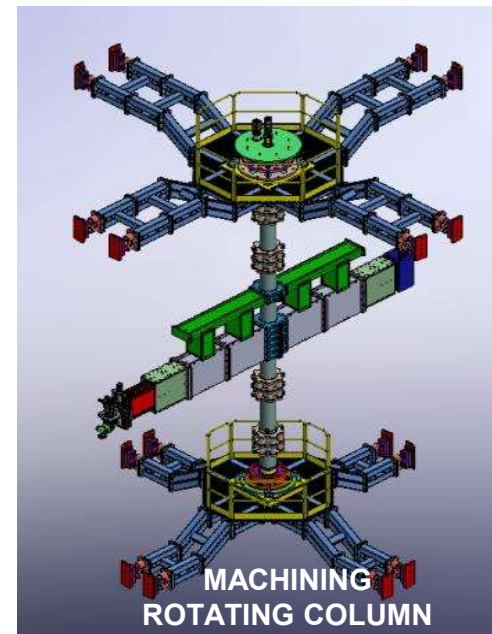
TIP BED LATHE FOR BLADES



ORBITAL MILLING MACHINE



TIP BED LATHE FOR ROTORS



MACHINING ROTATING COLUMN

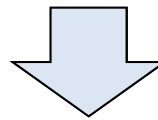
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Challenges



NEW GENERATION Machining Rotating Column

- All components of the machining rotating column are adjustable as per machining requirements “type of work”.
- The design characterized its simplicity, versatility, stability, reliability and accuracy (+++ Performance)
- Almost all of the pre-engineering work is done & during the preparation of proposal (Base scope tendering).



**Efficient and competitive
in the after sales service market**

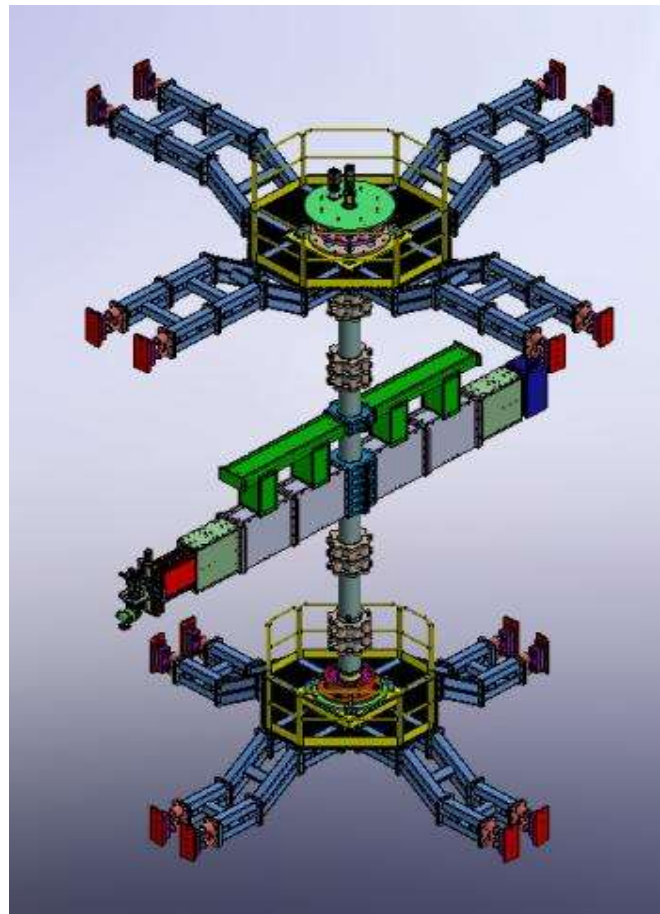
Challenges

A Versatile Machining-Tool Component

Machining Rotating Column

1.
Stay ring
embedded
flanges

2.
Runner
chamber



3.
Draft tube
cone

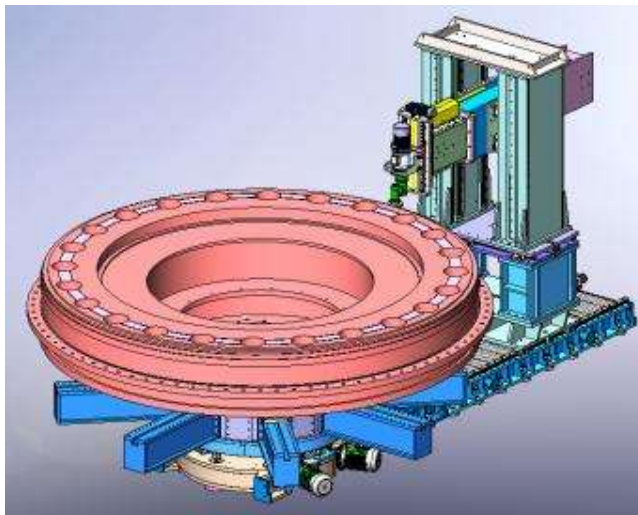
4.
Machining
Kaplan & Bulb
turbine

Challenges

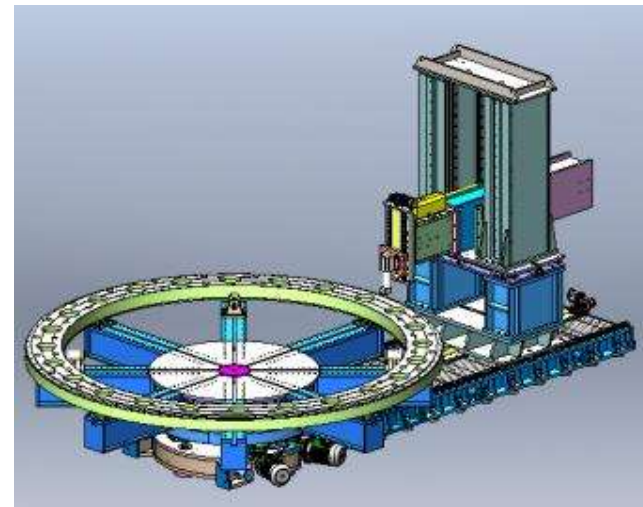
Machining Rotating Column

A Versatile Machining-Tool Component

- Head cover
- Head cone
- Bottom ring
- Regulating ring
- Runner
- Radial and axial bearings
- Valves casings and shutters
- Labyrinth rings



Head cover machining



Bottom ring machining

Challenges

New Generation Tools

Special Mobile Machining Tools

- Inherited experience from machining on job site for major turbine components of thermal PP.
- In-house development & manufacturing of machining tools, special “validated” design for hydro and thermal power plants.
- Successful implementation in multiple European job-sites, for new & rehabilitated hydro power projects.

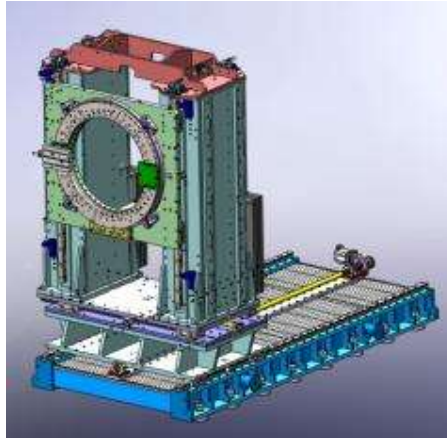


Level play field for all participants
(OEMs, PUs, IPPs) in the power industry

Challenges

Mobile Orbital Lathe

A Versatile Machining-Tool Component



- Butterfly valve trunnions
- Trunnion housings on body valves
- Blades bearing housings in runners

Butterfly valve trunnions machining



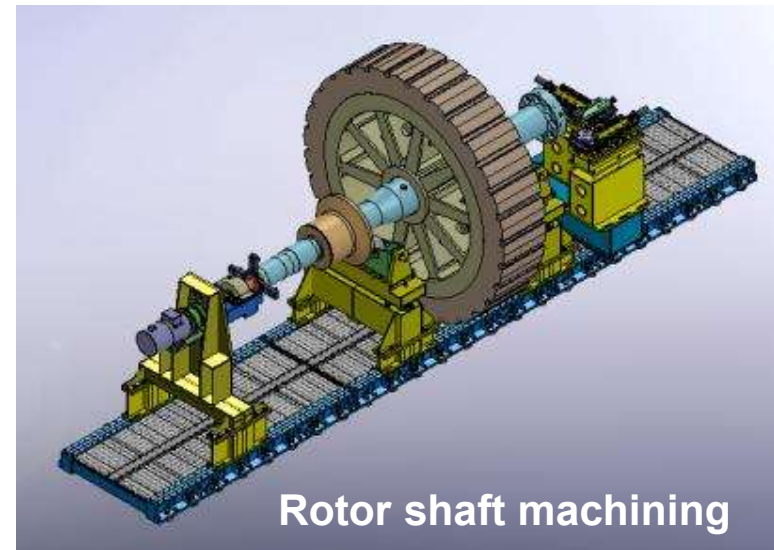
Challenges

Mobile Tip Bed Lathe

A Versatile Machining-Tool Component



- Shafts
- Runner
- Drive blades
- Dynamic balancing

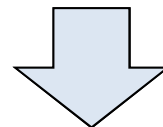




Challenges

Power Producers Battle Ground

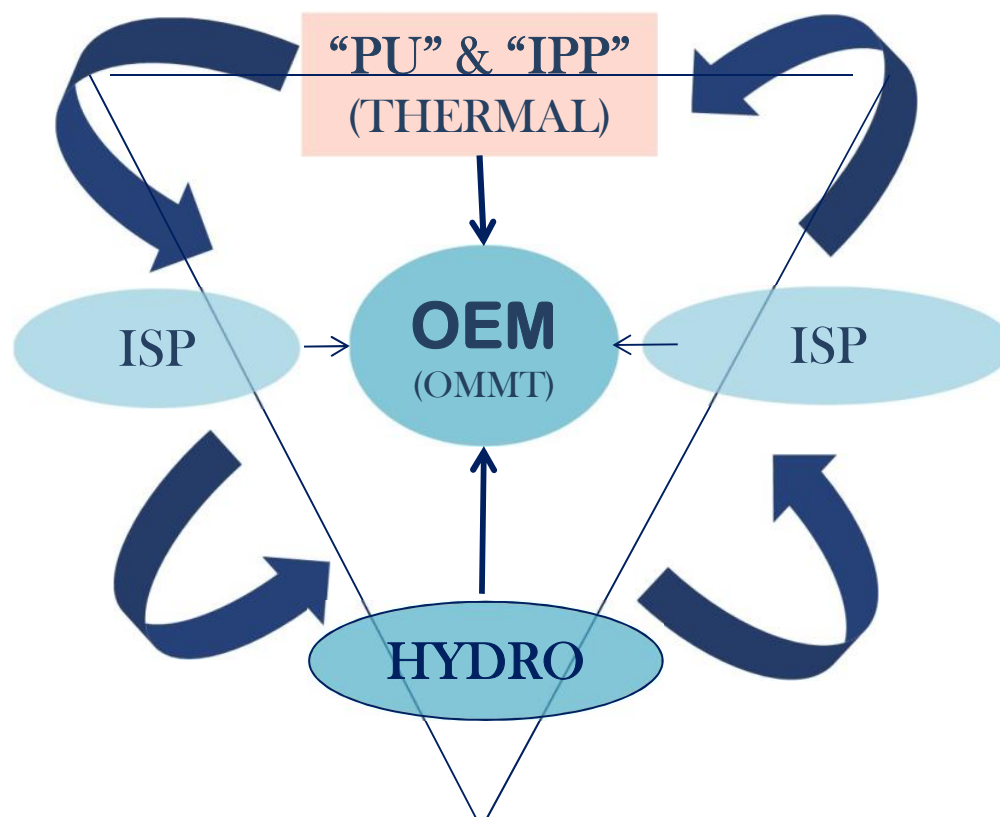
- Recognising external capabilities for on job-site machining
- Value the experience in dealing with the power industry
- Mobility & flexibility, a must in the service supply change
- Merging expertise within the service provider's team
- Share costs & benefits from increasing maintenance value



Corporate Image not only for the consumers

Challenges

A TYPICAL CASE FOR CONTRACTING



Support Sources

- Engineering (OMMT)
- Tender & Contract
- Terms (Scheduling)
- Project Management
- Deliveries (Logistics)

PU: Public Utility (Power Producer)
 IPP: Independent Power Producer
 OEM: Original Equipment Manufacturer
 ISP: Independent Service Provider
 OMMT: Original Manufacturer Machinery Tools

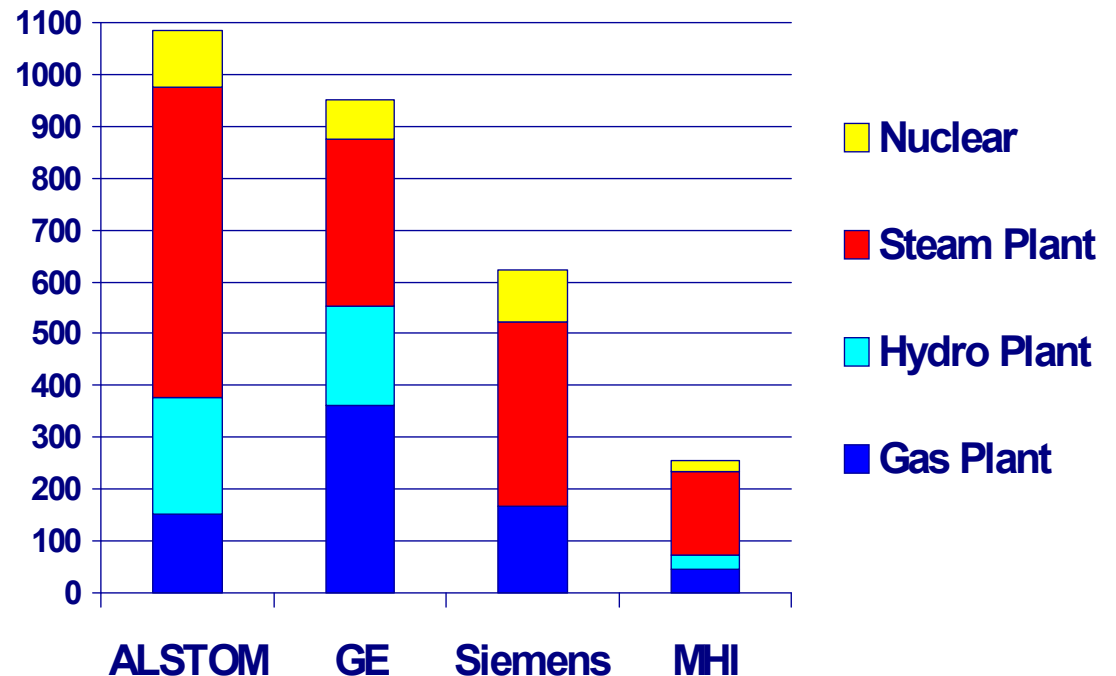
“OMMT” ALWAYS COMPLEMENTARY TO “OEM”

Challenges – Installed base (Units)

Observations

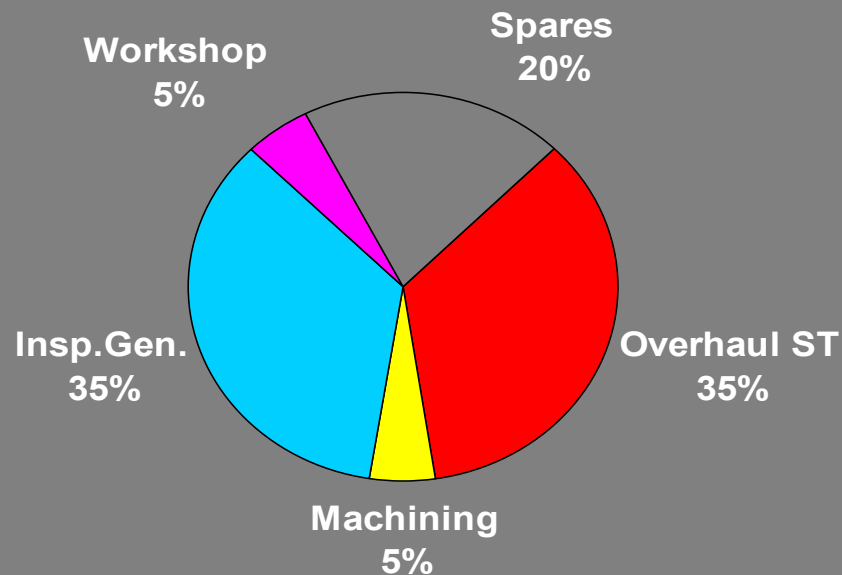
Past Market Record ABB / ALSTOM

- During the OEM booming time, ABB/ALSTOM had the largest installed based in the Industry.
- GE Largest installed GT & ST fleet, mainly in the Americas
- SIEMEN's largest installed GT & ST fleet, mainly in Europe and USA (Ex-Westinghouse)
- MHI largest installed GT & ST fleet, mainly in Asia.
- Above market record for aging fleet only & excludes today's total installed based (units) in the industry



Challenges – Orientation

Typical PO Volume (40 MW) ST&G Rehabilitation = 8.0 MEUR.



Third Party Service Provider

Price break down from an independent service provider!

Not having appropriate tools for complete on-job-site machining!

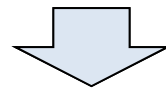
Requiring workshop repair activities (Off-shore) for parts of turbine & generator!

- Condensing steam turbine & generator w/focus on > repair & < replacement.
- Machining on the job site was less than 5% of the CP (Incl. Off-shore Workshop = 10%)
- With versatile job-site machining tools, savings could be achieved, cost and time wise!



Conclusive Remarks (1)

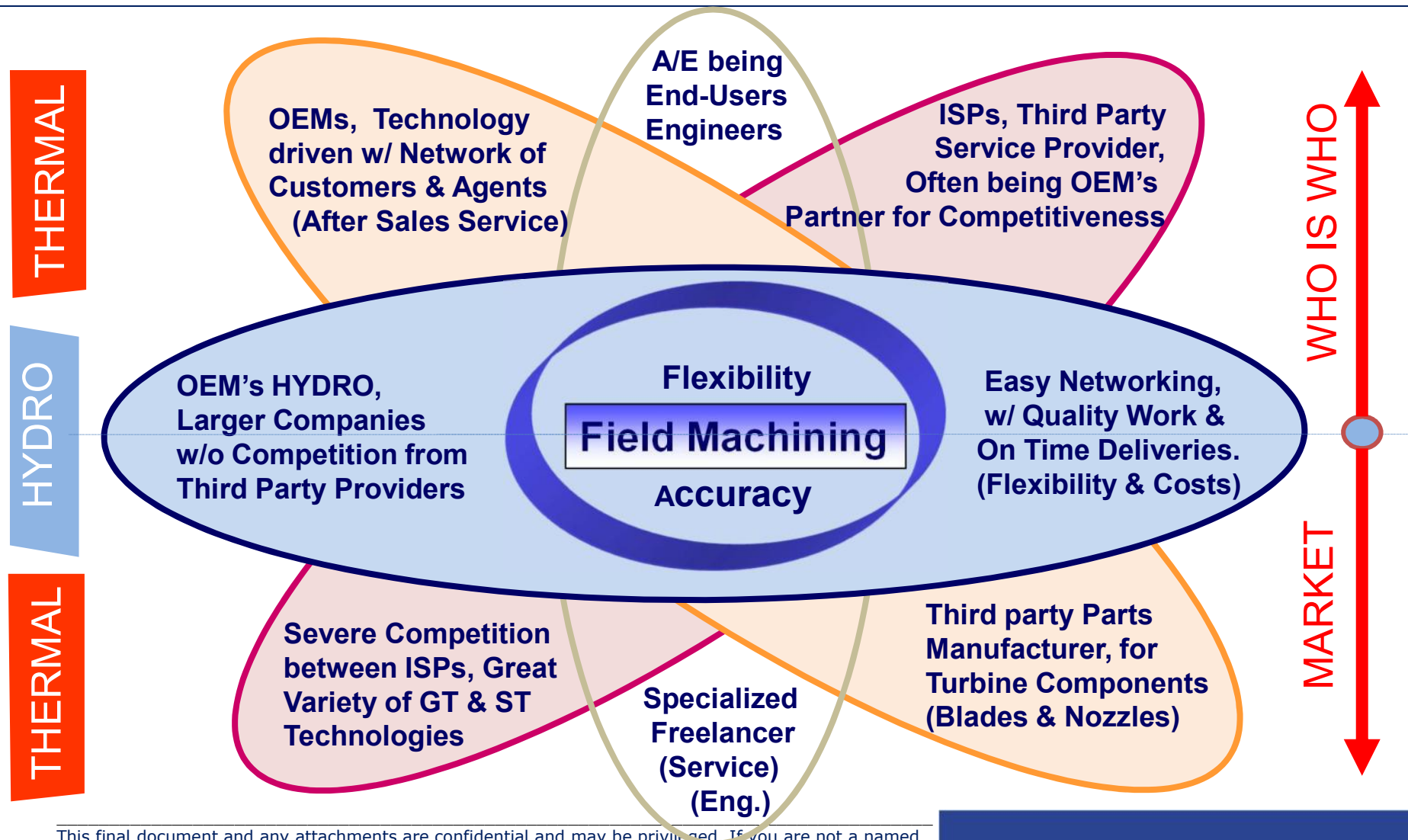
- Experienced & complementary service providers are key for global players to meet the challenges and faces a rapid changing energy sector. (Renewable, hydro, thermal)
- Single source for on-site machining, developed & manufactured its own machine tools, familiar with the power industry and w/track record in after sales services for thermal and hydro power plants, is advantageous
- Innovations in the after sales service market by presenting new generation of special mobile & validated machining tools. (Improved maintenance & enhanced resilience).



New Business Opportunities in the Region

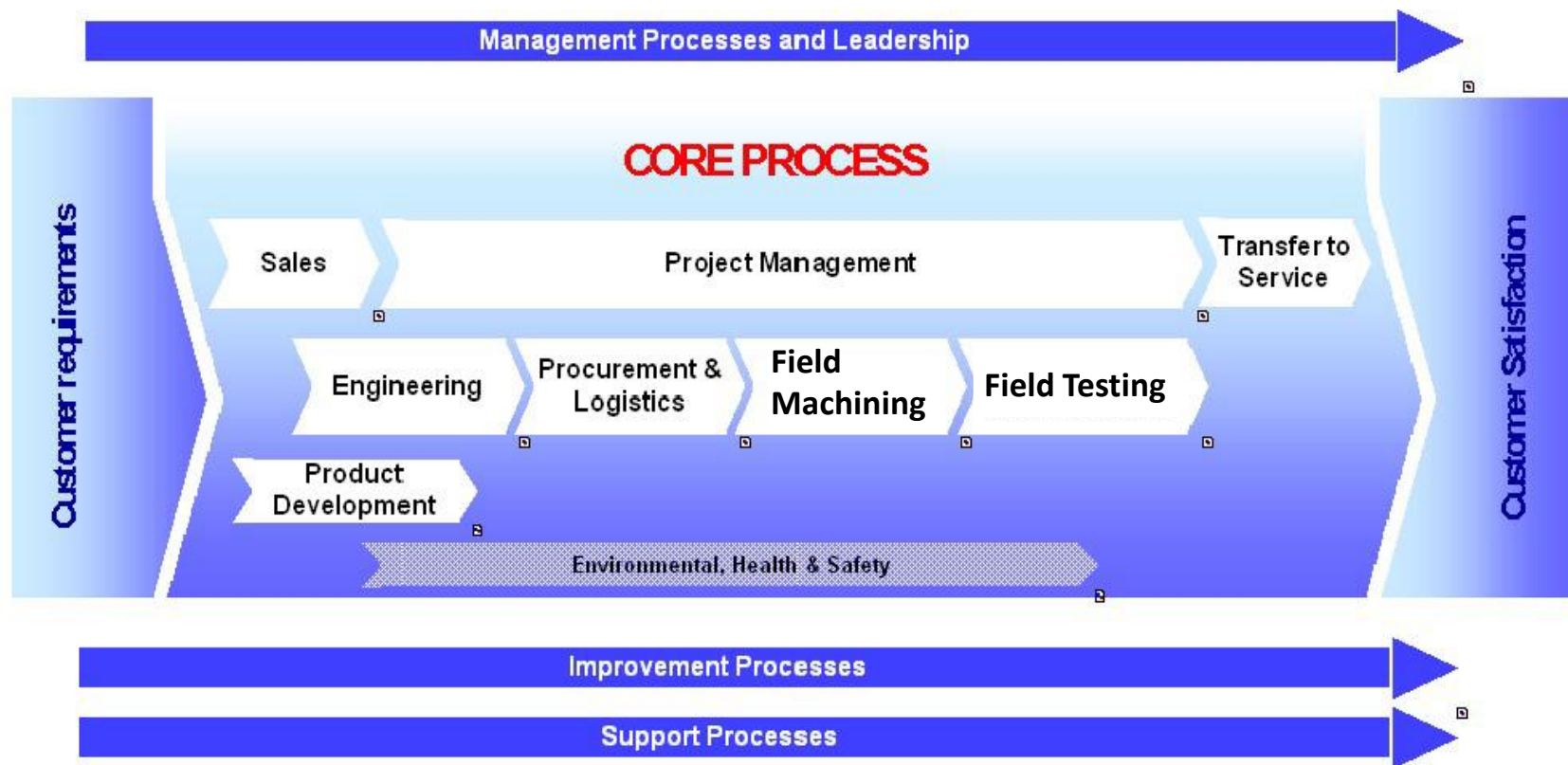


Conclusive Remarks (2)



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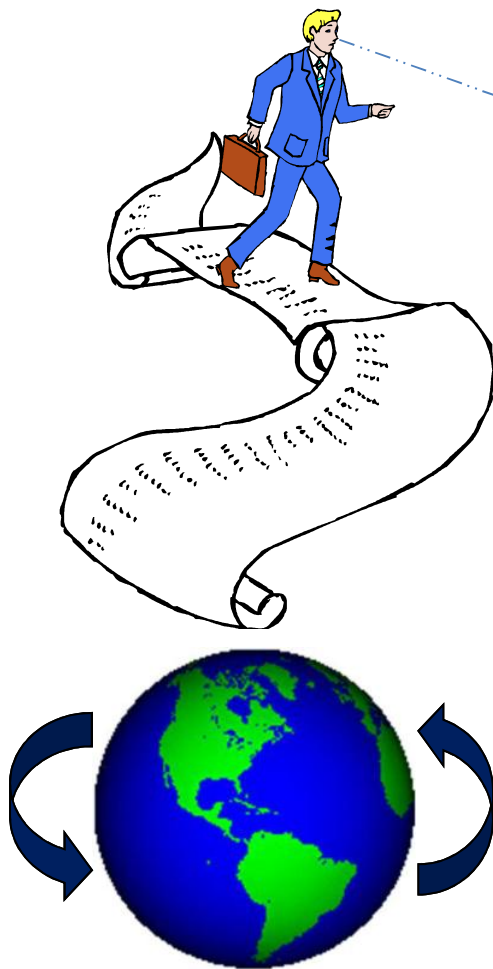
Conclusive Remarks (3)



The Talent Wedge: The growing gap between *supply of* and *demand for* talented people, is the greatest issue facing the service industry today.

Customer Satisfaction (Thermal)

Thank You



It's Stormy Out There!



Does choice matter?



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