

An integral part of apprentice training takes place in the steelworks

Securing future success in steelmaking by training of young steelmakers

The German minimill group Badische recognise the workforce to be the driving success of a plant's performance, people contributing 80% of productivity gains with only 20% attributed to investment in equipment. This article reviews their internal and external training philosophy. **By S Feger*, B Wiegele**, J Greinacher***, & T Berger******

TODAY, managing the demographic change is one of the most crucial topics for many steelmakers and mills worldwide. With the demographic change a number of challenges arise that have to be overcome. At the fore are shrinking birth-rates and a lack of adequately skilled labour. Thus, a systematic and continuous recruitment, education and training of the workforce are important levers for securing future success in steelmaking.

Demographic change & training

Usually the demographic change is accompanied by a shortage of talents influenced by a multitude of reasons. Significantly declining birth-rates are leading to an unprecedented shift in the age distribution of the population. This results in a lack of young people making it difficult to recruit beginners. In addition, the steel industry has to face a worldwide lack of skilled personnel suitable to take posts in hierarchical layers. Most industrialised nations are facing both a shortage of school graduates as well as of skilled young professionals and engineers. At the same time, industrialised nations are facing a lack of qualified experts due to rapid capacity expansions and thus demand in these countries.

Besides this, countries and also companies are no longer providing education facilities for young people making it extremely difficult to recruit well educated operators, fitters and electricians with a steelmaking background. Finally, the steel industry has to cope with overcoming perceptions that working in a steelmaking facility, ie the 'old smoke stack' industry, is a synonym for working in a noisy, hot and dirty environment with inflexible structures and very hierarchal systems. It is thus difficult to motivate new graduates to join a steel plant when it is supposed that other 'modern' industries can offer talented people more entrepreneurial freedom as well as a working place more acknowledged by society. All this leads to the same basic questions: How to overcome the tal-

ent shortage? And how to get the most out of newly hired employees? For sure, a systematic and continuous recruitment, education and training of the workforce are important levers for securing future success in steelmaking^[1].

Recruitment, training & education as a key

The Badische Group in Germany offers an example of how to answer these questions.

Attracting and retaining talent is becoming increasingly difficult as demand for highly skilled people outstrips supply. The recruitment concept of Badische Group (hereinafter called Badische) caters to potential talents when they are still frequenting primary school. The Group's own training centre BSW Anlagenbau und Ausbildung GmbH (BAG), established in 1989, cooperates with selected primary schools by organising two half-day workshops at the training centre in order to create interest in steel as a material and Badische as a steelmaker. Thus, when reaching secondary school age, the target group has already heard of Badische and has a positive attitude about industry and informs other pupils about the potential of Badische as a possible employer.

To further register with its target group, BAG closely cooperates with local secondary schools by conducting a 5-day internship for the whole class twice during their period of secondary schooling in an attempt to create enthusiasm for technical issues and build further interest in Badische. In addition, the two 5-day-blocks allow pupils to gain deeper insights into the industry rather than superficial 'flash lights', so positively influencing the hit rate to recruit at the end of their schooling. In addition, Badische benefits by becoming better known as a potential employer and by already knowing the calibre of the candidates who apply for work. Furthermore, the training centre participates at career and job fairs organised by schools, cities and local communities. As a result, each year, Badische is able to recruit

plenty of apprentices to meet its own demand (Fig 1). In 2011, Badische recruited 34 apprentices for different apprenticeship programmes. It is worth mentioning that workforce planning is actively done by Badische, including analysis of the age structure, job terminations and future demand. From starting the recruiting process until the end of the apprenticeship takes four and a half years. Thus, Badische makes forecasts for at least 5 years. Fig 2 shows an example of a 10-year forecast. One result of the workforce planning is that after detailed job termination analyses the number of apprentices increased to cope with the demographic change without losing expertise. This is illustrated in Fig 1 where the number of apprentices rose to 55 in 2008.

In total, 160 vocational apprentices were trained by seven full-time instructors in the training centre that year including some apprentices for local companies which had no training centres of their own or lacked the competences for special training modules in house. The advantages of training apprentices from external companies are numerous:

- The apprenticeship's quality has to be on a stable level;
- BAG has to stick to the learning schedule;
- Broader information exchange among the apprentices avoids the adoption of tunnel vision;
- The enlarged candidate pool improves and facilitates selection;
- Additional income to BAG is gained by charging a fixed monthly training fee.

But how does Badische comply with the increased evidence for extensive education a company has to provide? And how does Badische manage to educate its newly hired school graduates according to the demand of its plant?

In general a German apprenticeship programme takes three and a half years. It is a combined education of technical school and

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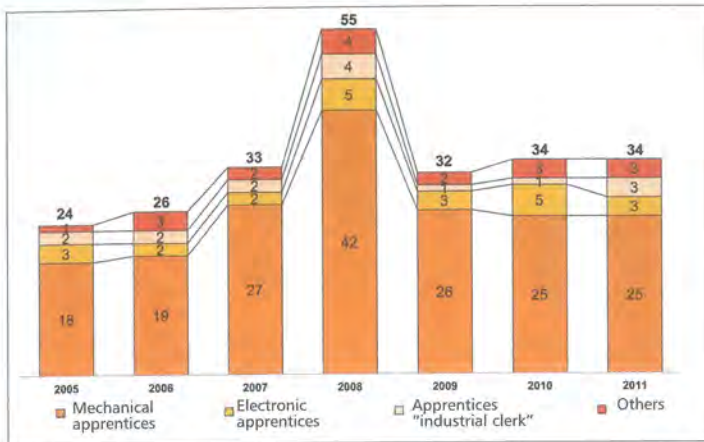


Fig 1 Development of recruitment figures by type at the Badische Group 2005 -11

practical experience in the company (Fig 3). This profound education can be seen as the backbone of the German industry and has many advantages in comparison to purely work-based or school-based training. These are:

- Broad, company unspecific set of skills acquired at vocational school being responsible for conveying theoretical technical knowledge and deepening the apprentice's general education.
- Work-based training allowing for adapting the apprenticeship programme to the needs of the company.
- A uniform standard of qualification for the trained persons is reached by using standardised content in all courses throughout Germany.

Training in mechanical engineering is Badische's most important programme. About 75% of apprentices are trained to become industrial or process mechanics (all male at the current intake), a further 10% are trained to become industrial electricians and the remainder various other professions. Training is organised in such a way that the apprentice spends up to two years exclusively split between attending vocational school and in the BAG training centre. The goal is to acquire basic technical and theoretical knowledge and to be in contact with the working materials as well as to get to know the working processes. This includes, for exam-

ple, gaining a forklift and crane driving license, completing first aid courses, attending health seminars and coping with stress and work pressures as well as accomplishing small projects such as making parts for lance manipulators or flanges for valve racks. In the third year, at the latest, the apprentice starts working at Badische Stahlwerke GmbH (BSW) steelworks, one of the most productive minimills in the world which produced more than 2.14Mt of good billets in 2011 using just two 100t heat conventional EAFs. During the first weeks at BSW, the apprentice moves between the various working areas with the intent to get to know the working places as well as the associated requirements and working conditions. This allows Badische to test the employee and to detect strengths and weaknesses. This generates very good cooperation between trainers, plant managers and the supervisors responsible for the area during the apprentice's on-site presence. That is why Badische also sets a high value on the qualification of its existing workforce: Only well-trained and qualified employees can pass on their expertise and special skills to the young and inexperienced employees. During the second part of the third year the apprentice works as a full member of a shift team. This enables the seamless transition from apprenticeship to plant employee once the apprenticeship is completed by passing the official examination at the end of the apprenticeship programme (Fig 4).

Another factor of Badische's training is that there is no specific, exclusively production related apprenticeship programme for operators. Even the process mechanic apprenticeship programme designed for operators includes a lot of mechanical training modules. The reason for this is simple: Badische wants operators who are able to detect the wear of equipment and to support the maintenance team during delays and downtimes. At Badische, apprentices with a mechanical background do not work necessarily as fitter in the maintenance departments after having completed their apprenticeship; they more likely work as a melter, caster or rolling mill operator benefiting from their mechanical background. As a result, plant downtime has decreased significantly and plant availability has risen enormously.

Even when the apprenticeship programme is completed and the person is transferred to the plant workforce, training does not stop. Badische invests much time and money in the continuous training of its workforce because the steelmaker realised that nowadays a steel plant's workforce is confronted with constantly growing demands. Equipment, technology and processes are becoming increasingly complex. In addition, pressure of time increases steadily to be more productive and to reach the highest efficiency. To cope with this, a workforce's knowledge and skills have to be continuously and systematically developed. Only a well qualified staff is able to take responsibility on complex work and to make the necessary, independent decisions. Badische is therefore convinced that well qualified employees are a precondition to achieve high performance and excellence in operations^[3].

As to the training of the workforce, Badische applies a multitude of different concepts. The basis of all training is that the employee knows his working environment, ie basic conditions and guidelines as well as expectations and requirements in order to work in a self-reliant and purposeful way. Badische complies with this precondition by issuing job related documents such as statements of job requirements and job descriptions, providing safety standards, accident analyses and prevention measures. Additionally, written instructions such as descriptions of equipment, operating patterns and checklists are implemented.

However, beyond doubt, the most important training for Badische is the practical on-the-job training. Mentoring and coaching via supervisor and foreman allows specific, job-related training with immediate application of the newly acquired knowledge including immediate feedback. The on-the-job training is performed using training manuals worked out by highly experienced senior supervisors. Finally, Badische's training portfolio is completed by at least 16 hours of classroom training per shift and year, discussions with suppliers, external seminars and experience exchanges with other steelmakers around the world. These are the so-called 'off-the-job' training measures.

The BSE Academy

The example so far described proves that Badische is aware of the vital importance of training. The workforce is seen as the most important success factor. This also shows Badische's philosophy stating that 80% of an enterprise's success depends on people, whereas only 20% is related to the equipment in place. However, Badische Stahl-Engineering GmbH (BSE) experience in consulting services

	Start of apprenticeship	End of apprenticeship	Trainee occupation	01.09.2007	01.09.2008	01.09.2009	01.09.2010	01.09.2011	01.09.2012	01.09.2013	01.09.2014	01.09.2015	01.09.2016
				01.02.2011	01.02.2012	01.02.2013	01.02.2014	01.02.2015	01.02.2016	01.02.2017	01.02.2018	01.02.2019	
GF Company management			Industrial clerk	0	0	0	0	0	0	0	0	0	0
800 Secretary			Industrial clerk										
805 Occupational safety			Engineer										1
180 Environmental protection			Engineer										
WE Maintenance				0	0	5	4	4	0	3	0	1	2
120 Management													
165 Building planning							1						
130 Maintenance													
140 Crane and vehicles workshop			Industrial mech., mechatronic technician				2	1		2			2
150 Warehouse and spare parts store			Industrial mechanic			1				1			
130 Supplies													
160 Service				4		1	1	1		1			1
Workshop pool (from MS and RM)			Industrial mechanic			3	2	3					1
SP Steel Plant				3	6	3	4	6	5	10	10	8	8
200 Management										1			
205 Occupational safety													
291 Optimization, development, statistics			Engineer										
210 Scrap yard			Industrial mechanic (in steps)	3	2	2	2	3	1	6	2	3	2
220 Refractories			Industrial mechanic (in steps)		1					2	1		1
230 Production melt and casting shop			Industrial mechanic (in steps)		5	1	2	3	4	1	7	5	3
290 Maintenance			Industrial mechanic							1			2
RM Rolling mills				2	7	3	1	1	3	2	3	1	8
300 Management													
305 Production planning and evaluation			Industrial clerk		1								
370 Production rolling mills			Industrial mechanic (in steps)	2	6	1		1	2	1	1	1	7
380 Rolling mill services			Industrial mechanic			2	1		1	1	2		1
EM Electrical maintenance				2	1	1	2	0	0	2	1	2	2
450 Management													
480 Supervisor electrical maintenance			Electrical engineering technic	1	1	1					1		
470 electrical maintenance			Electronic	1	1		2		2	1	2	2	
QS Quality and product development													
700 Management													
710 Metallurg./EDP-coord./customer consultant										1			1
750 Laboratory SP / materials tester RM			Materials tester	1				1	1				
RB Raw material procurement				0	0	0	0	1	0	0	0	0	0
930 Management													
930 Raw material procurement			Industrial clerk, vocational academy business studies					1					

Fig 2 10 year forecast of future apprentice demand

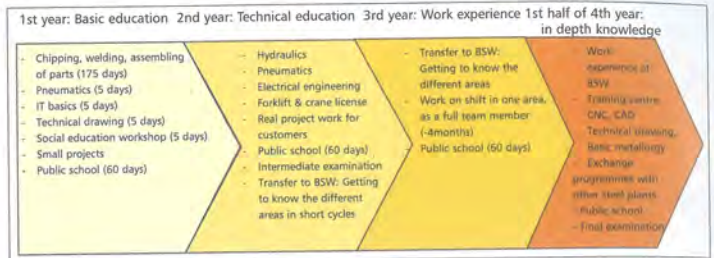
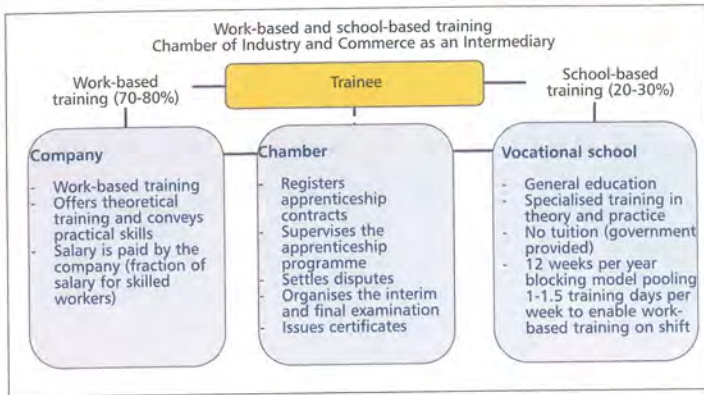


Fig 3 National German apprenticeship programme [2]

Fig 4 Content of Badische's tailor-made apprenticeship programmes 'Industrial mechanic' and 'Process mechanic'

to external companies shows that few other steelmaking plants seem to pay appropriate attention to creating the necessary skills and competences of their own workforce in line with the company's needs. Many operators in many – but not only – emerging countries have neither an adequate basic education nor experience in the steel industry. But these are the people running the capital-intensive equipment invested in by their company. Thus BSE decided to expand its consulting services by launching the BSE Academy. The BSE Academy aims to train not only their own workforce but also operators and managers from all around the world by offering four different training concepts:

- Classic seminars for managers and operators as part of consultancy contracts. The show-how and motivational effect achieved in these seminars not only boosts performance figures but also helps to create a cultural change within the client's company.
- Open courses taking place all year round with specific subjects and different levels of qualification for everyone involved in steel making – operators, supervisors, engineers and plant managers.
- Customised training as a tailor-made solution according to the specific needs of the client's employees and executed either at the BSE Academy's facilities including training locations in and around the Badische plant or onsite at the customer's plant.
- Certified programmes based on the high standards of German professional education and offered for different levels based on a modular system of hands-on courses. These programmes are still under development.

All the training possibilities provided by the Academy have one thing in common: The classroom training is combined with visits to BSW to witness one of the world's most efficient minimills in action.

Moreover, to further close the gap between general theoretical training and training on specific equipment and essentials of day to day needs for efficient plant operation, the training methods applied emphasise practical experience ranging across:

- Show-how training at the Badische steel works;
 - Instructors with hands on experience, specific from and to the minimill industry: from practitioner to practitioner;
 - Theoretical class room training;
 - Interactive learning in work-groups using case studies; and
 - A testimonial at the end of successful participation.
- Further to the different teaching methods, all



Fig 5 Motto of BSE Academy

Apprentices gain a mixture of classroom and practical experience

the courses are held in or close to Badische's steel plant to enable practical application at each stage. Training is thus closely related to the real life plant atmosphere^[4]. This is also reflected by the motto of the BSE Academy:

- Look: at one of the world's most efficient mini mills in action!
- Listen: to our instructors which are steel industry experts!
- Do: through practical exercises within our seminars and transfer your experiences to your home plant! (Fig 5).

Conclusion

The steel industry has to face the challenge of recruiting qualified personnel in the face of strong competition from other industries. The need to find talented people is compounded by the demographic change causing a shortage of labour in the upcoming age group. Thus Badische must continuously improve the knowledge and skills at all hierarchical levels of its employees.

It is essential to qualify young people not only to meet the 'skill demand' but also to overcome the aging of the workforce. Badische is of course conscious of the costs involved in educating and training its workforce, but the Group is convinced that investment in this boosts motivation in its workforce which is followed by higher productivity and lower costs.

In addition, BSE has, for many years, trained steelmakers across the world as part of transfer of 'know-how' contracts, today called 'classical' courses. During this time, one thing has become clear for the whole Badische Group: People are the driving success of a plant's performance! ■

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