



Milling education review

Education is essential to maintaining and growing the international milling industry. While there are learning opportunities at trade shows and conferences, it's hard to duplicate the hands-on learning available at facilities designed specifically for intense training.

In this article, *World Grain* reviews some of the most prominent of these training programs, including a description of their history, specialties and future course offerings.

KSU IGP

The International Grains Program (IGP), which was created in 1978, utilizes technical training and assistance programs to educate international flour and feed millers, grain buyers, overseas government officials and other public and private-sector parties involved in grain procurement and use. The IGP is located in Manhattan, Kansas, U.S., at Kansas State University (KSU).

The core curriculum includes flour milling and grain processing; feed manufacturing and grain management; and grain purchasing and risk management. IGP also can provide special course offerings as requested. IGP recently started offering some of its milling courses in Spanish.

Upcoming courses planned for 2011-12 include:

- Bühler-KSU Executive Milling (English), Nov. 7-11. Course discusses the underlying principles of milling; opti-

by Susan Reidy

Opportunities abound for hands-on training in art, science of milling at specialized facilities, institutions

mize machine adjustment; and milling handling.

- Advanced Feed Manufacturing, Oct. 4-7. Feed manufacturing short courses explore the major elements of modern feed manufacturing and examine advances in feed technology.

- Grain Milling: Food Safety and HACCP, Oct. 11-13. Course explores the flour milling process; flour mill GMPs and Master Sanitation Schedules; definition of HACCP; and how to develop a step-by-step process to implement a HACCP program in a mill.

- IAOM-KSU Intro to Flour Milling, Jan. 23-27, 2012. The course objective is to gain general understanding of the principles of the milling process, understanding the relationship between wheat quality and the effect of the milling process, gain knowledge of what wheat types and products each can produce, and learn the role each department plays in the success of the milling industry.



Students from across the world have been trained in the lab at Ocrim's Milling Training Center in Cremona, Italy. Photo courtesy of Ocrim S.p.A.

- IAOM-KSU Managing Mill Performance, Jan. 30-Feb. 3, 2012. Course covers the analysis of practices to improve the management of people and process to improve profitability.

- IAOM-KSU Mill Processes I: Basic Milling Principles, June 4-8, 2012. This course provides a better understanding of what is being accomplished in the milling process and how the participants' job functions fit into the process as wheat moves from the field to the table.

- IAOM-KSU Mill Processes II: Advanced Milling Principles, June 11-15, 2012. This course provides a better understanding of what is being accomplished in the milling process and enhances the troubleshooting skills of mill personnel.

The short courses are educational programs that provide hands-on training in state-of-the-art facilities. Training is led by KSU faculty and industry professionals. In 2010, IGP offered 27 courses to 477 participants from 43 countries. As of July 1, IGP had led 18 courses im-

proving 272 professionals from 21 countries, putting it on pace with another record-setting year. IGP said interest in its courses continues to grow because instructors keep their materials current and offer great hands-on experience in top-notch facilities, including state-of-the-art laboratories and a pilot mill.

IGP said it is continuously working to update its facilities. The Hal Ross Flour Mill was completed in 2007, and the IGP Conference Center offers a modern, comfortable teaching environment. IGP will start construction of the O.H. Kruse Feed Mill and Biorefinery this fall. The multi-million dollar mill will serve as a feed research, teaching and production facility through which IGP will be able to expand its feed curriculum. Through the mill, IGP hopes to address the urgent needs of the livestock feed industry today, particularly as it relates to feed safety and profitability.

In 2011, IGP joined with KSU Grain Science and Industry and partner organi-

zations such as AFIA and GEAPS to incorporate distance learning into some of its courses. IGP also is offering monthly webinars to keep international customers current on the state of U.S. grains and oilseeds. The webinars include the market and crop quality information taught in on-campus short courses.

IGP has been asked recently to address topics such as new technology in the industry, food safety and HACCP. Personnel management and energy management are also key areas of interest.

The newest course offering is in partnership with AIB International. Last October, IGP introduced a course targeted toward the development of a HACCP program for a grain processing facility. It is also developing online distance courses to meet the growing demand for training that can be completed without the cost of travel and time away from work and family.

OCRIM

Ocrim S.p.A. organizes a variety of educational courses to educate the milling industry at its Milling Training Center in Cremona, Italy. Ocrim first started educating the milling industry at a facility outside Cremona in 1965. More than 2,800 students have been trained to become chief millers, laboratory analysts and maintenance foremen. The courses attract students from across the world.

Ocrim offers a wide range of courses including mechanical, electrical maintenance, automation and specific courses for millers and lab workers.

Courses are continually updated with new technologies and new market demands. Subjects vary from the simple maintenance of a machine to more difficult questions related to the sustainability/resource management inside the milling complex. This includes sanitation, personnel, food safety and product traceability. Special courses can be developed to a customer's requirements.

Ocrim said it is always looking for new ideas to improve its efficiency and the benefits it can give customers. It strives to offer high quality for the machinery

students practice on, the school mill, the laboratory and the didactic programs.

SFT

The Swiss Institute of Feed Technology (SFT), Uzwil, Switzerland, was founded in 1979 by the then-owner of Bühler AG, Dr. René Bühler. Its purpose was to impart primarily practice-oriented specialist knowledge on feed production to professionals from the feed manufacturing and related industries.

The showcase of the SFT is the diploma course on feed manufacturing technology. It includes a preparatory course on a correspondence basis and an intensive course at the SFT headquarters. The recently released "Concept 2012" divides the course into two blocks, which makes absence from work even shorter. The courses are taught in German and English in three-year intervals. The main emphasis is placed on flow sheet and pro-

cess technology, but also electrical engineering, automation, animal nutrition and feed science. Students who successfully complete the course are awarded a diploma as feed production engineer.

SFT also offers two- to 10-day short courses in different languages, if required with simultaneous translation. The short courses so far have been limited to process technology and associated machines. There are no examinations. More information is available at www.sft-uzwil.ch.

Popular topics, SFT said, include: avoidance of contamination and cross contamination; high plant accuracy; homogeneity, traceability and hygiene; energy savings; productivity; and flexibility.

SFT can organize customer or plant-specific courses at the institute's site or at the customer's location. It can also act as a neutral consultant for plant optimization and alterations, carrying out inspections and conducting homogeneity

and cross-contamination tests.

Given its close relationship with Bühler, SFT's technological know-how and equipment in the training center will be permanently updated to the current state. This allows students to understand, apply and operate state-of-the-art technologies and processes in feed production plants, SFT said.

The Swiss School of Milling (SMS), founded more than 50 years ago, is planning its 16th Milling Convention with the Swiss Association of Head Millers for June 7-8, 2013. The host language is German, but all contributions will be translated into English simultaneously.

BÜHLER TRAINING CENTER

The Bühler Training Center in Uzwil, Switzerland offers courses for the operating staff in the milling industry. The education is based on short but intensive courses that last for one to three

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weeks. In addition to standard courses, the training center offers individually designed courses according to specific customer needs. This training is done at the Bühler Training Center or at the customers' facility.

Bühler said it teaches operational staff how to run a profitable flour mill and how a grain milling plant can make best use of the raw material at lowest operation cost. The courses are designed and offered for staff with different skills and levels. The main courses are: Flour Milling Technology: basic, advanced and expert level; Durum Milling Technology; Maize Milling Technology; Oat Processing Technology; Mechanical Maintenance; Electrical Maintenance; Fluting Course; and Plant Automation.

Most of these courses can be taught in German, English, French, Spanish and Italian. Courses in other languages are assisted by interpreters.

"We closely feel the pulse of the industry every day and therefore stay up to date all the time with the subjects taught at the Bühler Training Center," Bühler said. "Issues which are important to the milling industry and which need particular attention, such as ATEX, microbiology in flour quality control and DON reduction, are continuously integrated into our teaching material."

Bühler also offers milling courses for executives. These courses are designed for management members of the milling industry who do not have a profound technical background in milling.

Bühler said its educational programs are focused on practical "hands-on" training as well as classroom teaching.

"We are offering the ideal balance between the two with the help of an operational school mill, a fully equipped machine park, a workshop for mechanical as well as electrical installations and main-

tenance. With those facilities we cover what is needed for successful teaching."

SMS

The Swiss School of Milling (SMS), founded over 50 years ago, is a school for milling technologists and production managers. Students from all over the world travel to St. Gallen, Switzerland to participate in the SMS' courses which consist of two sections: the correspondence course and the main course. The SMS said it combines theoretical know-how with practical "hands-on" training.

The correspondence course imparts the basic knowledge required for optimal preparation for the main course, while students are at home working in their regular jobs.

In the milling technology subject, the emphasis is placed on the basics of flow-sheet technology and milling equipment

PTM

of the different sections of a flour mill. In the natural sciences subject group, the basics of mathematics (including basic physical formulae and units) and chemistry are taught. In addition, an introduction is given to microbiology and hygiene. In engineering, students acquire basic knowledge of electrical engineering, plant engineering, and pneumatic and mechanical conveying. As a preparation for flour analyses in the main course, students learn the theoretical basics of the most important analyses according to the International Association for Cereal Science and Technology (ICC) standards.

Required materials are sent to the students by the school. Students must solve control questions in the relevant areas and return their replies to the school by a certain deadline. Their replies to the control questions are rated and taken into account in the final grade. The time requirement for the correspondence course is about six to 10 hours per week, depending on a student's previous level of knowledge. Upon completion of the correspondence course, the students move to St. Gallen to attend the six-month main course at the SMS. In the milling technology subject group, knowledge of mechanical equipment is further deepened and a focus will be set on flowsheet technology.

Theoretical classroom work will be supplemented by hands-on exercises in the flour milling laboratory and in the school mill. In the natural sciences subject group, cereal science, baking technology, nutrition science presentation technique and managing/dealing with people (leadership) are added as new subjects. In the engineering subjects, electrical engineering, plant engineering and pneumatic topics are expanded upon.

The most common analyses, according to ICC, for determining the quality of milled products are performed on a practical basis at the school. During the main course, four "hands-on" afternoons are held every week. This means that courses will continue to focus heav-

ily on practice, which is highly significant for course participants.

The SMS said that due to its close contact with the milling industry, it has the advantage of receiving continuous updates about new developments and market requirements which are integrated in its training sessions. Students who receive the SMS diplo-

ma are professionally prepared to take over middle or upper management positions and are able to offer a real benefit to the company they are working with, the SMS said. In order to create better rounded production managers, the SMS syllabus covers the technology of baking, pasta, cereals and other grain-based food processes. For more

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information, visit www.sms-sg.ch or e-mail info@sms-sg.ch

SATAKE CENTRE FOR GRAIN PROCESS ENGINEERING

The Satake Centre for Grain Process Engineering (SCGPE) was established in May 1994 following an initiative from the Satake Corporation of Japan. Based in the School of Chemical Engineering and Analytical Science at the University of Manchester in Manchester, U.K., its primary focus is providing education, training and research at the highest academic level.

SCGPE offers doctorate degrees in a relevant subject of particular value to the industry.

Satake also offers specific small class or one-on-one job expert training in areas directly related to daily operations, such as mill optimization. One of Satake's experienced technicians will work alongside the candidate and offer practical hands-on guidance in their chosen subject. These type of courses will take from one day to a week.

The most recent updates have been the latest version of the single kernel characterization system (SKCS), which enables students to understand the various relationships between kernel hardness and milling characteristics. Satake also has invested in more fermentation facilities that enable students to appreciate some of the competing non-food demand for cereals.

Satake Europe Ltd. has invested heavily in the fully functioning pilot plant for

cereal processing. The facility is being used as a model by other research and education facilities in Europe.

NABIM

Since its formation in 1878, the National Association of British and Irish Millers (nabim) said it has been committed to the development of skilled millers and has placed a high priority on milling training. For more than 100 years, nabim said it has been at the forefront of technical education in flour milling, first within the U.K. and Ireland, and since the mid-20th century, across the world.

nabim's most well-known training opportunity is the distance learning program, delivered annually for around 80 years. The current session has nearly 750 participants with one-third of students based in Europe and the rest coming from countries across the world including Nigeria, Ghana, Egypt, Sudan, Tanzania, Malawi, Kenya, Zambia, Lesotho, South Africa, Namibia, the United Arab Emirates, Japan, Malaysia, Indonesia, Vietnam, Australia, New Zealand, Fiji, Canada and the West Indies.

The distance learning course, which runs from September to May, is divided into seven modules and provides a complete overview of flour milling. Each module is subject to rolling review, so a new edition of each module textbook is issued roughly every five years. This material is supplemented by additional information circulated with the year's lessons.

The first module covers health and safety, including risk assessment and the

prevention of fire and dust explosions, and hygiene, with an introduction to pests and prevention of infestation. Module two looks at wheat's structure, growth and production, intake, cleaning and preparation in the screenroom. The third module addresses the modern flour milling operation, its machinery and processes and the importance of achieving mill balance and improving mill performance.

Module four looks at various aspects of product handling, storage and distribution, flour blending, packing, warehousing, loading and infestation control. Flour itself is the subject of module five, discussing functionality and types of flour commonly milled, flour treatments, quality measurement and control, laboratory tests and flour uses.

Power and automation is the focus of module six, covering a range of topics from mechanical and pneumatic conveying to instrumentation and process control. In the seventh and final module, mill management is addressed, including a background to the global flour milling industry and market, commercial and operations management, and the miller's responsibility to protect the product, environment and people.

For each module, students are allocated one tutor, an expert in their field, who will provide guidance and advice on the coursework. Assessment is by written examination at the end of the course year. When students have successfully completed all seven modules, they are awarded nabim's Advanced Certificate in Flour Milling. See the nabim website (www.nabim.org.uk) for further details, including course fees.

nabim is continuously seeking new ways to improve its training provision. It is currently working on a pilot project to develop online training material on the workings of the first break roller mill and plansifter, using video, animation, demonstration and commentary.

In partnership with the Bühler Training Centre in Switzerland and Campden BRI, nabim developed the Advanced Milling Diploma program in 2006. It is offered every three years and is aimed at developing the future operations man-



The primary focus for the Satake Centre for Grain Process Engineering is providing education, training and research at the highest academic level. Photo courtesy of Satake.

agement of the milling industry. nabim will be taking applications for the next course in early 2012.

The course is restricted to 10 participants and involves two residential weeks at Chipping Campden and Uz-wil, studying the first two units of three, technical and production. The program gives participants the necessary fundamental understanding of functionality, which aids in the practical milling week at Bühler and in the third unit. In the final unit, participants initiate their own research project and produce a report which is independently assessed. The course takes approximately 18 months.

Participants will be chosen based on experience, qualifications, ability and potential.

nabim also offers proficiency qualifications in milling which test practical competence as well as underpinning knowledge and understanding. The units conform with the U.K.'s national qualification and credit framework.

IAOM

The International Association of Operative Millers (IAOM) has completely revised its Correspondence Course in Flour Milling. The course is used by milling professionals around the world to broaden their knowledge of the technology and management of grain milling. For decades, companies have used the IAOM Correspondence Course to better equip apprentice to senior-level employees of the total cross-section within the plant.

The course, completely revised and rewritten by industry veterans and IAOM members, has been reorganized into eight units. It encompasses all aspects of flour milling from wheat cleaning, basic milling principles, storage and grain handling to milled-grain product additives, plant management and mill mechanics. One unit is dedicated to an overview of how to mill grains other than wheat.

Units 1-6 have been grouped together as an operations set. The complete set will also cover management topics and issues.

Students must pass a test at the conclusion of each lesson. The testing op-

tion is available online or by hard copy. A certificate is issued on the successful completion of each unit, with a diploma issued to the student upon the successful completion of all eight units. The course is currently offered in English. Preparations are under way for the course to be offered in several languages, including Spanish, Arabic and Farsi.

IAOM said it is bringing back its popular Mill Maintenance II course this fall with tentative dates of Oct. 17-19, in Wichita, Kansas, U.S. The agenda will include site visits as well as demonstrations and presentations in a classroom setting.

In cooperation with Kansas State University, IAOM will offer four weeklong resident milling courses in 2012. Courses

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include: IAOM-KSU Intro to Flour Milling, Jan. 23-27; IAOM-KSU Managing Mill Performance, Jan. 30-Feb. 3; IAOM-KSU Mill Processes I; June 4-8; IAOM-KSU Mill Processes II, June 11-15.

IAOM is considering having pre-conference workshops at some of the international district meetings this fall. More information on IAOM programs is available at its website: www.iaom.info.

NCI

Located on the campus of North Dakota State University in Fargo, North Dakota, U.S., the Northern Crops Institute (NCI) supports the promotion and market development of crops grown in the four-state region of North Dakota, Minnesota, Montana and South Dakota. Its international meeting and learning center brings together customers, commodity traders, technical experts and processors.

NCI said it specializes in programs that focus on baking, pasta processing, extrusion technology, milling technology, risk management and feed manufacturing. Along with its regular courses, programs are developed to address new trends in the food and feed industries.

Some programs are requested by U.S. market promotion organizations such as the U.S. Grains Council, U.S. Wheat Associations, U.S. Soybean Export Council and the U.S.A. Dry Pea and Lentil Council. Some recent specialty courses have included: dried distiller's grains as a feed ingredient; developing a HACCP plan; and use and quality of peas and lentils.

NCI said HACCP and food/feed safety have become big issues with more discussion on traceability. Extreme volatility in prices also is of concern with the industry, NCI said, with companies asking for help in managing risks. NCI also said companies are dealing with a shortage of experienced millers, and are finding it difficult to replace retiring personnel.

Customized courses for individual companies are increasing, NCI said. The courses are confidential and provide an arena where participants can openly discuss issues facing their company.

NCI believes strongly in hands-on education, stressing the importance of participants seeing where their ingredients come from, how the grain moves from the farm to the market, and visiting with the producers and grain handlers. When producers meet with people from the course and trade teams, a relationship forms that often continues for years, NCI said.

The leading course is "Grain Procurement Management for Importers," which has been offered since 1983. It averages about 30 participants from 10 to 18 countries. NCI said its pasta manufacturing courses are unique and showcase the high quality durum that is grown in the northern U.S. region. The courses focus on the manufacture of traditional Italian-style pasta.

Recently, NCI converted its durum mill to a dual-purpose mill for milling durum and bread wheat flours. In addition to milling courses, the new mill is used by companies to evaluate milling and flour characteristics.

NCI has seen an increase in product development, where a company comes to NCI with a product it would like to investigate. The company can use NCI's equipment and staff assistance to process and evaluate a product. NCI's pilot-scale equipment allows the company to test ingredients or processes without shutting down their whole commercial line.

For the remainder of 2011, NCI is offering Wheat and Flour Quality for Breeding Programs, Oct. 4-7, and Understanding Northern Feed Ingredients, Oct. 25-27. More information and registration forms are available on NCI's website (www.northern-crops.com).

CIGI

The Canadian International Grains Institute (CIGI), Winnipeg, Manitoba, Canada, provides customized educational programs and technical expertise. Since 1972, more than 34,000 people from the grain, oilseed, pulse and special crop industries from 115 countries have participated in CIGI programs and seminars.

Funding is provided by Agriculture and Agri-Food Canada and the Cana-

dian Wheat Board (CWB). Additional funding and support is provided by other sectors of the agriculture industry.

CIGI typically provides more than 50 programs annually which are custom-designed to meet the needs of industry whether that's on field crops (wheat, pulses, barley, etc.), end uses (flour, pasta, noodles and more) or specific subjects (food safety, environmental and trade issues). Courses are offered at CIGI or off-site, and in the language of the customer.

Programs are sponsored by the CWB, government organizations and agencies, grain industry partners, seed development companies and agricultural commodity groups. CIGI also offers open enrollment courses and customized training on a fee-for-service basis.

Open enrollment courses include the following technical courses (course materials and presentations can be customized based on the registrants' interest and background):

- **Wheat Milling Technical Short Course:** Delivered by CIGI's milling staff with a combined 80-plus years of experience, this two-and-one-half day course provides a comprehensive basic education in the key aspects of flour milling technology. Through classroom presentations and practical demonstrations in CIGI's pilot flour mill, participants learn about raw materials, processes, equipment and new developments in the industry. The course also provides short demonstrations in the baking, pasta making, Asian products (noodles, steam breads and dumplings) and analytical services laboratory. This course is ideally suited for newer or junior flour milling personnel involved in milling, lab services, product development, technical services. It will also benefit anyone who requires a greater understanding of the flour milling process such as marketing and sales group of various grain handling companies.

- **Milling Apprenticeship Program:** CIGI also offers an in-depth two-week apprenticeship program targeted to wheat milling production staff with sufficient experience (typically three to five years) who have gained a good understanding of



Esey Assefaw (foreground), head of CIGI's Asian Products and Extrusion Technology program, leads a technical session for participants attending CIGI's Asian Noodle Technology Short Course. Photo courtesy of CIGI.

flour milling operating principles and related topics. Course prerequisites include successful completion of modules 1, 2, 3 and 4 of the nabim Flour Milling Industry Correspondence Course or equivalent courses of study offered by IAOM.

- **Asian Noodle Technology Short Course:** This course is designed for technical personnel in flour milling, quality control and assurance, new product development and research, as well as noodle manufacturers who require fundamental and practical knowledge of Asian noodle processing technology and flour quality requirements. Presentations and hands-on practical sessions cover noodle classifications, raw materials for noodle processing, and wheat and flour quality requirements while practical sessions focus on noodle processing and quality evaluation, milling of wheat for wheat noodle products and testing of flour quality. Special discussions can also be arranged to address specific participant needs.

In response to a request for in-depth milling training, CIGI will be providing a six-month comprehensive milling training program to a group of millers from overseas beginning in August 2011 on a fee-for-service basis.

CIGI has seen an increase in the types of customized, fee-for-service training it

offers in response to requests from multinational companies. This training is done on a confidential basis to address the specific needs of these organizations. CIGI expects that there will be opportunities to further expand these types of training and research activities in the future.

CIGI said there are three elements to its programming that distinguish it from other course offerings. CIGI's currency of knowledge has been and continues to be developed through its contact with 35,000 program alumni from 115 countries, nearly 2,000 annual program participants and over 800 inquiries for assistance each year.

CIGI staff also undertake practical, investigative research and travel extensively on marketing missions focused on Canadian field crops to better understand the processing and end-product requirements of customers worldwide. CIGI said it is unique in its ability to offer this level of knowledge and expertise to course participants together with access to state-of-the-art facilities housed under one roof.

CIGI's technical facilities provide access to a wide variety of processing equipment in one location including a pilot flour mill, pilot bakery, test bakery, pilot Asian products and extrusion facility, pilot pasta plant, pulse processing facility, and analytical services and food

quality testing laboratories. Depending on their needs and interests, course participants have the opportunity to spend time in each of these areas during demonstrations and hands-on practical sessions, all within the same building.

Over the past year, CIGI completed a \$1.1 million equipment upgrade funded by Western Economic Diversification, the CWB, Saskatchewan Pulse Growers and CIGI. The equipment expands CIGI's ability to develop new products using Canadian field crops and demonstrate their commercial aspects to the domestic and international industry.

Specific equipment purchased includes:

- A new reel oven in the pilot bakery with features such as steam injection for the production of thin crust products and stone inserts that can be used to simulate hearth baking.

- A rack oven common in small-to medium-sized bakeries to produce a wide range of products, from cakes, cookies and pastries to breads and rolls.

- In the pilot mill, a new milling control system has been installed (Bühler WinCos.r2). This powerful system can monitor and control the mill's entire operation from roll gap adjustments to flour yield calculations based within the plant control system instead of having an additional standalone PC for these functions

- A lab-scale durum mill and a pilot-scale variable speed stone grinder that can mill whole grain flour in one pass from pulses, barley, wheat and other crops. Both of these additions build on CIGI's ability to evaluate, optimize and demonstrate the use of different flours for different end uses.

- New lab-scale air classifier used for separating flour fractions based on their size and a lab-scale mastersizer for analysis of the distribution of various particle sizes in a specific flour sample. Both pieces of equipment will be used to develop a better understanding of the impact of the size and concentration of pulse flour fractions in food product formulations. **WG**

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