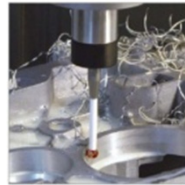




Sectorial Workshop

Standards Supporting Energy Efficiency in Manufacturing Processes



SOMMACT

Self-Optimising Measuring MACHine Tools

www.sommacct.eu

The SOMMACT project case

Renato OTTONE

ALESAMONTI's
Research and Development director

SOMMACT Project Technical Coordinator

r.ottone@alesamonti.com



Project identification:

SOMMACT Self Optimising Measuring MACHine Tools

Grant Agreement no.: **CP-FP 229112-2**

Start Date: 2009-09-01

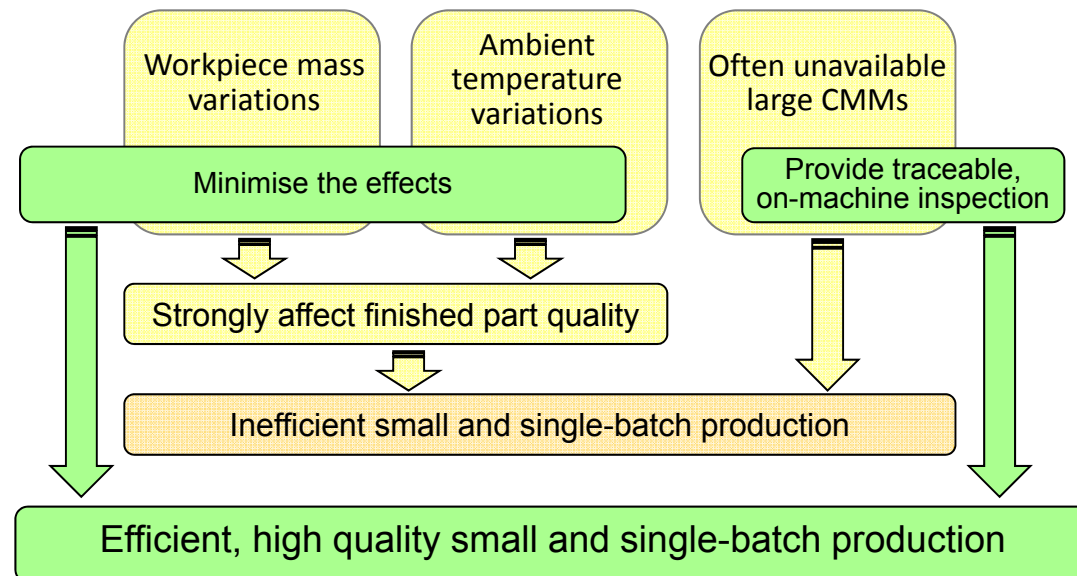
Duration: 36 months → **Closing on 2012-08-31**

The problems to be solved:

On **large machine tools** (some metres), to efficiently perform small and single batch production, some main problems are identified:

We will:

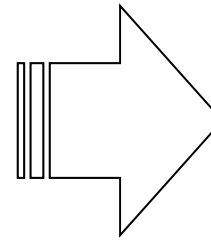
- Reduce the effects of mass variation and ambient temperature variation on the workpiece geometric accuracy.
- Provide facilities to efficiently perform **traceable measurements**, directly on the machine tool itself.





Project objectives:

- 100% improvement of product quality
- 20-30% reduction of total manufacturing time for small and single batch production
- 15-20% increase of machine availability
- Strong drive toward “zero defects” target
- 70% reduction of workpiece moving phases
- 15-20% increase in acceptable operating temperature conditions



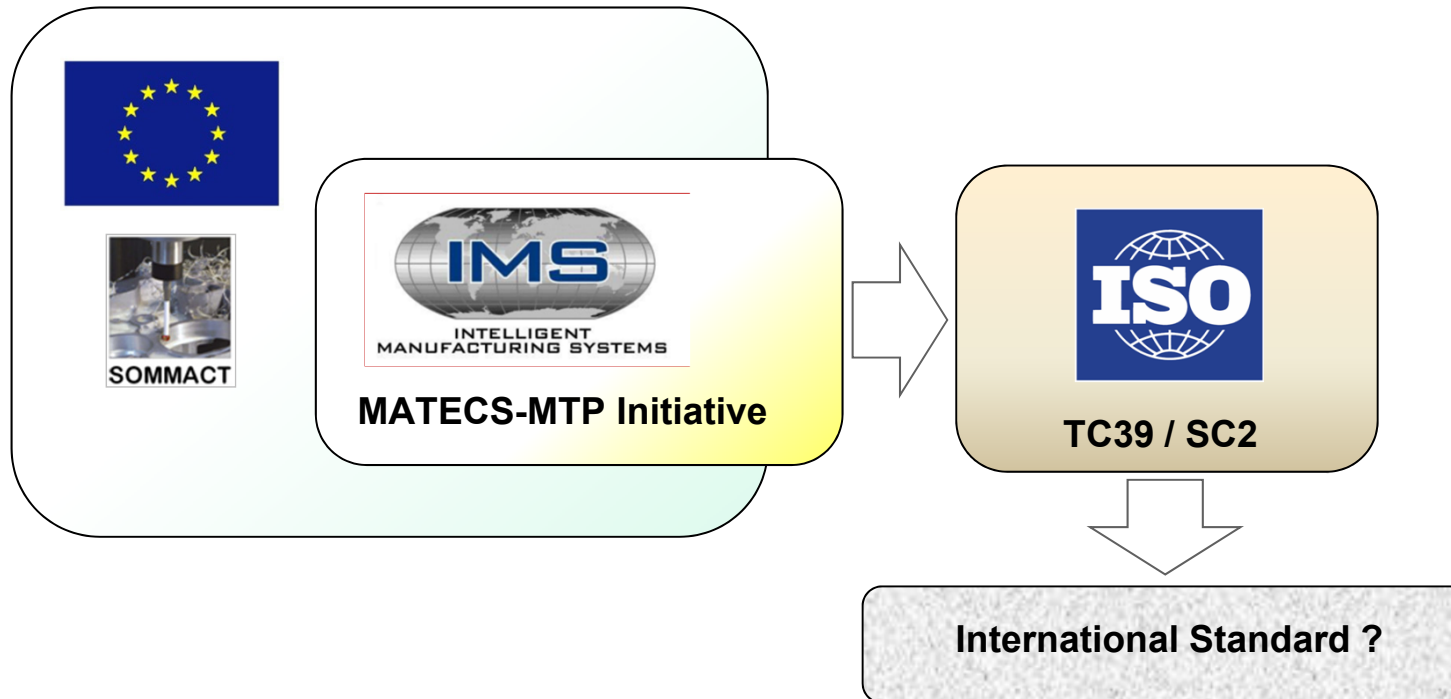
Energy Efficiency
in
Metal Cutting
Processes

The most stupid things we could do in manufacturing
(and we actually keep on doing)
are to **waste energy performing unnecessary operations**
and producing scrap!



Framework for standardisation activities

- The call itself was specifically considering standardisation activities
- and was requiring interaction with IMS — Intelligent Manufacturing Systems,
- we therefore decided to follow a well-defined path:





Why ISO?

Some very favourable conditions in SOMMACT

- All International Standards related to expected SOMMACT outcomes are **developed within the same organisation.**
- Machine tool related standards are developed within a single ISO Technical Subcommittee.
- Some SOMMACT partners have good experience in International Standard development, **other have been “summoned” to become qualified as experts from their National Standard bodies.**
- I personally coordinate the working group that is the Italian mirror to ISO TC39/SC2 within UNI, the Italian Standard body.

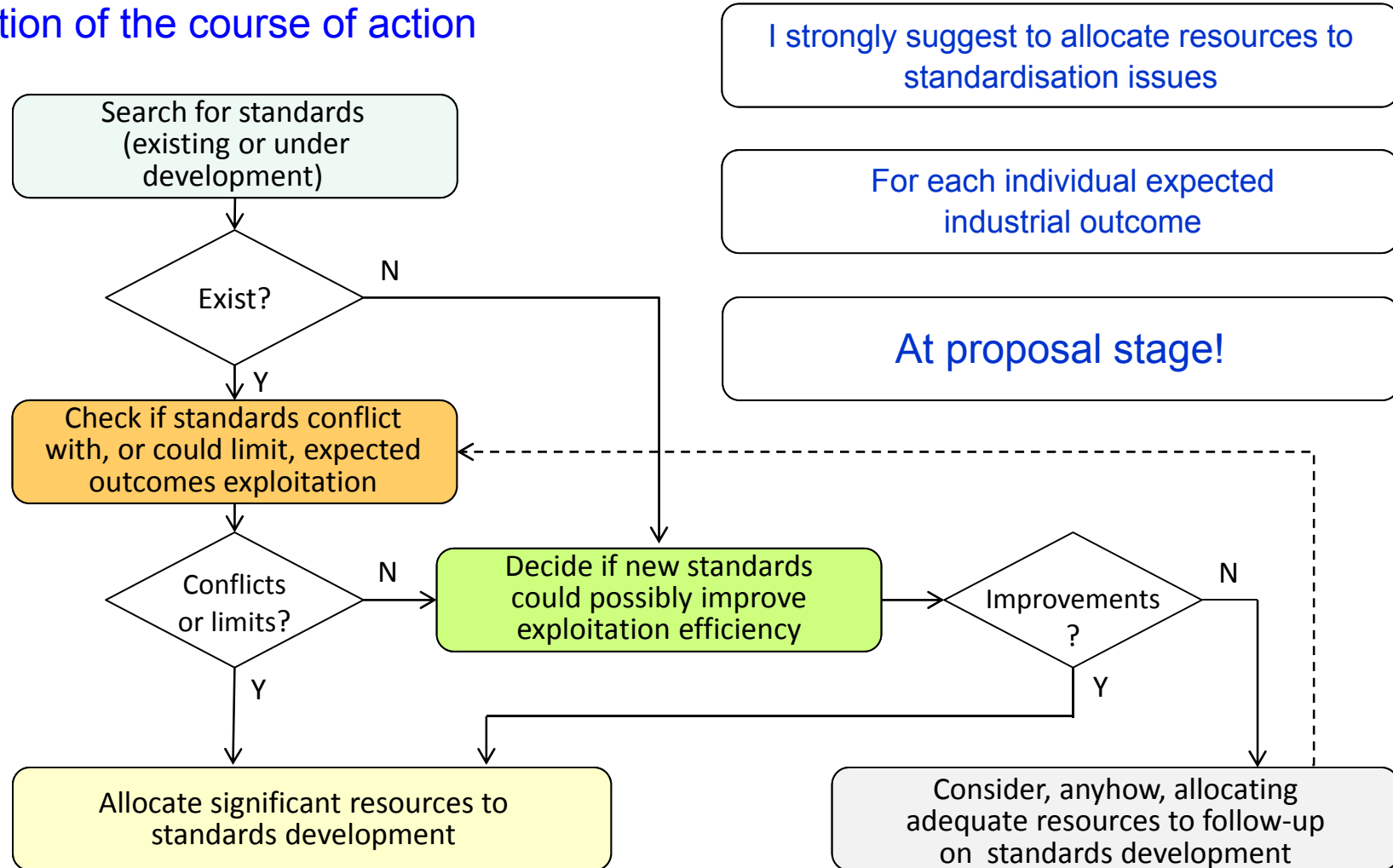


TC39/SC2





Definition of the course of action





SOMMACT case N.1

Decide if new standards could possibly improve exploitation efficiency

Effective exploitation of traceable on-machine inspection (one of the major SOMMACT objectives) would require an International Standard for the determination of relevant measuring performances.

May 2007

I became the Project Leader for the development of ISO 230-10, *Test code for machine tools — Part 10: Determination of the measuring performance of probing systems of numerically controlled machine tools.*

I learned a lot from the cooperation with “best-in-class” researchers within ISO TC39/SC2 and with application engineers from major probing systems vendors.

This is **NOT** a “side effect”. It significantly improved the quality of project results.

2011

The first edition of ISO 230-10 was published on 2011-05-15 and it is being applied on SOMMACT project demonstrator.



SOMMACT case N.2

Decide if new standards could possibly improve exploitation efficiency

Compensation of machine tool geometric errors is becoming very important as some relevant industrial sectors (e.g.: aerospace) already started requiring stringent tolerances for machine tool volumetric accuracy.

The subject is very complex and the market needs technical information on main aspects to be considered.

The availability of a Technical Report would significantly improve the chances to quickly exploit SOMMACT project results and help to effectively convert them into competitive advantages.

Development route starting point

An outline of the proposed document was informally presented on **2010-04-15** at the ISO TC39/SC2 70th Meeting held in Seoul (KR). Delegates considered a document on numerical compensation of machine tool geometric errors would properly complement existing standards and suggested it should be a **Technical Report**.



SOMMACT case N.2

Example of development route

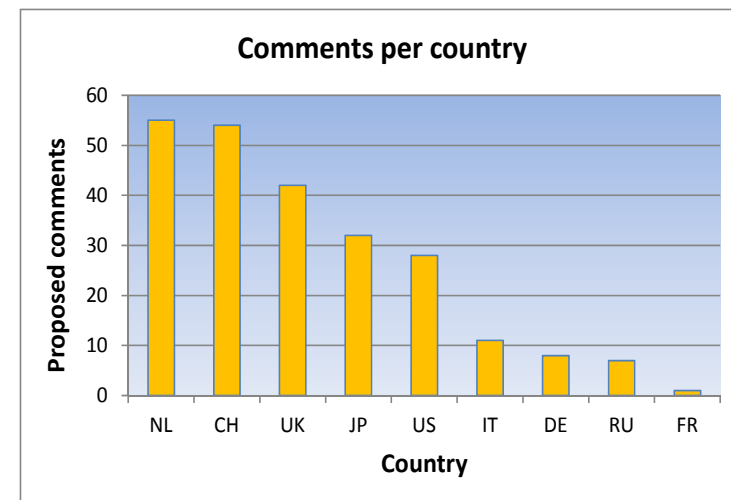
2010-07-18 — The outline of the proposed document was formally submitted for electronic ballot within UNI's *Commissione Tecnica U97 — Macchine utensili* for approval of the NWIP submission to ISO. The proposal was approved on 2010-11-30 and transmitted by UNI to ISO TC39/SC2.

2010-12-03 — ISO TC39/SC2 Secretariat published the NWIP for electronic ballot.

2011-02-28 — All 16 Member Bodies casting a vote approved ISO/NP TR 16907, *Machine tools — Numerical compensation of geometric errors* and eight national member bodies nominated experts that will actively participate to the development work. I have been designated as co-project leader.

2010-04-30—The preliminary draft of ISO/NP TR 16907 was submitted and then discussed at **2011-05-16/20** TC39/SC2 71st Meeting — Zurich (CH). Comments were appreciated and it was decided that a new draft will be proposed by end of November 2011 for discussion during 2012 spring meeting.

2012-05-14/18 — At the TC39/SC2 meeting — Hangzhou, CN the (**outstanding**) 238 received comments were thoroughly discussed. The document will move to Committee Draft (CD) status.





SOMMACT case N.3

Check if standards conflict with, or could limit, expected outcomes exploitation

Compensation of machine tool geometric errors is indispensable for the exploitation of virtually all SOMMACT project exploitable results.

The application field

SOMMACT project preferred application focuses on relatively large machine tools, like horizontal spindle milling/boring machine tools: [ALESAMONTI's core business](#).

Testing of geometric accuracy of such machines is specified in ISO 3070 (all parts), *Machine tools — Test conditions for testing the accuracy of boring and milling machines with horizontal spindle*.



Test procedures specified in current edition of such standards contain instructions like:
“... lock axes that are not under test.”

The application of this instruction would generate **catastrophic effects** as **numerical compensation would not work** on axes that are locked!

The solution

During last ISO TC39/SC2 72nd meeting (Berlin, 2011-10-10/15) we convinced delegates that ISO 3070 (all parts) shall undergo revision.

[The Project Leader is now Dr. G. MALAGOLA](#) (from ALESAMONTI)



The following considerations apply:

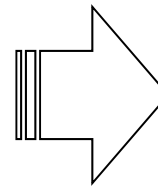
When setting up to organise your thoughts on dedicating resources to research with **expected industrial outcomes** you have to seriously **consider standardisation issues** at a **very early stage**

Search for standards
(existing or under development)

Check for conflict with, or limit to,
possible outcomes exploitation

New standards could possibly
improve exploitation efficiency

Recourses to be committed to
standardisation are significant and
shall be budgeted



Some relevant costs will need
to be sustained even after
project termination

Expected benefits may be more significant!



SOMMACT project is a “lucky case”!

- Standardisation issues were addressed in the call itself and were considered at proposal stage.
- Some SOMMACT project partners could significantly benefit from previous experience on standardisation issues.
- Through the EC supported IMS MATECS-MTP initiative, (<http://www.ims.org/2011/11/matecs-standardisation-of-machine-tool-error-functions-representation-and-compensation/>) we could enjoy the benefits deriving from cooperation from other IMS Regions.
- We succeeded in extending SOMMACT project results to the EC co-financed IFaCOM project (Intelligent Fault Correction and self-Optimizing Manufacturing systems, [www. ifacom.org](http://www.ifacom.org)) thus being able to allocate resources for costs related to standardization activities that will occur after SOMMACT project termination.

Other projects might not be so “lucky”!



Problems related to costs associated to Standardization activities:

1. Costs related to standardisation activities are typically associated to Dissemination and Exploitation (Other).
2. These costs may be very significant.
3. At proposal stage, proposers might tend to limit them on the (probably wrong) assumption that examiners would apply some “unwritten rules?” that would disqualify proposals allocating (excessive?) resources to “Others”.
4. Cost related to standardisation activities tend to extend beyond relevant projects termination.

Possible solutions?

- Additional clarifications could be included in the “Rules for Proposals Evaluation” in order to minimise both the likelihood and the impact of problems listed in items 1., 2., and 3. above.
- Consideration could be made on the possibility to provide co-financing support for costs related to standardization activities that will occur after the relevant projects termination.



Thank you for your attention!

Renato OTTONE

r.ottone@alesamonti.com