



Ansökan till VINNOVA

Diarienummer

2009-03078

Avsänd av sökande

2009-09-01 13:00

Utlysning

Omställningsförmåga och kompetensförsörjning

OM ANSÖKAN

1. Nytt projekt eller fortsättning

Ansökan avser nytt projekt

2. Diarienummer (fortsättning)

3. Projekttitel (max 100 tkn) *

Code X En framtida kod för kompetens, samarbete och attityd i tillverkningsbranchen

4. Project Title (in English) *

Code X - A future code on flexible competence, cooperation and attitude in manufacturing

5. Arbete påbörjas, datum *

(ÅÅÅÅ-MM-DD)

2009-11-01

6. Arbete avslutas, datum *

(ÅÅÅÅ-MM-DD)

2012-10-31

7. Sökt Belopp *

2009	2010	2011	2012	2013	Summa
300	4.800	4.800	4.500		14.400

8. Projektsammanfattning (Max 1500 tkn) *

Svetsning är en teknologi av stor betydelse vid industriell produktion. Nya tekniska framsteg skapar nya kundanpassade produkter som kan produceras till låg kostnad i internationellt optimerade produktionssystem. Denna stora potential kan inte tillfullo realiseras på grund av att traditionella strukturer inom företaget och mellan företag och dess anställda förhindrar en dynamisk utveckling. Syftet med detta projekt är att med utgångspunkt i ett tekniskt utvecklingsprojekt identifiera dessa hinder och potentialer utifrån perspektivet anställda och företag. Baserat på vår kartläggning avser vi att analysera och utveckla olika framtidsscenarier. Projektet innehåller element som lärande, coaching, anställningsformer och samverkansformer som mobiliserar och frigör den potential som finns i företaget och bland de anställda. Resultaten kommer att generaliseras till en kod för kompetens och samarbete mellan anställda och deras företag i tillverkningsbranchen.

10. Har varit i kontakt med VINNOVA-handläggare

Margareta Groth

11. Sekretess

Finns det uppgifter som bör sekretessbeläggas

Nej

PROFIL FÖR PROJEKTLEDAREN

Organisation

Luleå tekniska universitet

Förnamn

Alexander

Organisationsnummer

202100-2841

Efternamn

Kaplan

Arbetsplatsens namn

Institutionen för tillämpad fysik, maskin- och materialteknik - Siriuslaboratoriet

E-post

Alexander.Kaplan@ltu.se

Adress**Direkttelefon**

0920-49 17 33

Postnummer

971 87

Mobil

070-311 83 53

Postort

LULEÅ

Kön

Man

Telefon

0920-49 10 00

Födelseår

1967

Fax**Land**

Sverige

OM SÖKANDEN

Organisation

Luleå tekniska universitet

Arbetsplats

Institutionen för tillämpad fysik, maskin- och materialteknik

Organisationsnummer

202100-2841

Engelskt namn

Department of Applied Physics and Mechanical Engineering

Engelskt namn

Luleå University of Technology

Adress**Adress****Postnummer**

971 87

Postnummer

971 87

Postort

LULEÅ

Postort

LULEÅ

Webbplats

www.ltu.se/inst/tfm

Webbplats

www.ltu.se

Telefon

0920-49 10 00

Telefon

0920-49 10 00

Fax**Fax**

0920-49 13 99

Land

Sverige

Land

Sverige

Prefekt/Firmatecknare *

Jan Dahl

E-postadress till**prefekt/firmatecknare ***

jan.dahl@ltu.se

SPECIFIKATION AV SÖKANDENS KOSTNADER

Specifikationen avser det sökta beloppet hos VINNOVA. Totalsumman per/år skall överensstämma med sökt belopp/år på sid 1 punkt 7 i ansökan.

(Ange summorna i hela kronor)

	Summa	2009	2010	2011	2012	2013
Löner	3.210.000	215.000	1.070.000	1.070.000	855.000	
Externa tjänster	0					
Utrustning	0					
Material, drift	0					
Resor	300.000	10.000	100.000	100.000	90.000	
Övrigt 1)	60.000		20.000	20.000	20.000	
Förvaltning, 2)	1.230.000	75.000	410.000	410.000	335.000	

lokalhyra

2)

SUMMA 4.800.000 300.000 1.600.000 1.600.000 1.300.000 0

1) Specificeras i bilaga 1.

2) Gäller universitet och högskolor. Max 35% enligt beslutade riktlinjer.

SAMFINANSIERING

(Ange summorna i hela kronor; 1.000.000)

Finansiärer

Finansiär Beslutat 2009 2010 2011 2012 2013

I

Volvo Construction Equipment AB Volvo Construction Equipment AB 556021-9338	<input type="text" value="Ja"/>	<input type="text" value="0"/>	<input type="text" value="600.000"/>	<input type="text" value="600.000"/>	<input type="text" value="600.000"/>	<input type="text" value="0"/>
Svetskommissionen Svetskommissionen 802017-0307	<input type="text" value="Ja"/>	<input type="text" value="0"/>	<input type="text" value="400.000"/>	<input type="text" value="400.000"/>	<input type="text" value="400.000"/>	<input type="text" value="0"/>
Andon Automation Aktiebolag Andon Automation Aktiebolag 556651-7370	<input type="text" value="Ja"/>	<input type="text" value="0"/>	<input type="text" value="200.000"/>	<input type="text" value="200.000"/>	<input type="text" value="200.000"/>	<input type="text" value="0"/>
Force Technology Sweden Aktiebolag Force Technology Sweden Aktiebolag 556228-0403	<input type="text" value="Ja"/>	<input type="text" value="0"/>	<input type="text" value="200.000"/>	<input type="text" value="200.000"/>	<input type="text" value="200.000"/>	<input type="text" value="0"/>
Jonsson & Paulsson Industri Aktiebolag Jonsson & Paulsson Industri Aktiebolag 556210-2052	<input type="text" value="Ja"/>	<input type="text" value="0"/>	<input type="text" value="200.000"/>	<input type="text" value="200.000"/>	<input type="text" value="200.000"/>	<input type="text" value="0"/>
Nitator i Oskarström Aktiebolag Nitator i Oskarström Aktiebolag 556201-9835	<input type="text" value="Ja"/>	<input type="text" value="0"/>	<input type="text" value="200.000"/>	<input type="text" value="200.000"/>	<input type="text" value="200.000"/>	<input type="text" value="0"/>
SSAB Tunnpåls Aktiebolag SSAB Tunnpåls Aktiebolag 556313-7941	<input type="text" value="Ja"/>	<input type="text" value="0"/>	<input type="text" value="200.000"/>	<input type="text" value="200.000"/>	<input type="text" value="200.000"/>	<input type="text" value="0"/>

Egna insatser**utöver sökt av VINNOVA**

--	--	--	--	--

SUMMA:**02.000.0002.000.0002.000.000****0****Sökt för dyrbar utrustning (t ex****Belopp****Wallenbergsstiftelsen, Vetenskapsrådet)**

RÄTTIGHETER OCH PATENT SAMT PROJEKTPARTNERS

**Finns immaterialrättigheter (Patent/dataprogram)
av betydelse för projektet?**

Om Ja, har sökande rätt att utnyttja dessa?

**Finns avtal mellan parterna om immaterialrätter som
skapas inom projektet (konsortialavtal) ?**

**Om projektet genererar intäkter, kommer dessa då
att tillfalla sökanden?**

Övriga projektpartners

Projektpartner	Kontaktperson	Telefon	E-postadress
I Volvo Construction Equipment AB Volvo Construction Equipment AB 556021-9338	Jack Samuelsson	016-541 5228	jack.samuelsson@volvo.com
I Svetskommissionen Svetskommissionen 802017-0307	Lars Johansson	070-574 4344	lars.johansson@svets.se
I Andon Automation Aktiebolag Andon Automation Aktiebolag 556651-7370	Göran Bergling	070-590 1756	goran.bergling@andonautomation.com
I Force Technology Sweden Aktiebolag Force Technology Sweden Aktiebolag 556228-0403	Tomas Tränkner	076-769 0872	ttr@force.se
I Jonsson & Paulsson Industri Aktiebolag Jonsson & Paulsson Industri Aktiebolag 556210-2052	Tommy Jonasson	063-155800	tommy.jonasson@jpab.se
I Nitator i Oskarström Aktiebolag Nitator i Oskarström Aktiebolag 556201-9835	Magnus Andersson	070-597 75 34	magnus@nitator.se
I SSAB Tunnpålat Aktiebolag SSAB Tunnpålat Aktiebolag	Joachim Larsson	070-213 25 30	joachim.larsson@ssab.com

556313-7941

I

BILAGOR, UPPLADDNING AV FILER

Obligatoriska bilagor

[Anvisningar för innehållet i nedanstående bilagor](#)

Bilaga 1. Projektbeskrivning (max 12 sidor, om inte annat anges i utlysningssinformation)

[Projektbeskrivning.pdf](#)

Bilaga 2. Personalbilaga (nyckelpersonernas CVn, max 3 sidor, om inte annat anges i utlysningssinformation)

[Personalbilaga.pdf](#)

Övriga bilagor

KLARMARKERA

Efter sista ansökningstidpunkt får inga kompletteringar göras av ansökan såvida inte VINNOVA har begärt det.

En mottagningsbekräftelse på Din ansökan kommer att skickas via e-post till Dig som står för användarkontot, projektledare, firmatecknare (prefekt eller motsvarande) samt, om ifyllt, ytterligare mottagare.

INSÄNT AV

Förnamn

Alexander

Efternamn

Kaplan

E-postadress

alexander.kaplan@ltu.se

Universitet/Högskola/Institut/Företag etc

Luleå tekniska universitet

Adress

-

Postnummer

971 87

Postort

Luleå

Organisationsnummer

202 1002841 01

Telefon

0920 49 1733

Fax

0920 49 2228

Webbplats

www.ltu.se/tfm/produktion



Code X

A future code on flexible competence, cooperation and attitude in manufacturing

Abstract

Welding is a technology of wide-ranging impact in industrial manufacturing. Significant technology developments provide new products that can be produced at low costs by optimized national and global cooperation. This huge potential is limited by the manifold traditional behaviour patterns of companies and their employees, which limit dynamic changes. For a demonstrator constellation this project aims to clearly identify both potential and restrictions from the perspective of the company and the employee. Based on mapping of the existing situation today various future models and corresponding scenarios will be analysed. The project envisions a modern learning, coaching, employment and cooperation model that optimises the mobilisation of the driving forces of people and companies. The potential and limits of generalisation of the findings will also be studied.

Code X

En framtida kod för kompetens, samarbete och attityd i tillverkningsbranschen.

Sammanfattning

Svetsning är en teknologi av stor betydelse vid industriell produktion. Nya tekniska framsteg skapar nya kundanpassade produkter som kan produceras till låg kostnad i internationellt optimerade produktionssystem. Denna stora potential kan inte tillfullo realiseras på grund av att traditionella strukturer inom företaget och mellan företag och dess anställda förhindrar en dynamisk utveckling. Syftet med detta projekt är att med utgångspunkt i ett tekniskt utvecklingsprojekt identifiera dessa hinder och potentialer utifrån perspektivet anställda och företag. Baserat på vår kartläggning avser vi att analysera och utveckla olika framtidsscenarioer. Projektet innehåller element som lärande, coaching, anställningsformer och samverkansformer som mobiliserar och frigör den potential som finns i företaget och bland de anställda. Resultaten kommer att generaliseras till en kod för kompetens och samarbete mellan anställda och deras företag i tillverkningsbranschen.

1 Relevance

Vision

Engineers, machine operators, technical managers/directors and consultants are technologically up to date. They have a holistic company view and a positive attitude for changes and they are available in a flexible, substitutable manner.

Consequently, with superior flexible (welding) technology, products with outstanding but reliable properties and dimensions/design can now be developed and efficiently manufactured in a network.

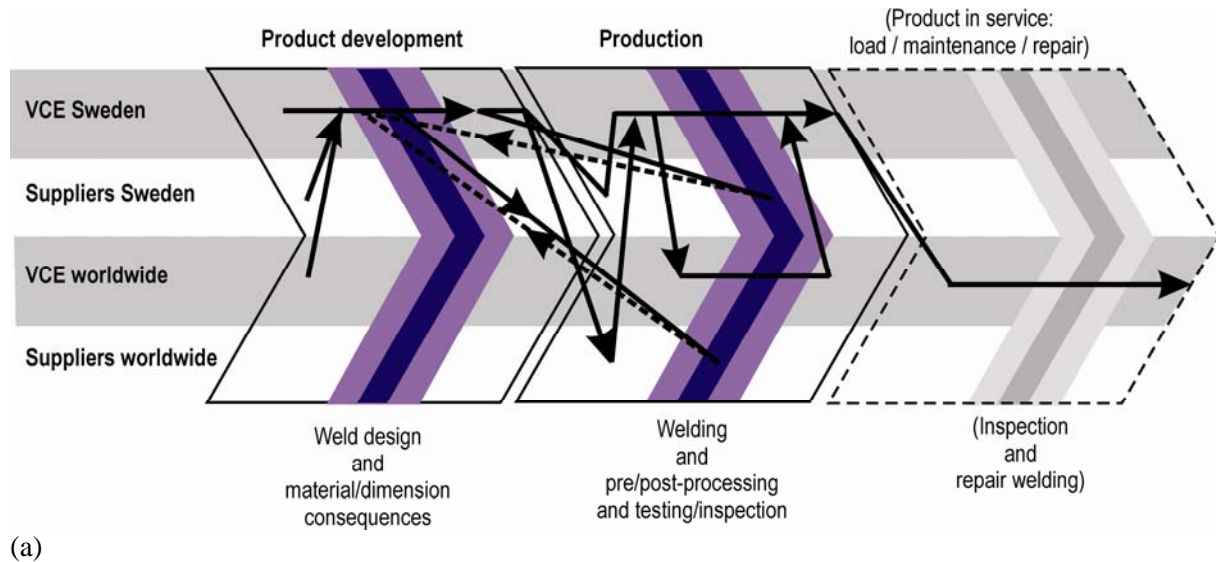
Scope

The project *Code X* addresses competence and cooperation in technology within the manufacturing industry. The project will focus on a case study and (in the final phase) seek generalization of the findings.

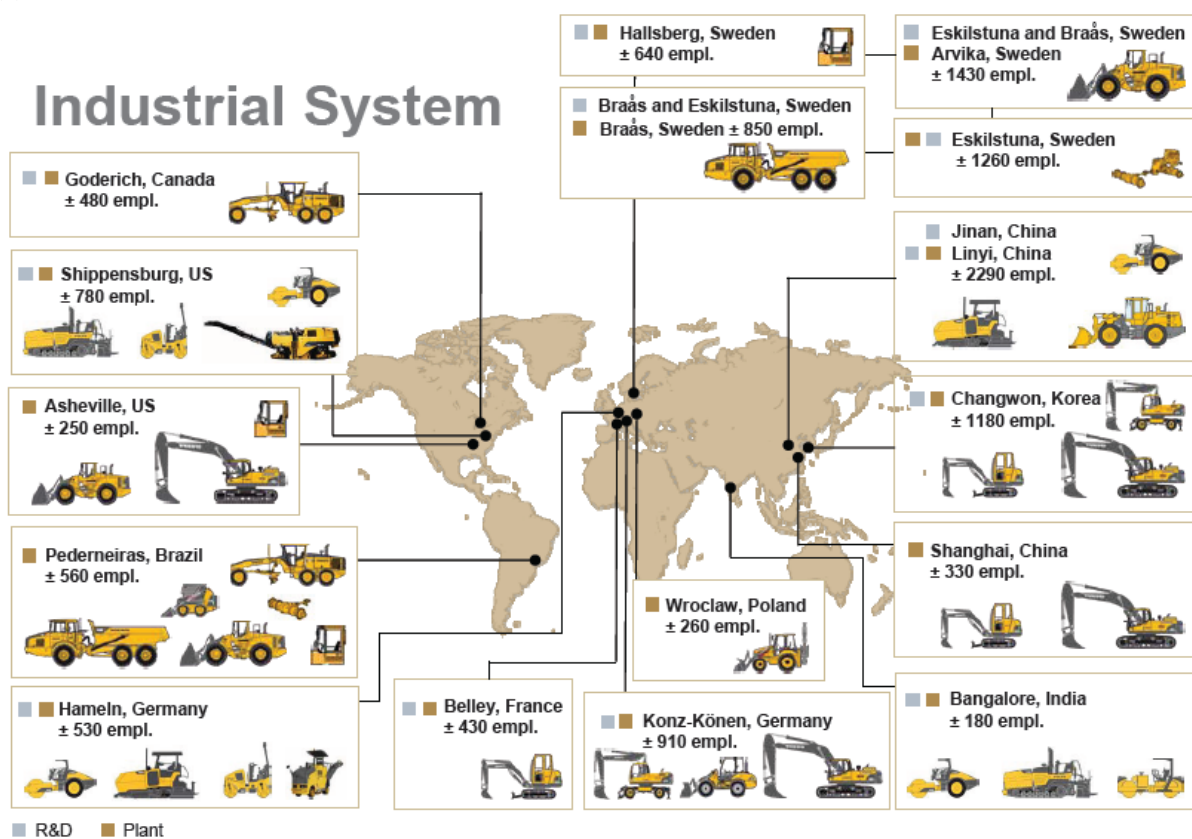
Welding at Volvo Construction Equipment (VCE) in cooperation with its factories worldwide and its supplier and consultants network (hereafter called VCEE – the VCE-Enterprise), see Fig. 1, was chosen as the demonstrator case to be studied, because welding is a knowledge- and cooperation-intensive technology [1] with wide-ranging impact on product development and production. VCEE is an enterprise with a highly developed company culture (including for competence in welding) that

recognizes a large potential in the enhancement of the technical competence. VCE has about 10 Swedish supplier for larger welded part structures or components and about 20 for smaller parts. For all 20 VCE welding plants worldwide a great number of suppliers are involved.

The target group addressed are product development and production engineers, machine operators, technical managers/directors and technology consultants.



(a)



(b)

Fig. 1: (a) Sketch of welding as direct and indirect part of product development and production (and in service) and the interplay with suppliers and factories worldwide; the polygon arrows are an example of the time sequence and cooperation when developing/prototyping/testing/redesigning a product, followed by its production, (b) Volvo CE products, factories and R&D sites worldwide

Needs

Individual needs:

- Secured regular income
- Consideration of her/his private situation
- An atmosphere of positive driving forces
- A good working environment and a work that challenges the individual's skills

Swedish society needs:

- Sufficient employment in Sweden, particularly through exporting products and services
- A well-balanced labour market and society

Industry needs:

- Optimum economic benefit from human and technological potential
- Robust, sustainable concepts

To release human and industrial potential, new competence- and cooperation-management models are needed that balance the partially conflicting needs outlined above. With respect to (welding) technology, the individual worker needs coaching, confidence, appreciation and support while industry needs modernized competence, holistic understanding and positive attitudes. [2]

Potential impact

Same as for welding at Volvo CE, in general (for manufacturing and its industry) superior technology and knowledge is available today, which is under-utilised due to many reasons but eventually through lack of competence. In principle, the competitiveness could be enhanced tremendously. The key question is: Which scenarios of development are realistic and robust? A revolutionary new code of flexible cooperation between employees and industry (in a win-win manner) is also expected to have a symbolic impact on modernizing the Swedish society.

2 Quality**State-of-the-Art**

Large research efforts at all levels have led to the availability of highly advanced welding technologies (such as laser welding) with various superior features. Powerful on-line and post process weld quality inspection methods and tools for product failure simulation under load have also been developed. The latter enable advanced product design while maintaining the required product strength. Also, many high strength materials/steels are nowadays available. The industrial implementation of these techniques and materials has lagged behind the research effort. Welding lines and corresponding joint design (not the whole product design, but load-critical joints) often remained unchanged for decades. Reasons are lack of competence and conservative attitudes, as the failure of a weld is often difficult to estimate during design and to recognize and predict after production, but the consequences even from microscopic defects can often have catastrophic consequences for the safety of people and of the product, as well as for the productivity, thus economically.

An example is the sinking of the 275 m long MSC Napoli [2] from a small welding defect that caused a several meter long crack in the hull. The risk of severe consequences from failure, the difficulty in controlling the complex context that determines the strength of a welded product plus the expense of technology changes have a strong dampening effect on change. This leads to a very conservative behaviour led by high levels of confidence in well established product design and welding techniques. Without a radical new approach this conservative trend is expected to continue, thereby frustrating much of the large potential of innovation. For welding with its traditional community the here addressed research on human factors like sub-conscious attitudes and decisions is completely new and unexplored. As a first step, in June the partner LTU/M, on behalf of SWC, has launched an enquiry about decision making in welding in Swedish industry.

An exception is Germany that massively supports laser processing (BMBF: “The century of the photon”) through associations, incubators, knowledge transfer, 1000 researchers, etc. Today most high power lasers are manufactured in Germany and the highly skilled industry makes decisions on huge investment in lasers, e.g. the ultramodern Wolfsburg-factory with more than 400 lasers installed (investment ca. 2 billion SEK) welds 70% of a VW Golf with lasers – a big production and skill challenge, but enabling innovative design and materials. Similarly Meyer shipyard welds 75% of all 9 km in a passenger ship with lasers, as recently succeeding in improving the required welding standards.

Releasing the large potential of new welding technology depends heavily on the human competence management of the employees and their conscious or sub-conscious attitude to change (enthusiasm vs. fears, confidence in controlling the technology). Today most of the mechanisms in the individual, in its relations with others and in the organisation as a whole take place unaware, but are often determining. Traditional cultures at VCE often suppress the striving after higher qualifications in an irrational manner, which in turn leads to wrong technology decisions and less competitiveness. Different country cultures at VCE made the communication and solution of problems difficult. Just recently VCE was radically reorganized, changing from 7 regional CEOs to 25 thematic CEOs distributed over 9 countries, forcing stronger cooperation but facing cultural and organisational differences.

Many components in vehicles, trains, ships, power plants, bridges are complex structures with fatigue damage as the most common failure. The same is true for modern VCE-wheel loaders, haulers, excavators, cranes or forest machines, where 70-80 % of the vehicle weight consists of welded steel plates/castings. Expertise to design and manufacture against fatigue failure is of great importance. At the same time new products requires increased payload, speed and demands on life, in turn asking for weight reduction (i.e. CO₂-emissions) requiring higher competence.

Among today’s employment models important is to distinguish between VCE-employees (Sweden vs. other countries), supplier employees and consultants. The cooperation with consultants (e.g. about 100 in electronics) and suppliers often has the disadvantage of lacking genuine company and technology competence, but facilitates to quickly react. In contrast, VCE-employees face different internal career opportunities and superficial headcounting restrictions. VCE is a promoter of distant cooperation by web-conferencing since 2006, e.g. enabling Eskilstuna to share planning, knowledge and culture with the coworkers in the Brazil and USA-plants. The applicant (see CV) has been highly active in coordinating EU-pilot projects on new lifelong learning methods, demonstrating potential and limits.

Today’s competence models are too rigid. The Swedish Welding Commission has developed the *Road Map 2015* (www.svets.se), stating seven clear goals on improved teaching and knowledge transfer on welding in Sweden, which is a starting point for the project. A successful example is the world-leading role of VCE in proper weld design by the chain research-new standards-courses, e.g. by the cross-disciplinary knowledge platform LOST (see CV). This enabled internal top-qualification but made apparent less qualified work and products at other VCEE-locations.

Flexible expertise, created in 1997 [3], is related to the fundamental of collective routines (or: communities of practice) in companies, being adaptive processes robust against changes. The change of collective routines requires learning both at the individual and collective level [4]. It requires a balance between maintaining sufficient fundamental knowledge plus and the capability for learning new skills in adjacent areas.[5] The knowledge and culture capacity of a company is essential for the extent of dynamic changes, both in the explorative and in the implementing/operational phase of an enterprise [6]. Flexible expertise requires a view on the whole enterprise from the individual and lifelong personal challenges and vocational learning, also at the collective level. [7,8].

A corresponding concept for Sweden, related to the LEAN manufacturing philosophy, was recently developed by the applicants.[9] Many promising concepts are named by acronyms like LEAN, TQM, TBM, BPR or names like Boundaryless Organisations and Learning Organisations. The international

management literature paints a bright and optimistic picture assuming that companies actually implement the current management concept. We must conclude that the picture was not only positive from either the company's organisations, or the employees' perspective, but good examples exist. Simultaneously, a long series of negative tendencies are visible in working life – increased number of people on long-term sick leave and with work-related injuries, burned-out and stressed people. Much of the old problems remain in modern organisational forms. Thus the concepts need to be reconfigured, taking further partially unexplored, sub-conscious factors into account.

Objectives

- New cooperation codes between employees and their enterprises to better release the economic potential of advanced (welding) technology by simultaneously improving the conditions for the individual
- New attitude codes and contract codes between the employees and their enterprise
- More comprehensive mapping of the existing situation
- Methods for enhancing the awareness of human behaviour within an enterprise
- New models for teaching and training of skills, awareness and attitudes
- New instruments supporting advanced approaches
- Scenarios comparing different new cooperation models employee/enterprise
- Generalisation of the findings from the demonstrator case (welding at VCEE)

3 Methodology and work plan

Methodology

A representative pilot case will be studied, namely the competence management for welding of a component at VCEE within its whole context. Eventually, generalization of the findings will be proven. First, mapping will be carried on the situation today with respect to company philosophies, structures, competence management, employment/business relations and individual attitudes. The mapping will then be analysed. Based on the findings and on hypothetical assumptions, we will create models for new win-win codes between experts/employees and their enterprises for the demonstrator case. Moreover, ideas for innovative practical instruments that facilitate communication and fact-management will be created. Based on the mapping and supported by those instruments, model implementation scenarios will be studied, analysed and compared through illustration, rational weighting, simulation and expert opinions. From the findings competence model codes will be formulated and proven for generalization.

Hypothesis

The superb technologies (demonstrator: welding techniques, weld quality inspection instruments, ultra high strength metal alloys) available today would be applied much more effectively and frequently in a different competence and attitude environment. Products with superior design and properties would then be developed and produced at low costs, to the significant advantage of Sweden. A higher awareness of potential and drawbacks is the key for agreeing on new, flexible win-win codes for the relationship between employees/experts and their enterprises. The codes will match the needs of the enterprise culture for trust, flexible competence and flexible operation with the needs of the individual for security (salary, family location) and job satisfaction, e.g. by new teaching, coaching, employment and communication models.

Examples for possible solutions include the learning of interdisciplinary knowledge and holistic facts, coaching of individual needs and attitudes, employment that considers rapid changes in the company (e.g. *flexperts* or new definitions for consultants) and the stable location of the individual, e.g. by 90% of the time distant web/videoconference-based jobs.

Partnership

- LTU/M: Luleå TU, Div. Manufacturing Systems Engineering: key researchers involved: Prof. Alexander Kaplan, Dr. Peter Norman (30% of full time), Dr. Torbjörn Ilar (30%), PhD-student (40%) Jan Karlsson: Research on laser welding (its wider context) and LEAN production

- LTU/E: Luleå TU, Div. Industrial Production Environment: Prof. Lena Abrahamsson, Prof. Jan Johansson, PhD-student (100%): Human factors and gender aspects in the factory
- KTH: The Royal Institute of Technology, Div. Light Weight Structures: Guest Prof. Jack Samuelsson, Dr. Zuheir Barsoum (10%): Simulation of a weld design under load
- SWC: The Swedish Welding Commission; association of 400 industrial members; coordinating many working groups, courses and standard implementation in welding; member of International Institute of Welding (IIW) and European Welding Foundation (EWF)

VCEE - VCE-Enterprise including complementary types of suppliers:

- VCE: Volvo CE (Eskilstuna, Borås, Arvika): Development and production of a wide range of construction vehicles, here: wheel loaders, articulated haulers, dumpers
- Nitator AB: Component supplier, developing and manufacturing e.g. consoles, beams; 180 employees
- J&P: Jonsson & Paulsson ind AB: Component supplier; manufacturing of 2-20 mm thick sheets, e.g. with 7 welding robots, 5 cutting lasers; 130 employees
- Andon Automation AB: System supplier; develops/installs welding systems, including safety cell, robot, control electronics, laser/electric arc
- FORCE Technology: System supplier; develops/assembles a vision system for (novelty: standard-relying) on-line weld quality control
- SSAB Plate: Supplier of steel plates; world leader in ultra high strength steel

LTU (see CV) is among the top four universities in *production engineering* (defined strong research environment) in Sweden, KTH even one of the two governmental reference universities. LTU/M is the internationally recognised Swedish academic leader in industrial laser technology, particularly laser welding, with the ambition to cover the broad interdisciplinary spectrum. LTU/E is a pioneer in *human work science and gender aspects in industry*. SWC conducts excellent networking and teaching management, far more advanced than in other comparable countries. Prof. Jack Samuelsson is highly recognized for his VCE-views and visions. VCEE has an excellent company culture in Sweden but still misses out much of the potential of modern welding technology. VCEE will thus contribute with demonstrator opinions, discussions, facts and a pilot component group.

International partners to be involved in the discussions (the academic are in close contact with LTU)

- VCE/GLOBE: The factories of Volvo CE in Brazil, USA (Asheville) and Korea, see Fig. 1, that develop and manufacture components with VCE Eskilstuna
- NL: University of Tilburg/IVA, Prof. Loek Nieuwenhus – leading research in human work science
- UK: University of Cambridge, Institute for Manufacturing – leading research in company organisation and cooperation
- KOR: RIST Pohang (Korea) – leading research in welding, huge leading edge-laboratory

The above partnership is a partially new, interdisciplinary composition with excellence in their respective area and the ambition to strongly modernize traditional patterns in industry. The established industrial consortium VCEE+KTH is used to technical research projects, but expressed its enthusiasm for the present possibility for studying and improving the “soft” work environment, through the new unusual partner LTU/E but also SWC, all linked by LTU/M.

Budget: The interest of industry in the project idea was very strong, thus only selected companies could participate. The project will involve intense internal discussions and investigations at the companies that will result in their financially significant work contribution, see Tab. 1 and budget, despite not accounting the international VCE-factories involved. The five suppliers have parallel tasks. SWC will involve its members through a new working group and the dissemination channels and will develop/run new courses required. While senior researchers at LTU/M (50% of budget) and KTH (10%) will coordinate the industrial discussions, a PhD-student at LTU/E (40%) will carry out the accompanying scientific analysis.

Work plan

Table 1: Work Plan with timeline and partners' work volume per WP

Work Package / Year	2010	2011	2012	%	LTU/M	LTU/E	KTH	SWC	VCE	Nitator	J&P	Andon	FORCE	SSAB
WP1 Mapping				15										
WP2 Analysis		M1		10										
WP3 Brainstorming				15										
WP4 Development		M2		10										
WP5 Pilot team				20										
WP6 Scenarios			M3	15										
WP7 Generalisation			M4	10										
WP8 Coordination				5										

Bar height = Work volume

WP1: Mapping – welding competence environment at VCE today

- Enquiries and interviews with employees
- Acquisition, collection and evaluation of statistical data
- Collection and comparison of relevant findings and approaches worldwide

Partners: LTU/M coordinates WP1 and collects/incorporates all information, all partners discuss which information is essential to acquire; LTU acquires all information from all industrial partners including VCE/GLOBE; LTU/E evaluates the data and studies and compares the findings worldwide.

Deliverable D1: Feedback map of competence, attitudes and employment relations for the case studied, in relation to worldwide

WP2: Analysis – trends, potential and hindlers for a new code

- Analytical discussion with engineers, operators, directors, consultants on the situation today
- Analysis of all data and comments
- Development of a suitable manner for presenting the information

P: LTU/E coordinates, after analysis from LTU/E, LTU, VCE and SWC analyse and discuss the whole situation; after first conclusions also all suppliers comment

D2: Analysed map (based on D1)

Milestone M1: Enhanced awareness of potential and drawbacks for advanced codes

WP3: Brainstorming – new code models and measures

- Synthetic discussion with company experts on possible future strategies and models

P: VCE coordinates; several brainstorming between all partners; LTU: formulation of the models

D3: Concepts of new models for codes between employees and their enterprise

WP4: Development – new code models and measures

- Development of new models in detail
- Development of planning and teaching instruments
- Develop a realistic view on the role of welding today and in the future
- Develop suitable instruments that facilitate fact-finding and communication (Web-conference)

P: LTU/M coordinates; LTU and KTH carry out the detailed development, accompanying feedback from all industrial partners; SWC develops the competence environment and installs a group

D4: A series (2-5) of detailed codes between employees and their enterprise

M2: New models for competence and cooperation codes

WP5: Pilot team – initiation of a code test group at VCEE

- Installing a demonstrator team at VCEE for a specific part development needed
- Installing an interdisciplinary/holistic welding working group (Swedish Welding Commission)
- Implementation of new models and instruments (as far as immediately possible)
- New courses: teaching and coaching of the new models and instruments to the group members
- Developing and producing the selected demonstrator component
- Analysis of hindlers that were overcome or require wide-ranging measures

P: VCE coordinates and determines; SWC initiates a new expert group and new courses, supported by LTU and KTH, all industrial partners conduct the task, LTU analyses

D5: Analysis report on progress and hinders for immediate model implementation

WP6: Scenarios – hypothetical and iterative code analysis and comparison

- Determination of possible scenarios that can be imagined
- Engineers, operators, directors, consultants, academics: discussion on driving forces and possible strategy implementation
- Illustrative flowchart formulation of a consequence analysis as a discussion instrument

P: KTH coordinates - and analyses the product development; LTU/M analyses the production; LTU/E analyses the individual and the society; all industrial partners provide feedback

D6: Flowchart analysis weighting different scenarios for the different models

M3: Illustration and analysis of the possible consequences through new models

WP7: Generalisation – of the codes to other enterprises, technologies and sectors

- Generalisation of the code formulation
- Generalisation of the analysis

Partners: LTU/E coordinates and analyses the task through discussions with LTU/M, KTH and SWC

Deliverable D7: Model and its flowchart analysis generalised to other enterprises, technologies and sectors

Milestone M4: New models and their analysis for a wide range of applicability

(WP8: Project coordination – LTU/M)

4 Exploitation

Implementation of results

The Deliverables D1-7 compose a new *Code X* between employees and their enterprise that formulates their agreement on manners for improved competence, cooperation and attitudes. The *Code X* will be available as a public printed and electronic handbook by combining the modular reports D1-7.

The *Code X* can then be applied by leaders at any hierarchy level in a company as a guideline for improving the company culture top down, i.e. it can either be applied specifically for small units or even for a large company as standard.

The corresponding leader or a hired *Code X*-coach is the central coordinator of the *Code X* and of a corresponding project team (to be constituted, can include governmental policy makers) with the specific aim to improve the company culture in a certain area of the enterprise (to be defined). First the *Code X*-team relates the actual situation of the enterprise area faced in terms of competence, cooperation and attitude to a similar category in the Feedback Map D1, for which the Analysed Map D2 recommends specific improvements. The *Code X* guides the team step by step through its enterprise-specific discussions. Thus from the analysis the *Code X*-team discusses and proposes new model codes (D4) and with help of the Scenario Analysis D5 the pros and cons of each model can be weighted until a certain code model will be chosen. The Demonstrator Analysis D6 can serve as a real life reference. While D1-6 is specified for welding technology, leaders of other technology areas can try to transfer the basic concept to their area, guided by the General Models and Analysis D7, being analogue to D1-6, but only on a conceptual level.

Once the new model code is chosen, its interpretation and implementation will be discussed. A *Code X*-skilled leader or coach (similar to coaches in the *LEAN* production philosophy) will step-by-step guide the project team through reconfiguration of the selected area of the enterprise, agreeing on and defining: goals/needs for competence, measures (courses, trainings, etc.), changes in employment/cooperation relations, dissemination. Eventually an enterprise-area specific *Code X* has then been accomplished with the goal of a strong consensus (attitudes) in the project team, including the employees' position, as a base for implementing a more powerful new win-win situation.

Dissemination

The *Code X* will be a self-consistent book (in Swedish and English), available electronically free of charge through different homepages (e.g. partners) and in printed form on a cost recovery base. Beside scientific publications (journals, conferences) of the PhD-student on the analysis, popular scientific publications will be created, particularly for reaching the manufacturing industry and the welding community. Established communication channels, particularly by SWC, will be used. Emphasis is put on installing *Code X* courses (industrial and undergraduate) and seminars for developing company leaders and consultants towards *Code X*-experts (similar to the implementation of *LEAN* production today).

5 Risk analysis

The approach bears the challenges (i) that the individual employees are expected to develop their attitudes in relation to the enterprise further and (ii) that the complexity of the enterprise organisation increases. Moreover, (iii) testing of new models is limited and bears thus the uncertainties of hypothetical assumptions.

(i) Addressing the awareness, obstacles and driving forces of the individual attitudes is a sensitive task difficult to handle. The project faces the risk that investigations about real mechanisms and corresponding new attitudes and approaches are unusual and uncomfortable for the individual and therefore blocked, rather preferring the confidence of established behaviour patterns. [Estimated risk: 30%] Efforts have to be done here for careful, sensitive communication.

(ii) Today's system is working pretty well because manageable. The Code X-approach requires extra efforts in teaching, mutual understanding, personal coaching, etc. which increases the complexity and is a challenge and risk for leaders and coworkers and for the legal employment system. While the research is not on risk [0%], successful implementation requires extra management efforts and reduces the robustness of the model – with the risk [50%] of being unacceptable.

(iii) Although the project considers as important to study possible scenarios for implementing the developed model codes and to study a demonstrator group, the impact of the developed models can per definition be studied and discussed only hypothetically, thus no guarantee [risk 30%] can be given on how realistic and robust the new models are. Therefore analytical efforts will be spent in carefully defining the scenario and demonstrator studies.

Inherently, the approach can hardly have a negative impact, particularly as the speed of change can be adjusted, thus the project can focus on releasing the positive potential.

6 References

- [1] Thomy, C. et al (2007) Joining of dissimilar materials - New perspectives for lightweight design in the transportation industries, *Welding in the World*, 51, 311-326.
- [2] www.maib.gov.uk, see report/investigation/2008/MSA Napoli
- [3] Feltovich, P.J., Spiro, R.J. & Coulton, R.L. (1997). *Issues of expert flexibility in contexts characterized by complexity and change*. In: P.J. Feltovich et al: *Expertise in context; human and machine*. Menlo Park/Cambridge/London: AAAI Press.
- [4] Gielen, P.M., A. Hoeve & L.F.M. Nieuwenhuis (2003). Learning entrepreneurs as experts. In: *Journal of agricultural education and extension*. 9(3) 103-116.
- [5] Boerlijst, J.G., Van der Heijden, B.I.J.M., & Verhelst, N.D. (1996). *The measurement of expertise*. Paper presented at the 4th Asia Pacific Conference on Giftedness, Jakarta, 4-8 August 1996.
- [6] Nooteboom, B. (2000). *Learning and Innovation in Organizations and Economies*. Oxford University Press.
- [7] Van der Heijden, B.I.J.M. (1998). *The measurement and development of occupational expertise throughout the career. A retrospective study among higher level Dutch professionals*. PhD-thesis. University of Twente, Enschede (NL)

- [8] Van der Heijde, C.M., & Van der Heijden, B.I.J.M. (2006). A competence-based and multidimensional operationalization and measurement of employability. *Human Resource Management*, 45(3), 449-476.
- [9] Johansson, J & Abrahamsson, L (2009). The good work – a Swedish trade union vision in the shadow of lean production. *Appl ergonom* 40(4), 775-780.

Code X**A future code on flexible competence, cooperation and attitude in manufacturing****CVs OF THE KEY RESEARCHERS**

Name	Age	Sex	Title/function	% of time
Alexander Kaplan	41	M	Prof. LTU / head of div, vice chair LUPO	10 %
Jack Samuelsson	64	M	Guest prof. KTH, R&D-coord. Volvo CE <2010	10 %
Lena Abrahamsson	43	F	Professor LTU / chair of LUPO, applicant	10 %
Jan Johansson	60	M	Professor LTU / head of department	5 %

Curriculum vitae – ALEXANDER F. H. KAPLAN

Born in Vienna, Austria, 18 December 1967 (Nationality: Austria), ID: 671218-5690

Parental leave: 2 months in 2006 (in Australia), 2 months in 2007 (in USA)

Professional preparation

Dipl.-Ing. (MSc) in 1990 (top 2% in duration) in electrical engineering, Vienna TU (Austria)

Dr. techn (PhD) in 1994 on modelling of the physics of laser welding, at Vienna TU (AT)

Universitätsdozent (Venia Docendi) on laser technology in 2000 at Vienna TU (AT)

Honorary Docent (DSc) on materials processing in 2000 at Luleå TU

Professional and Academic Appointments

01/01/2006 (starting date) **Vice-chair: LTU research area “Production/Organisation”**

01/10/2002 (starting date) Head of Division of Manufacturing Systems Engin. at Luleå TU

14/01/2002 (starting date) Professor of Manufacturing / Laser Materials Processing at LTU

01/03/2001 28/02/2002 EU post-doc fellowship (ranking 2 of 21) for Osaka Univ, Japan

01/02/1996 28/02/2001 Head of group on European projects (ISLT, TU Vienna)

01/05/1989 28/02/2001 Research assistant (contract, 1996 permanent) at Vienna TU (A)

Commissions of trust; larger national funding evaluations:

- Coordinator of 16 scientific European workshops of the mathematical working group M⁴PL

- Application for installing a 15 kW high power fiber laser (2nd-most powerful cw-NIR-laser worldwide) at the K&A Wallenberg Foundation; accepted; funds: 11 584 000 SEK (2007)

- Selected for a planning grant (top 30%) and for interview (top 13%) on “The Swedish Laser Centre” within VINNOVAs “VINN X Centres of Excellence” program, rejected at final phase (top 5%). (2006) LTU/Dept. TFM decided to internally initiate/develop the centre.

- Application in the SSF-individual grants programme INGVAR (1999), selected at phase 1 and 2, among top 10 % invited for interview, rejected at the final phase 3 (top 5 %)

Current larger grants from other external sources as main fund holder

▪ Knut & Alice Wallenberg Foundation, High Power Fibre Laser, 11 584 000 kr, 2007-2010

▪ EU ProCyCo – The Production CyberCollege, 237 197 Euro, 2006-2009

▪ VINNOVA, HYBRIGHT – Virtual construction support for advanced joining, 4,4 mkr, 2006-2009

▪ VINNOVA, DATLAS – Data interactive process monitoring for laser welding, 4,5 mkr, 2006-2009

Other achievements, tutoring, publications

Honorary Professor at Changchun University of Technology, China (appointed in 2003)

Second-most cited paper (no. 1, *Science*, is a medical) among 3100 in laser welding (in title):

Kaplan, A.: A model of deep penetration laser welding based on calculation of the keyhole profile, *Journal of Physics D: Applied Physics* (Impact Factor IF = 2,26), v 27, pp 1805-1814 (1994).

Main supervisor of 6 PhD-students actually, of 5 completed PhDs and of 5 Licentiates

Research: Development of sophisticated semi-analytical mathematical models and analysis on laser materials processing by a new mathematical approach that enables flexibility to take

into account individual mathematical models for each relevant physical mechanism.

Scientific referee for: J. Appl. Phys. (IF = Impact Factor: 2.54), Appl. Phys. Lett. (IF 4.21), etc.

Coordinator post graduate course EuroLaser Academy, 30-100 graduates/year, 1996-2000

Languages: German (*mother tongue*); English, French, Swedish (*fluently*); Japanese (*broken*)

In contact with approximately 100 relevant industrial companies in Sweden (62 in the industrial network "Lasergruppen/Svetskommissionen"), beside others particularly in Europe and Japan. Academic network with personal contacts to ca. 80 laser groups worldwide.

Examples: Osaka U: Prof.S.Katayama, Volvo CC: J.K.Larsson, Chosun U (KOR): Prof.H.S. Bang; Michigan U: Prof. J.Mazumder; Stuttgart U: Prof.T.Graf, Cambridge U: Dr. W.O'Neill

Coordinator of the mathematical modelling working group M⁴PL since 1991 (16 workshops)

Swedish delegate of Commission IV (Laser weld.) of IIW (International Institute of Welding)

Board member of leading conferences: ICALEO, WCCM/APCOM, CLEO/EQEC, etc.

Swedish node of Nordic laser network portal NORLAS (www.norlas.com, www.svelas.nu)

Coordinator for northern Sweden in the 5 years teaching project *pro Design* (KK-foundation) and *Produktionslyftet* with regional industrial network on LEAN production

Coordinator of three EU-projects (one actual), manager of six further EU-projects

EU-projects: For many years (since 1994) Alexander Kaplan has been strongly engaged in managing, coordinating and creating EU-projects, mainly in the Leonardo da Vinci programme for vocational training but also in other research programmes in FP7. Many projects under the developed umbrella (ELA – The EuroLaser Academy) have been pilot projects aiming at creating and testing new teaching, training, networking and knowledge/resource management methods. Examples are different course styles (teacher and student mobility), interactive teaching material, interactive remote lab-videoconferencing, virtual laboratory training environment (software), etc. This versatile competence by involving 40-60 European partner organisations is highly valuable for the present proposal due to the creative experiences in vocational teaching and training, knowledge/resource management (teachers, lab equipment, software), human and organisational needs, actual trends, etc. Thanks to those initiatives (originally since 1990 by Prof. D. Schuöcker, TU Vienna) the applicant has a leading role in Europe at different levels.

EU Leonardo da Vinci-projects coordinated by A. Kaplan, each: ca.300 000 €, 6-25 partners

- ELA: EuroLaser Academy, different graduate course styles with cooperating teachers
- ELANET: ELA Network for Education & Training, simulation CD-ROM (Vienna TU)
- DELTA: Virtual teaching curriculum (15 CD-ROMs, Vienna TU, 1996-2000)
- VIRTUELA: Development of an interactive virtual laser laboratory (1999-2003)
- MESIMA: Manufacturing Enterprise Simulation Arena (from here: LTU, 2002-2005)
- CyberLab: Remote lab experiments by interactive web-conferencing (www.cyberlab.se)
- ProCyCo (2007-2009): The Production CyberCollege: CyberCafé, web-meetings, multi-virtual lecture – all between Luleå TU, Cambridge U, Paris ENSAM, Stuttgart U

Publications: Published manuscripts totally 176 (August 2009): 44 in journals (IF = Impact Factor), 6 in books, 104 in proceedings, 3 theses; editor of 19 proceedings; h-factor 8; e.g.:

Illar, T., J. Powell, A. F. H. Kaplan: Simulation of production lines involving unreliable machines: The importance of breakdown statistics and machine position, *Intl J Simu Model*, v 7, n 4 (2009).

Kaplan, A. F. H.: Model of the absorption variation during pulsed laser heating applied to welding of electronic Au/Ni-coated Cu-leadframes, *Appl Surf Sci* (IF 1,30), v 241, n 3-4, pp 362-370 (2005)

Kaplan, A. F. H., M. Mizutani, S. Katayama, A. Matsunawa: Unbounded keyhole collapse and bubble formation during pulsed laser interaction with liquid zinc, *J Phys D: Appl Phys* (IF 1,95), v 35, pp 1218-1228 (2002).

Kaplan, A. F. H.: Surface processing by non-Gaussian beams, *Applied Physics Letters* (IF 4,21), v 70, n 2, pp 264-266 (1997).

Curriculum vitae – JACK SAMUELSSON

Birth date: 1945-09-16

Employment: Research coordinator at Volvo Construction Engineering, retires April 2010

Title: Prof (guest) Dept: Aeronautical and Vehicle Engineering

Div: Light-Weight Structures

KTH (Royal Institute of Technology), SE-100 44 Stockholm, Sweden

A. Professional preparation

Education: 1970 M. E. in Aeronautical engineering In the Royal Institute of Technology,

1988 PhD. In Light-Weight Structures

2006 Docent in Lightweight Structures

B. Appointments:

1970 - 1972 Structural Analysts at Nordströms Linbanor

1972 - 1974 Testing Engineer and Structural Analysts at MoDoMekan

1974 - 1993 Manager Structural Testing in Development Laboratory at Volvo BM (VME Industries 1987 -).

1994 – 1999 Manager Structural Analysis and Testing in Products Development at Volvo Construction Equipment Components

1999 - 2002 Research Co-ordinator at Volvo Wheel Loaders

2003 - Research Co-ordinator at Volvo Construction Equipment

retires 04/2010, but will continue at KTH as guest professor

1999- 2005 Adjunct Professor in Reliability of Vehicle Components at Royal Institute of Technology, Department of Aeronautics

2006- Guest Professor in Reliability of Vehicle Components at Royal Institute of Technology, Department of Aeronautics and Vehicle Engineering, continues after retirement at least until the project end

1995- 1999 Swedish Expert in Commission XIII at International Institute of Welding (IIW);

2000 - Swedish Delegate in Commission XIII at IIW.

2006 - Member of TWI Research Board

D. Networks in academy and industry:

The following list indicates some of my other engagements:

- Member of EIS (Engineering Integrity Society) since 1978
- Member of Volvo Fatigue Group since 1980
- Nominee for VME Industries engagement in TWI 1989-1997
- Nominee for Volvo in TWI 1999-
- VCE nominee in VTec (Volvo Technological Committee) 1995-1998
- VCE-nominee in Volvo Technology Strategy Group 1996 – 2000
- Nominated to Evaluation Expert from Volvo within EU FP5 RTD-program
- Participation in evaluation of EU FP5 RTD-projects 1999 and 2000
- Participant in VINN Excellence Center ECO² Vehicle Design

C. Tutoring experience

Supervisor of completed Thesis: 4 (2001,2005,2008,2008)

Supervisor for completed Lic-thesis: 6 (2001,2003,2005,2005,2005,2006)

Actual supervising: 2 PhD students, co supervisor of 1 PhD-.student

Other R&D-merits of relevance:

- Responsible of apr. 200 technical reports within data acquisition, structural analysis, testing and fatigue design related to welded, cast, forged, hardened and machined structures.
- Participant in 3 EU-projects within fabrication and simulation of welded structures.
- Project leader for 3 Nordic projects and 6 PFF-project within fatigue assessment, quality assessment and fabrication of welded and cast components.
- Project leader for 4 projects related to vehicle development (GRÖN BIL, STEM, VINNOVA).
- Current project leader for a national technology platform – LOST- related to Lightweight welded structures
- Received the Oscar Kjellberg Medal 2006 from The Swedish Welding Commission

Grants from other external sources:

(As main fund holder, current projects)

- PFF, Viktsreduktion av gjutna Fordonskomponenter genom utveckling av dimensionerings-, kvalitets och kontrollmetoder , 7 500 000 kr, 2001-2008 (3 delar I, II och III med Dnr: 2001-06193, 2004-02099 och 2006-01000)
- STEM. Hybrid Elektrisk Lastmaskin (HEL), 8 000 000, 2006-2008, Dnr 2006-00067
- MERA, Kvalitet Optimering och Kosteffektiva Svetsade Strukturer - KOST-2010, 3 774 000 kr, 2006-2009, Dnr 2006-01680
- VINNOVA, Lätta Optimerade Svetsade Strukturer - LOST, 3 165 000 kr 2006-2009, Dnr 2006-00563
- FFI. Elhybrid hjullastare, Utveckling och analys av system med avseende på energieffektivitet, säkerhet och körbarhet 4 000 000 kr, Dnr 2009 -000136

Publications

- [1] Marquis, G. and Samuelsson, J., Modelling and fatigue life assessment of complex fabricated structures, Materials Science and Engineering Technology, 36, No. 11, 2005
- [2] Samuelsson J., Byggnevi M., Jonsson B, Järvstråt N., Marquis G., Hansen A., Barsoum Z., Integrated Design and Manufacturing of Welded Structures, NI-project: Q-FAB, Nordic Innovation Centre, Oslo, Norway, June 2007
- [3] Jonsson; B. and Samuelsson, J. Weld Quality Assessment and Actions, Steel Research International 77, No. 12, pp. 849-856, 2006
- [4] Samuelsson, J., Haagensen, P. J., Agerskov H., and Marquis, G., Work in Progress on Fatigue Strength of Welded Joints in the Nordic countries, IIW Doc. No. XIII-2168-07, International Institute of Welding, Annual Assembly, Dubrovnik, 2007 (1/4)
- [5] Samuelsson J., Jonsson B, and Barsoum Z. Service Fatigue Design of Complex Welded Construction Equipment, Materialwissenschaft und Werkstofftechnik, No 19/2008, pp 734-739, 2008

Remark from the main applicant, A. Kaplan: *Jack Samuelsson is an exceptional, highly recognized personality both at Volvo CE and in the Welding Community, in Sweden and worldwide. He has the deeply impressing capability of a very clear view on the whole VCE-Enterprise with respect to strategy, research, knowledge transfer, human resources, employment relations and cooperation, in product development and production, taking into account human factors. He is capable to clearly distinguish between enthusiastically highlighting strengths and critically pointing on deficiencies. Unfortunately this capacity retires soon, but Jack is ready to continue serving Sweden as guest professor at KTH. The present proposal is a unique opportunity to still benefit from his outstanding view in a strategic manner rather than, as usual, at the engineering level of purely technical projects. He initiated such wider approach in the VINNOVA LOST-platform which could here be extended.*

Curriculum vitae – LENA ABRAHAMSSON (main applicant/coordinator)

Lena Abrahamsson, ID: 661003-8967, *Place of birth:* Kalix, *Country of citizenship:* Sweden. Parental leave during 1990-91 and 1993-94.

Professional preparation

- Professor in human work science, Luleå University of Technology, 2006-05-19
- Associate professor/docent in human work sciences, Luleå Univ. of Tech., 2003-03-21
- PhD in human work sciences, Luleå Univ. of Tech., 2000-02-25
- Master of Science in industrial work environment, Luleå Univ. of Tech., 1990-03-15

Positions and assignments

- Full professor at the Division Industrial Production Environment, Department of Human Work Sciences, Luleå Univ. of Tech., current position (from May 2006).
- Visiting Research Fellow (post-doc) at Centre for Change Management, Department of Management, University of Wollongong, Wollongong, Australia, Sept-Dec 2001
- Lecturer and assistant lecturer at the Division Industrial Production Environment, Department of Human Work Sciences, Luleå Univ. of Tech., 2000-2006.
- PhD-student at Industrial Production Environment, Dep. of Human Work Sciences, Luleå Univ. of Tech., 1995-2000
- Management and eng. consultant at *Ifa Production Developm. AB*, Stockholm, 1990-1995

Recent commissions

- **Leader for the official (one of 12) multi-disciplined research profile *LUPO, Production and Organisation at Luleå University of Technol., on-going (from 2006-)***
- Project leader for Quality in post-graduate education at Luleå Univ. of Tech., 2008
- Head of the multi-disciplinary graduate school *Learning* at Luleå Univ. of Tech., 2002-2005.

Main research project (a selection)

Ongoing ‘strategical cooperation projects’, together with fellow researchers:

1. *Production Botnia*, EU Regional Development Fund, 2008-2011, SEK 15.000.000. Together with Kjell Rask (project leader), Jan Johansson and industrial companies. Chairman of steering committee. The project consists of four research groups at LTU.
2. *Council Theme Work based learning and changeover in working life*. European Social Fund, 2009-2011, SEK 16.000.000. Together with Stefan Ekenberg (project leader) and research groups at Linköping’s University, Gothenburg’s University and Apel AB. Member of steering committee and work group.
3. *LUPO strategies for global links*, Vinnova, 2008-2009, SEK 750.000. Project leader together with Alexander Kaplan (Department of Applied Physics and Mechanical Engineering, LTU).

Ongoing research projects, together with fellow researchers (a selection):

1. *Work environment for cleaners*, IFAU, 2009-2010, SEK 1.400.000
2. *‘Daring gender’ when promoting academic entrepreneurship*, Vinnova, 2008-2012, SEK 4.000.000. Project leader together with Ylva Fältholm.
3. *Future factory – a concept factory formed by women*, FAS, AFA and EU Regional Development Fund, 2008-2011, SEK 5.200.000, proj. leader together with Ylva Fältholm.
4. *‘Fuzzy front end’ – management and organisation of product and process development in process industry*, Vinnova, 2007-2009, SEK 2.900.000. Project leader together with Johan Frishammar (Department of Business Administration and Social Sciences, LTU).

5. *Recognition of learning and competence in working life*, FAS, 2007-2009, SEK 2.400.000, project leader

Publications on human work science, learning and gender (a selection)

1. Johansson, Jan & Abrahamsson, Lena (2009). "The organisation of production and work" in Bohgard, Mats; Karlsson, Stig; Lovén, Eva; Mikaelsson, Lars-Åke; Mårtensson, Lena; Osvalder, Anna-Lisa; Rose, Linda & Ulfvengren, Pernilla (eds.) *Work and technology on human terms*. Prevent. (en översättning av 33)
2. Johansson, Jan & Abrahamsson, Lena (2009). "The good work – a Swedish trade union vision in the shadow of lean production". *Applied Ergonomics* Vol. 40, no. 4, July 2009. pp. 775-780.
3. Abrahamsson, Lena & Somerville, Margaret (2007). "Changing storylines and masculine bodies in Australian coal mining organisations". *Norma* (Nordic Journal for Masculinity Studies), Vol. 2, No. 1 2007, pp 52-69.
4. Lindelöf, Peter; Abrahamsson, Lena & Johansson, Bo (2007). "Management of work environment design when developing new technologies of production in international cooperation projects – Learning from an EU-project". *Ergonomia. An international journal of ergonomics and human factors*. Vol. 29, No 1, January-March 2007, pp. 35-48.
5. Abrahamsson, Lena & Johansson, Jan (2006). "From grounded skills to sky qualifications – A study of workers creating and recreating qualifications, identity and gender when meeting changing technology in an underground iron ore mine in Sweden". *Journal of Industrial Relations*, November 1 2006, Volume 48, No. 5, pp. 657–676.
6. Abrahamsson, Lena (2006). "Exploring construction of gendered identities at work", pp 105–121. In Billet, St.; Fenwick, T. & Somerville, M. (eds.). *Work, Subjectivity and Learning. Understanding Learning through Working Life*. Dordrecht: Springer.
7. Somerville, Margaret & Abrahamsson, Lena (2003). "Trainers and Learners Constructing a Community of Practice: masculine work cultures and learning safety in the mining industry". *Studies in the Education of Adults*, Volume 35, Number 1, 2003, pp. 19-34.
8. Abrahamsson, Lena (2002). "Restoring the order: Gender segregation as an obstacle to organisational development". *Applied Ergonomics*, Vol. 33, Issue 6, 2002, pp. 549-557
9. Abrahamsson, Lena (2001). "Gender-based Learning Dilemmas in Organizations". *Journal of Workplace Learning*, Vol. 13, No 7/8 2001, MCB Univ. Press, pp. 298-307.
10. Abrahamsson, Lena (2000). "Production economics analysis of investment initiated to improve working environment". *Applied Ergonomics*, Vol. 31, Issue 1, January 2000.
11. Abrahamsson Lena, Johansson Jan, *Work Culture and Gender Issues in a Changing Technical Context - Examples from LKAB Iron Ore Mine in Kiruna*. Proceedings of the 5th International Conference on Mass Mining (Massmin 2008), 9-11 June, Luleå (S)
12. Abrahamsson Kenneth, Lena Abrahamsson, Jan Johansson (2004), "From overeducation to underlearning: a survey of Swedish research on the interplay between education, work and learning" in *European Journal Vocational Training*, No 31 January - April 2004"
13. Abrahamsson Kenneth, Lena Abrahamsson, Jan Johansson (2006), "Lärande i arbete och vardag som utbildningsvetenskaplig diskurs", i Säljö, Sandin *Utbildningsvetenskap ett kunskapsområde under formering*, Stockholm: Carlsson förlag

My publication list holds over 100 publications in total. See also the university database: www.ltu.se/forskning/1.16009?query=Lena%20Abrahamsson&btnSearch=%20Sök%20&l=en

Curriculum vitae – JAN Å. JOHANSSON

Born 9 June 1949 in Boden, Sweden.

Professional preparation

- Engineer in Building Construction, Senior high school of Technology, Luleå, 1968.
- MSc. in Industrial Management and Engineering, Linköping University of Tech., 1975.
- Ph.D. in Human Work Sciences, Luleå University of Technology, 1986.
- Associated professor in Human Work Sciences, Luleå University of Technology, 1993.

Post-doc position

- Honorary Visiting Professor at the School of Industrial Relations and Organisational Behaviour, University of New South Wales, Sydney, Australia (1 jul 1999 – 31 dec 1999)

Professional and Academic Appointments

- Building Controller, Norrbotten County Council, (18/6 1968 - 30/8 1971)
- Junior Researcher in Industrial Organisation at University of Technology, Linköping, (33% 1/1 1974 - 28/2 1975, full-time position 1/3 1975 - 30/6 1975).
- Since 1/7 1975 I am employed at Luleå University of Technology:
 - Junior Researcher in Industrial Organisation (1/7 1975 - 30/11 1975)
 - Temporary post as Senior Lecturer in Industrial Ergonomics (1/12 1975 - 30/6 1976)
 - Senior Lecturer in Social Psychology of Working Life (1/7 1976 - 31/12 1979)
 - First Research Engineer in Work Sociology (1/1 1980 - 31/12 1986)
 - Acting Professor in Industrial Ergonomics (1/7 1982 - 30/6 1984, part-time 50%)
 - Senior Lecturer (Assistant Professor) in Industrial Sociology (1/1 1987 - 31/12 1988).
 - Acting Professor in Industrial Work Environment (1/1 1989 - 25/10 1994)
- Full Professor in Industrial Work Environment (26/10 1994 -)

Commissions

- Director of Studies (1/1 1980 - 30/6 1982, 1/7 1985 - 31/12 1986)
- Head of Dept. of Human Work Science (1/2 1989 31/12 2000, 15/7 2008 -)
- Deputy Dean at Faculty of Technology (1/1 2001 – 31/12 2006)
- Member of the Swedish Research Council (2001-2003)
- Member of the Swedish Research Councils Ethical Committee (2002-2003)

Research Supervision

- Main supervisor for 18 PhD thesis
- Co-supervisor for 8 PhD thesis

Main research grants the last five years

My research group has over the last five years an average grant level of more than SEK 10.000.000 a year. Some example:

- Theme A&O (Work based learning), European Social Fund, 2009-2011, SEK 16.000.000
- Production Botnia, European Regional Development Fund, 2009-2011, SEK 13.100.000
- Two logics and one practice – a study of modern management concepts in public sector, FAS, 2007-2009, SEK 2.200.000
- Socioeconomic analysis of new mining sites, Northland Resources Inc ,2007-2008, SEK 3.000.000
- National Theme Network-Learn, European Social Fund, 2004-2007, SEK 23.000.000

Most important publications related to the application

- Johansson B., Johansson J., "Work Environment Functions in Small Enterprises in Sweden", *Applied Ergonomics*, Vol 23 April 1992.
- Johansson J., "A Survey of Swedish Work Environmental and Occupational Research during the Twentieth Century". In *Human Factors and Ergonomics in Manufacturing*, Vol 9 (4) 1-14 (1999)
- Johansson, Jan & Abrahamsson, Lena (2008/forthcoming). "The good work – a Swedish trade union vision in the shadow of lean production". *Applied Ergonomics*.
- Helgeson B., Johansson J., *Some Characteristic Features of Industrial Work in the Future*, paper presenterat vid APSIOT's Meeting of Sociology of Industry, Organization and Work den 36-27 november 1992 i Lisbon
- Johansson J., "The Swedish Trade Union Movement and the New Organization of Work", In Flood P., Heraty N., Morley M., and McCurtin S. (eds), *The European Union and the Employment Relationship*, Oak Tree Press, Dublin 1997.
- Johansson J., Björkman T., Olsson M., Lindell M., "Qualified Vocational Education in Sweden - a New Form of Post-secondary Education" in Breuer K., Beck K. (eds.), *Are European Vocational Systems up to the Job?. Konzepte des Lehrens und Lernens*, Band 8, Peter Lang, Frankfurt am Main 2002
- Johansson J., *Competence Development in Small Enterprises*, Research report 1995:42, Luleå University of Technology
- Johansson J., Nilsson B., *Some Educational Policy Challenges - A study of seven small industrial companies in northern Sweden*, Research report 1996:01, Luleå University of Technology